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The Forgotten Parent: Exploring Paternal Influences on Young Children's Eating Behaviors, Diet Quality, Physical Activity, and Body Weight

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The Forgotten Parent: Exploring Paternal Influences on Young Children's Eating Behaviors, Diet Quality, Physical Activity, and Body Weight

Rachel Lynn Vollmer, PhD

University of Connecticut, 2014

Very little is known about paternal influences on childhood obesogenic related behaviors. The primary objectives of this study were to 1) Identify the relationship of paternal feeding practices and feeding style on child eating behavior, diet quality, and weight status, 2) Evaluate the relationship between paternal and child diet quality, physical activity, and weight status, and 3) Evaluate the influence of father reported maternal and paternal perceptions of the role of the father on child feeding practices. This study included a one-time, one-on-one interview with biological fathers of preschoolers (n=150) to assess feeding practices, feeding style, child eating behaviors, diet quality, physical activity behaviors, a father's perception of the role of the father, and his perception of his partner's view of the role of the father. Height and weight of each father-child dyad was also measured. Linear regression was used to test relationships in each objective. Findings revealed that paternal feeding practices and style is not associated with a child's diet quality or weight status, but child eating behaviors are associated with child BMI z-score, and these relationships are moderated by paternal feeding practices. For example, child satiety responsiveness is inversely ($\beta = -.421$, $p = 0.031$) associated with child BMI z-score, only if paternal restriction scores are high, which is not significant when paternal restriction scores are low ($\beta = -.200$, $p = 0.448$). There were significant, positive relationships between father-child weight status ($\beta = .03$, $p = 0.055$), overall diet quality ($\beta = .39$, $p < 0.0001$), and weekday ($\beta = .27$, $p = 0.002$) and weekend ($\beta = .62$, $p = 0.001$) vigorous physical activity. A father's perception of his role at mealtime was associated with higher responsibility for child feeding ($\beta = .033$, $p = 0.020$) and lower use of pressure to eat ($\beta = -.048$, $p = 0.029$) and restrictive feeding practices ($\beta = -.030$,

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$p=0.05$), indicating that a father's perception of his role may influence his child feeding practices. Overall, this study suggests that some child appetitive traits may predict child weight status when exposed to certain paternal feeding practices. Future child obesity prevention programs should consider the role of a father in addition to a mother.

The Forgotten Parent: Exploring Paternal Influences on Young Children's Eating Behaviors,
Diet Quality, Physical Activity, and Body Weight

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B.S., Bradley University, [2007]

M.S., Eastern Illinois University [2009]

A Dissertation

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[2014]

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[2014]

APPROVAL PAGE

Doctor of Philosophy Dissertation

The Forgotten Parent: Exploring Paternal Influences on Young Children's Eating Behaviors,
Diet Quality, Physical Activity, and Body Weight

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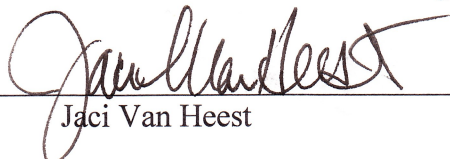
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Chapter I: Introduction

Background and significance

Similar to adult rates, the prevalence of overweight and obesity among children has also dramatically increased in the past three decades (Fryar, Carroll, & Ogden, 2012). Currently, it is estimated that approximately 14 percent of U.S. preschool age children are overweight (C. L. Ogden, Carroll, Kit, & Flegal, 2014). Early prevention is essential and, a prime opportunity to intervene exists during preschool years. While children's eating is deprivation driven initially, by the time children reach 3 years of age, their eating is environmentally driven, often in response to parental cues (R. Klesges, Stein, Eck, Isbell, & Klesges, 1991). A longitudinal investigation found that weight status of children between the ages of 2 and 6 years old was the most robust predictor of adult overweight (De Kroon, Renders, Van Wouwe, Van Buuren, & Hirasing, 2010). Furthermore, children who were overweight between the ages of 2 and 4 years were five times more likely to be overweight at age 12 years compared to those who were not overweight (De Kroon et al., 2010).

Due to these alarming rates of childhood overweight and obesity, much research has focused on the school age child, however, recent reviews suggest that these interventions targeting food intake, physical activity, and weight status on school age children have a small impact (Luttikhuis et al., 2009); (Summerbell et al., 2005). Focusing on a child's individual eating and activity behaviors once they are of school age may be too late to make significant long-term changes and thus, prevention efforts should be targeted towards preschool age children and younger (Dattilo et al., 2012). Furthermore, the parent of a young child is a key player in their child's weight status due to genetic influences on weight as well as the food environment they provide and the feeding process they employ with the child (Birch, LL. & Anzman, SL.,

2010); (Stang, J. & Loth, KA., 2011); (Wake, Nicholson, Hardy, & Smith, 2007). However, most of the research surrounding modifiable factors, such as diet, physical activity, and feeding practices, associated with child obesity has been one-sided, often ignoring the father or not including child eating behaviors (Golley, Magarey, Baur, Steinbeck, & Daniels, 2007).

While it is true that women still have primary responsibility for feeding children (U.S. Department of Agriculture, 2000), women's employment patterns have changed in that they have less time to devote to feeding their young children (Savage, Fisher, & Birch, 2007), thus fathers may be more involved in child feeding than they have previously. Furthermore, recent studies have provided evidence that the influence a father has on a child's weight is possibly stronger than the influence of a mother (Freeman et al., 2012; Taylor, Wilson, Slater, & Mohr, 2011; Wake et al., 2007). This suggests that a father provides distinctive influence over a child's weight status. Thus, only examining the influence of feeding practices and styles of mothers provides an incomplete picture. Therefore, the overall purpose of this research is to provide insight into the paternal influences on child eating behaviors, diet quality, physical activity, and weight. In the long term, the results of this research may help develop effective childhood obesity prevention programs and, specifically, inclusion of the father. This research will help identify which behaviors of fathers should be targeted to change a child's diet or physical activity.

Research Objectives

Overall Research Aim: Provide insight into the paternal influences on child eating behaviors, diet quality, physical activity, and weight.

Study #1 (Chapter III): Identify the relationship of paternal feeding practices and feeding styles on child eating behavior, diet quality, and weight status (testing in several parts, not simultaneously).

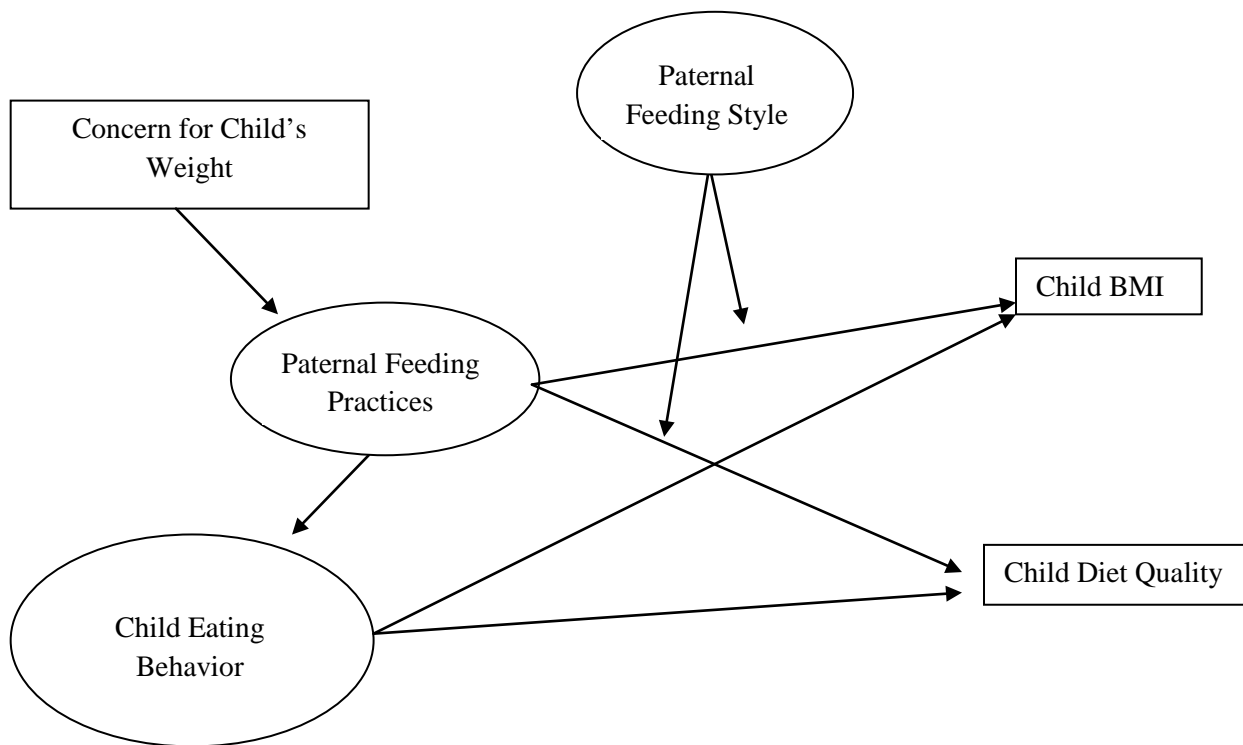


Figure 1.1. Proposed model for Study 1

Study #2 Aim (Chapter IV): Evaluate the relationship between paternal diet quality, physical activity, and weight status on the diet quality, physical activity, and weight status in preschool age children.

Study #3 Aim (Chapter V): Evaluate the influence of father reported maternal and paternal perceptions of the role of the father in the family or at mealtimes on child feeding practices.

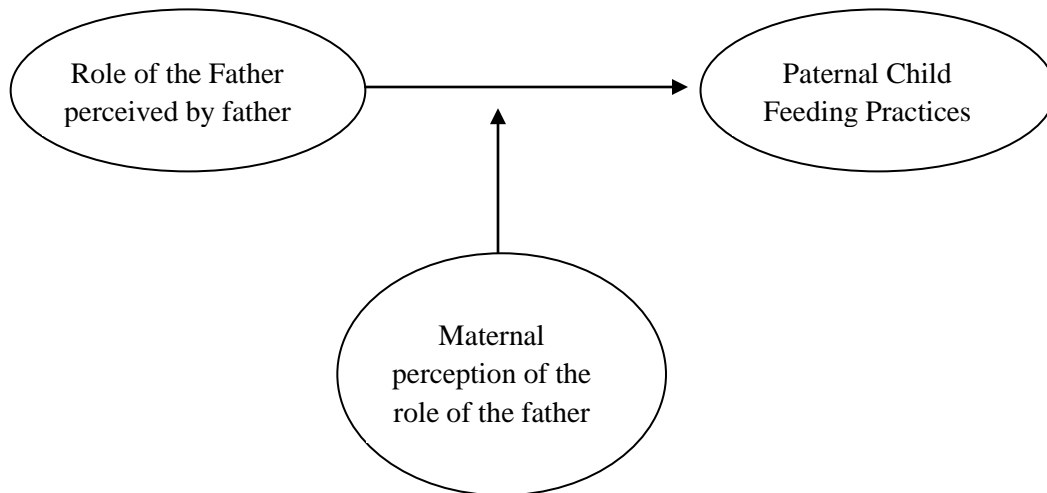


Figure 1.3. Proposed model for Study 3

Chapter II: Literature Review

Current Prevalence and Trends

Child overweight and obesity is a serious health concern in the U.S. In the simplest terms, child overweight is defined as excess body weight, while obesity is defined as excess body fat (Tyler & Fullerton, 2008). Estimates of childhood obesity are based on body mass index [BMI] measurements. BMI is a ratio of weight to height and there are normative values for children based on age and gender (Tyler & Fullerton, 2008). Although BMI and body fat are highly correlated, it is not an exact measure of body fat (Freedman et al., 2005). Child obesity does not have a standard definition, and often researchers define obesity inconsistently (Tyler & Fullerton, 2008). Because there is not a clear definition, BMI percentile cut-offs (BMI-for-age) are most frequently used for interpretation of weight status in children. The American Medical Association [AMA] has proposed more recently that child obesity should be defined by a BMI – for-age percentile at 95 or higher and a BMI-for-age percentile between 85 and 95 should be used to define overweight (Childhood Obesity Action Network, 2007).

As stated above, although BMI and body fat are correlated, they are not interchangeable (Freedman et al., 2005). This is an important point, considering Mexican American and non-Hispanic, white children have significantly higher levels of body fat than non-Hispanic black children at the same BMI level (Flegal et al., 2010). Another measurement used in obesity literature, is the BMI *z*-score. This is a standardized measure, because it statistically accounts for different ages and gender of children (Tyler & Fullerton, 2008). As stated above, BMI is a not a direct measurement of adiposity, however, measuring excess adiposity in children is very difficult as they are constantly growing. While difficult to assess, excess adiposity in children can be measured using Dual-Energy X-ray absorptiometry [DXA], bioelectrical impedance analysis (BIA), triceps skin fold thickness, or waist circumference (Tyler & Fullerton, 2008).

Although each of these provide measures of excess adiposity, they often are not practical, with some requiring specialized equipment and without standard reference value for interpretation.

The prevalence of childhood obesity has tripled in the past 3 decades with current estimates of 17% obesity among children aged 2 to 19 years old (C. L. Ogden et al., 2014; C. L. Ogden, Carroll, Kit, & Flegal, 2012). As children age, the prevalence of obesity increases. Currently, 8.4% of children ages 2 through 5 years, 17.7% of children ages 6 through 11 years, and 20.5% of adolescents ages 12-19 years are classified as obese in the U.S. (C. L. Ogden et al., 2014). The prevalence of childhood obesity is exacerbated in minority racial and ethnic groups as well as in children of low socioeconomic status [SES] (C. L. Ogden et al., 2014). Specifically, the prevalence of obesity is much higher in non-Hispanic black and Hispanic children compared to non-Hispanic white children and prevalence is also higher among low SES children compared to higher income counterparts (C. L. Ogden et al., 2014). Although there has been a decrease in obesity prevalence among preschool aged children, obesity prevalence still remains high and further work is needed in obesity prevention (C. L. Ogden et al., 2014).

Obesity not only increases the risk for chronic diseases, it also increases health care costs which impacts the entire population (Wang & Dietz, 2002). To curb this epidemic, many researchers have turned their focus from adults to children and adolescents because it is believed that their behavior may be somewhat easier to change earlier in life (Doak, Visscher, Renders, & Seidell, 2006). Furthermore, prevention of childhood obesity, not treatment, would be the key to preventing further prevalence of obesity and prevent the onset of obesity in adulthood (Doak et al., 2006). Due to the rapid rise in childhood obesity prevalence in recent decades, many researchers have been attempting to design an effective prevention method or program that has the potential to curb the epidemic.

Current State of Obesity Prevention

Prevention of childhood obesity is preferential to treatment due to the health consequences and costs associated with obesity (Doak et al., 2006). Although genetics plays a role in obesity, prevention efforts are often focused on changing individual behaviors (Hoelscher, Kirk, Ritchie, & Cunningham-Sabo, 2013). A broader target of prevention efforts focus on socio-ecological contexts such as public policy changes to the National School Lunch Program or marketing strategies (Steele, Nelson, & Jelaliah, 2008). Given the scope and depth of the literature surrounding child obesity prevention, in this literature review, the focus will be related to individual and interpersonal levels including the child and family.

Most childhood obesity prevention efforts have focused on school aged children (6-11 years old) in the school setting and often target individual behaviors, such as fruit and vegetable intake or physical activity. Not many of these interventions show lasting behavior changes when a longitudinal follow-up is conducted. However, this may be because prevention programs are focusing on children much too late. Many children are already overweight or obese by the time they are 5 years old (L. Birch & Ventura, 2009; Small, Anderson, & Melnyk, 2007; Ventura, AK. & Birch, LL., 2008).

Biologically, the period before adiposity rebound, which occurs by the time children are 5 to 7 years old, is a critical time for intervention (Small et al., 2007). Children who have a rapidly increasing BMI during adiposity rebound period are at a higher risk for become obese later in childhood and thus, adulthood (Small et al., 2007). Thus, the goal would be to attenuate the rapidly increasing BMI. In addition, early adiposity rebound has also been associated with increased risk of obesity development later in life (Small et al., 2007). Thus, the critical age for obesity prevention, is before the age of 5 years old (Small et al., 2007).

Theoretical Models/Approaches

In the younger cohorts, it seems that when the social cognitive theory (SCT) or the social learning theory (SLT) is used alone or used in conjunction with another theory within an intervention, it produces a significant change in at least one targeted behavior. Even though the SCT is popular within interventions for younger children, there is a question as to whether these young children, especially younger than 5 years, are mature enough for the applicability of this theory (Nixon et al., 2012). Often determinants of younger children's behaviors are decided by parents or caregivers, and not the young child, specifically relating to the environment in which the child lives (Nixon et al., 2012).

As stated above, a parent should be the agent of change in reference to childhood obesity interventions when including young children in particular. The familial approach borrows concepts from the social cognitive theory to promote behavior change, but in this approach it places responsibility on the parent or caregiver and takes the responsibility off of the child (Golan, M. & Weizman, A., 2001). Parent's cognitions and behaviors and the home and family environment are targeted for change instead (Golan, M. & Weizman, A., 2001). There are three main concepts in the familial approach: parental cognitive and behavior change, environmental change, and modeling (Golan, M. & Weizman, A., 2001). Parental cognitive and behavior change is accomplished by enhancing nutrition and parenting skills. Nutrition skills can be enhanced by increasing parental nutrition knowledge, food selection and purchasing skills, food preparation skills, management of positive meals and snacks, options for family exercise, and self-efficacy for healthy eating habits (Golan, M. & Weizman, A., 2001). Parenting skills are enhanced by teaching parents about the division of responsibility for child feeding. The division of responsibility dictates that parents provide the where, when, and what food is eaten and the

child determines how much food is eaten (Golan, M. & Weizman, A., 2001). Parenting skills are also enhanced by emphasizing parental authority, not control, effective communication and reinforcement skills, enhancing problem solving skills, and self-efficacy for parenting (Golan, M. & Weizman, A., 2001). Changes in the environment are an important component in the familial approach. The environment should support healthy habits for the entire family including positive family meals, regular mealtimes, individual portions, alternative leisure time activities, creating rules for eating, and reducing temptation for overeating (Golan, M. & Weizman, A., 2001). Another main concept in the familial approach, as borrowed from the social cognitive theory, is modeling. Parent behavior change precedes child behavior change because children learn norms and habits by modeling their parent's behavior (Golan, M. & Weizman, A., 2001). Parents are taught that in order to change their child's behavior, they must change their behavior first. This approach begins with a change in parent cognition so parents can effectively alter their own behavior and home environment (Golan, M. & Weizman, A., 2001). The change in environment is a very important component in this approach. Many individuals assume that unhealthy behaviors are a personal responsibility and not a response to the environment (Schwartz & Brownell, 2007). Education alone and change in cognition may not be strong enough to garner actual behavior change. By changing the environment, which is the parent's responsibility, children may have more success in prevailing over negative environmental stimuli (Schwartz & Brownell, 2007). Behavior change is more successful if the environment the child lives in supports those behavior changes (Schwartz & Brownell, 2007).

This familial approach is effectively illustrated in the "Healthy Dads, Healthy Kids" obesity program. In this overweight treatment program, fathers were the main target for behavior change and their non-overweight children attended a small number of the sessions with their

fathers (Morgan et al., 2011). While behavior change in children was not an objective, the researchers found that children of fathers in the intervention program significantly improved their physical activity, resting heart rate, and dietary intake (Morgan et al., 2011). By using fathers as role models and authority figures in changing the home environment, their children also adopted healthier behaviors, and thus providing commanding evidence for the familial approach particularly for fathers in prevention of childhood obesity.

Contexts/Settings

Most childhood obesity prevention programs focus on the school-age children or the adolescent, with relatively few programs tested among the preschool age population (Waters et al., 2011). Most preschool child obesity prevention programs take place in the home-, healthcare, or child care-setting. Child obesity prevention programs in child care centers or preschools have been somewhat successful in making positive changes in mealtime behaviors, diet preferences, or diet quality (Endres, Barter, Theodora, & Welch, 2003; Fitzgibbon et al., 2005; S. L. Johnson, Bellows, Beckstrom, & Anderson, 2007; Sigman-Grant et al., 2013; Williams, Strobino, Bollella, & Brotanek, 2004), and physical activity or sedentary behaviors (Binkley & Specker, 2004; B. A. Dennison, Russo, Burdick, & Jenkins, 2004; Eliakim, Nemet, Balakirski, & Epstein, 2007; Hannon & Brown, 2008; Parish, Rudisill, & Onge, 2007; Trost, Fees, & Dzewaltowski, 2008; Williams, Carter, Kibbe, & Dennison, 2009), although only a small number of programs has been successful in reducing a child's risk for obesity (Eliakim et al., 2007; Fitzgibbon et al., 2005). Most child care and/or preschool based programs focus on classroom education and not all include some form of parent engagement (Larson, Ward, Neelon, & Story, 2011). Based on previous literature, it seems that successful child care or preschool-based prevention programs engage parents, provide classroom based nutrition curriculum, modify the food service policies,

and provide children with opportunities for physical activity above and beyond what they are already getting (Larson et al., 2011).

Home-based obesity prevention programs are also popular for the preschool age child. Parents make decisions about food, meals, and opportunities for physical activities when children are not in child care or preschool (L. Birch & Ventura, 2009; Peterson & Fox, 2007), and these type of programs are promising (Harvey-Berino & Rourke, 2003). In fact, a meta-analysis found that among children 0 to 5 years of age, programs based outside of the school are more effective, perhaps because parental engagement is essential in changing behaviors or home environments for this age group of children (Waters et al., 2011). Without the home-level environmental changes, progress cannot be expected in childhood obesity prevention (W. H. Dietz, Bland, Gortmaker, & Molloy, 2002; Gittelsohn & Kumar, 2007; Livingstone, McCaffrey, & Rennie, 2006; Peterson & Fox, 2007).

Healthcare settings have also been used as a vehicle for obesity prevention programs for preschool age children, such as the doctor's office or in low-income audiences within the Women, Infants, and Children [WIC] program. Again, a small number of programs for the preschool age child have used this setting for prevention efforts, however, such programs have been successful in changing food-related and activity-related behaviors of young children and their mothers (McGarvey et al., 2004), but the effect of such programs on child obesity risk is unknown.

Barriers to Childhood Obesity Prevention Efforts

There are several challenges in the current obesity prevention literature that make it difficult to extrapolate current data to future studies. For example, some studies show moderating effects of child BMI, gender, or SES on outcomes. When applying this to program development, children of different genders or from families with varying income levels may need different interventions. In other words, interventions are not a one size fits all, even though they are usually delivered as such and may produce insignificant results (Thomas, 2006). Descriptions of theories used are often lacking so it is not known if a theory was not chosen or if it was not reported. This leads the reader to believe there were no guiding principles for intervention design or behavior changes (Thomas, 2006) making it difficult to translate to other populations or replicate findings. Even when a theory description was provided, measurement of theory constructs were missing so it is unclear which constructs of the theory were effective or mediated behavior change, thus making it difficult to use with other populations. When changes in behaviors or weight are reported, it is rare to have studies report why these behaviors changed in terms of theoretical or intervention components (Livingstone et al., 2006).

Many existing interventions only focus on one level of influence on weight status. Studies need to address both micro- and macro-level determinants of behavior and not one or the other (Thomas, 2006). It was often not reported how interventions were delivered, the program's fidelity, or the difference in participant exposure to the intervention (Thomas, 2006). In some preschool based programs, teachers are allowed freedom to adapt the program to their classrooms needs, which again, make it difficult to repeat the intervention and expect the same results. Even if a parent component was part of the intervention, it is unknown if parents were

involved and to what degree. Differences in results or lack of significant results may be due to the simple inconsistencies in program delivery or attendance and exposure (Thomas, 2006).

Aside from the methods, researchers measure outcomes in different ways making it difficult to interpret the effects of each prevention program (Livingstone et al., 2006). Even when comparing similar outcomes of prevention programs, it is rare to see long-term assessments. With only short-term changes, immediately post-intervention, it is purely impossible to examine the overall outcomes of the program (Livingstone et al., 2006).

To change a child's behaviors, changes in the home environment need to occur (L. Birch & Ventura, 2009). A child's eating and activity behaviors are often a result of the family's shared environment at home, indicating that parents also need to be targeted in childhood obesity prevention efforts (Livingstone et al., 2006). Many childcare or preschool-based programs target parents by sending materials or information home, most likely because it is simple. When parents are invited to meetings, the parents attending are most likely the parents that are more involved in extracurricular activities in the first place, which may provide a biased sample (S. Anzman, Rollins, & Birch, 2010). Getting parents to participate in prevention programs may be difficult due to time constraints, lack of understanding, or schedule conflicts. Also, many parents may not consider their child obese and thus may not feel that they need to be involved in an obesity prevention program, especially if participation is optional (S. Anzman et al., 2010).

Prevention efforts should target young children as they are learning about food and mealtime behaviors (S. Anzman et al., 2010; Nader et al., 2012; Ventura, AK. & Birch, LL., 2008). Targeting young children indicates the need to use parents as the agents of change. A child's home environment needs to be further considered for interventions in addition to just the

usual preschool or childcare intervention settings (W. H. Dietz et al., 2002; Gittelsohn & Kumar, 2007; Livingstone et al., 2006; Peterson & Fox, 2007).

Dietary Intake & Eating Behaviors

Diet Quality & Intake of U.S. Preschoolers

Diet plays a pivotal role in the development of child obesity (Swinburn, Sacks, & Ravussin, 2009), because food preferences and diet patterns are established early in life (Birch, LL. & Anzman, SL., 2010) and can serve as a key focus in child obesity prevention (Ford, Slining, & Popkin, 2013). Diets among preschoolers are often high in empty calories (Reedy & Krebs-Smith, 2010), and studies examining trends have found that preschoolers are snacking more on low-nutrient, calorie-dense foods and beverages (Piernas & Popkin, 2010). One study found that between 1977-1978 and 2003-2006, total daily calorie intake among 2 to 6 year old children increased by 160 calories (Poti & Popkin, 2011). A study by Ford and others (2013) found that specifically, from 1989 to 2008, consumption of foods high in added sugars, solid fats, and sodium increased dramatically among U.S. preschoolers. While there was a small increase in total calories from fruit, the largest increases were in savory snacks, pizza, sweets, fruit juice, and mixed Mexican dishes (Ford et al., 2013). Studies of current diets among preschoolers have found that these diets are high in saturated fat and sodium, and low in fiber (N. F. Butte et al., 2010).

The Dietary Guidelines for Americans [DGAs] serve as dietary guidance recommendations for the U.S. population aged 2 years and older and they emphasize balanced energy intake and food group intake recommendations (Mosher et al., 2014). When using DGAs as a guide to measure diet quality, it is evident that there is room for improvement among young children (Fox, Condon, Briefel, Reidy, & Deming, 2010). For example, among 3 year old

children, approximately 25 percent are still receiving whole milk instead of lower fat milk (Fox et al., 2010), and lower-income children are much more likely to be given whole milk compared to higher-income children (Cole & Fox, 2008). It is encouraging to note that more young children consume whole fruit instead of 100 percent fruit juice, and preschoolers eat more whole-grain cereal compared to non-whole grain cereal (Fox et al., 2010).

A small number of studies have used the Healthy Eating Index [HEI] to measure diet quality among preschool age children and their parents. The HEI is a composite score ranging from 0 to 100 that is used to assess overall diet quality, while controlling for quantity of food consumed (Guenther, Reedy, Krebs-Smith, & Reeve, 2008). Components of the index (adequacy score) include total fruit, total vegetables, dairy including soy beverages, and total protein including plant and seafood sources, whole fruit, dark green vegetables and beans, whole grains, oils including non-hydrogenated vegetable oils and oils in fish, nuts, and seeds. The moderation component is comprised of saturated fat, refined grains, sodium, and calories from solid fats, alcoholic beverages, and added sugars. In a large, nationally representative sample, preschoolers had an average diet quality score of 53 out of a possible 100 points (McGill, Keast, Painter, Romano, & Wightman, 2013). In a different study, preschoolers of overweight or obese mothers scored an average 68 points on the HEI-2005 (Laster et al., 2013). Although this higher score is encouraging, it is still well below the most desired score of 80 points or higher (Laster et al., 2013). Most children also did not meet recommendations for fruit, vegetables, whole grains, meat and beans, sodium, saturated, and empty calories (Laster et al., 2013).

As echoed in trend studies, a large percentage of preschool age children consume low-nutrient, calorically-dense beverages, desserts, and foods, with a staggering 82 to 89 percent of preschoolers consuming at least one of these foods each day (Fox et al., 2010). Although some of

these results are encouraging, the proportion of calories coming from foods high in calories and low in nutrients in preschoolers' diets is very concerning for obesity prevention (Fox et al., 2010).

Eating Behaviors & Appetitive Traits

There is little evidence to suggest that obese young children are binge eating and lean young children are not (M. Faith, Carnell, & Kral, 2013). The energy gap between obese and lean young children is likely very small and subtle, leading many researchers to focus on eating behaviors and appetitive traits that, overtime, lead to excess weight gain (M. Faith et al., 2013). There are four main eating behaviors that have been strongly linked to obesity in the literature: 1) eating in the absence of hunger [EAH], 2) eating rate, 3) satiety responsiveness, and 4) food responsiveness (M. Faith et al., 2013). EAH refers to a child's propensity to eat a snack, when available after the child has eaten a meal to satiation (N. F. Butte et al., 2007; J. Fisher & Birch, 1999; J. O. Fisher & Birch, 2002). Eating rate is often defined as number of calories consumed during a specified amount of time (M. Faith et al., 2013). Satiety responsiveness, or calorie compensation, refers to an individual's ability to adjust food intake depending on hunger and fullness cues { {227 Carnell 2009; 109 Carnell 2008} }. Food responsiveness is defined as the child's propensity to eat following exposure to food cues, such as sight or smell (Carnell, S. & Wardle, J., 2008; S. Carnell & Wardle, 2008).

EAH has been estimated to have heritability of 51 percent (N. F. Butte et al., 2007; J. Fisher & Birch, 1999; J. O. Fisher & Birch, 2002). EAH tests are often conducted in the laboratory setting, in which children are given an unlimited meal to eat until satiety. Following this meal, children have a choice to play or engage in other activities while snacks are made available. During this time, children are allowed free access to these foods and can consume as

much as they prefer (J. Fisher & Birch, 1999; J. O. Fisher & Birch, 2002; Fisher, J.O. & Birch, LL., 1999). These studies have provided evidence that children who eat in the absence of hunger tend to have higher BMI, BMI z -score, and higher likelihood of being overweight or obese among young children and adolescents (J. O. Fisher & Birch, 2002; Hill et al., 2008; Kral & Faith, 2009; Shomaker et al., 2010). In a prospective study, children were categorized into high-risk or low-risk for obesity groups. The boys in the high-risk group consumed two times as many calories in an EAH test compared to boys in the low-risk group (Whitaker, Wright, Pepe, Seidel, & Dietz, 1997).

Generally, faster eating is thought to be associated with higher energy intake (Kaplan, 1980), although some argue that the same amount of food can be eaten, it is just eaten in a shorter period of time (M. Faith et al., 2013). Increased adiposity has been observed in preschool settings among children who had faster eating rates (Drabman, Hammer, & Jarvie, 1977; Drabman, 1979). Interestingly, when comparing obese and non-obese brothers, it was discovered that the obese brothers had faster eating rates compared to their non-obese sibling (Waxman & Stunkard, 1980). Furthermore, not only has it been found that obese children tend to eat faster than their lean counterparts, obese children do not slow their eating rate towards the end of a meal (Laessle, Uhl, Lindel, & Muller, 2001; Lindgren et al., 2000). Another study found faster eating rates among 4 year old children significantly predicted excess adiposity at age 6 years (Berkowitz et al., 2010). This eating behavior has also been estimated to be highly genetic, with estimates anywhere from 62 to 84 percent heritability (C. Llewellyn, Carnell, & Wardle, 2011; C. H. Llewellyn, van Jaarsveld, Boniface, Carnell, & Wardle, 2008; C. H. Llewellyn, van Jaarsveld, Johnson, Carnell, & Wardle, 2010; Van Jaarsveld, Johnson, Llewellyn, & Wardle, 2010).

Although, conceptually, satiety responsiveness and calorie compensation are similar constructs, they are measured very differently. Calorie compensation is measured in a lab setting by assessing how a child compensates his food intake following a high- or low-calorie preload (M. Faith et al., 2013), while satiety responsiveness is measured via the Child Eating Behavior Questionnaire [CEBQ] (Carnell, S. & Wardle, J., 2007). Studies have found that children with poor compensation tend to have higher energy intake over 24 hours (L. L. Birch & Fisher, 2000), higher weight status (Bellissimo et al., 2008), total body fat (M. S. Faith, Pietrobelli, & Hen, 2012), and adiposity (S. L. Johnson & Birch, 1994). Additionally, children with low satiety responsiveness scores tended to have higher BMIs (L. L. Birch & Fisher, 2000; Carnell, S. & Wardle, J., 2008; S. Carnell, Haworth, Plomin, & Wardle, 2008; P. W. Jansen et al., 2012; Spence, Carson, Casey, & Boule, 2011; Viana, Sinde, & Saxton, 2008; L. Webber, Hill, Saxton, Van Jaarsveld, & Wardle, 2009). The extent of this eating behavior's heritability is still unknown. One study examining the lab-based caloric compensation found no heritability (M. Faith et al., 2012), while the questionnaire-based [CEBQ] satiety responsiveness heritability was estimated to fall between 63 and 72 percent (S. Carnell et al., 2008; C. H. Llewellyn et al., 2010).

When researchers measured food responsiveness via the CEBQ, they found that higher scores on the food responsiveness subscale were associated with higher BMI *z*-scores and higher weight status (Carnell, S. & Wardle, J., 2008; Sleddens, Kremers, & Thijs, 2008). When using the Dutch Eating Behavior Questionnaire [DEBQ] to measure food responsiveness, results were inconclusive with some studies showing no association (Caccialanza et al., 2004) with weight and others suggesting positive relationship (Braet & Van Strien, 1997) or, an inverse relationship (Baños et al., 2011; Ledoux, Watson, Baranowski, Tepper, & Baranowski, 2011). These discrepancies may be explained by the differences in measurements. The CEBQ is designed to

measure normal eating, while the DEBQ is designed to measure disordered eating behaviors (M. Faith et al., 2013). Food responsiveness is believed to be a heritable trait with estimates at 59 percent for infants (C. H. Llewellyn et al., 2010) and 72 percent in preschoolers (S. Carnell et al., 2008; C. H. Llewellyn et al., 2010).

Physical Activity & Sedentary Behaviors

Many professional associations suggest that children engage in physical activity every day (American Academy of Pediatrics, 2010; American Heart Association, 2010; Dietary Guidelines Advisory Committee, 2010; National Association for Sports and Physical Education, 2010), although recommendations for different intensity levels varies from association to association. According to the National Association for Sports and Physical Education (NASPE), preschool aged children should engage in at least 2 hours of play, with 1 hour being structured physical activity, and the other hour being unstructured physical activity (National Association for Sports and Physical Education, 2010). Research has shown that the benefits of physical activity are still achieved even if this activity is broken up into smaller segments of 10 or 15 minutes at time, which may be preferable for small children with shorter attention spans (Strong et al., 2005).

Similar to eating habits, physical activity patterns are also set early in a child's life (Strong et al., 2005), however, some evidence suggests that physical activity follows a low-to-moderate trajectory from early to middle childhood (Janz, Dawson, & Mahoney, 2000; Janz, Burns, & Levy, 2005). In fact, physical activity tends to decline as children age, with the decline in girls being much more dramatic (Livingstone, Robson, Wallace, & McKinley, 2003).

There is a scant amount of research regarding physical activity and preschoolers because many assume that preschool age children engage in large amounts of physical activity (Hodges,

Smith, Tidwell, & Berry, 2013), although recent studies have suggested that the levels of moderate to vigorous physical activity among preschool children is quite low (Alhassan, Sirard, & Robinson, 2007; Dowda et al., 2009; Trost et al., 2008), thus preschool age children are not meeting the recommendations (Hodges et al., 2013). This is concerning because low levels of physical activity in the preschool age group has been associated with higher body fat (Moore, Nguyen, Rothman, Cupples, & Ellison, 1995). In contrast, higher levels of vigorous physical activity lowers the risk of overweight in young children (Metallinos-Katsaras, Freedson, Fulton, & Sherry, 2007).

The Council on Sports Medicine and Fitness, The Council on School Health and, the NASPE recommend that preschoolers avoid being sedentary for more than 1 hour at time with screen time limited to 2 hours daily (American Academy of Pediatrics, 2006; National Association for Sports and Physical Education, 2010). Three decades ago, researchers found that there was a positive relationship between TV watching time and obesity in children (W. H. Dietz Jr & Gortmaker, 1985). High levels of sedentary behavior and low levels of physical activity have additive affects on the risk for childhood obesity (K. Patrick et al., 2004; Strong et al., 2005). Sedentary behaviors tend to be more static during a child's life course (Janz et al., 2000; Janz et al., 2005). In fact, children who watch the most TV and play the most video games continue to do so as they develop into adolescents (Janz et al., 2000; Janz et al., 2005). Furthermore, some studies suggest that the decline in physical activity is paralleled with an increase in sedentary activity, thus further increasing the risk of child overweight and obesity as a child ages (Nelson, Neumark-Stzainer, Hannan, Sirard, & Story, 2006).

There are very few studies that have examined sedentary behaviors of preschool age children (España-Romero, Mitchell, Dowda, O'Neill, & Pate, 2013). As stated above, many

parents perceive that their children are meeting physical activity recommendations (J. Dwyer, Needham, Simpson, & Heeney, 2008) , however, studies have found that preschoolers are quite sedentary (Alhassan et al., 2007; Irwin, He, Bouck, Tucker, & Pollett, 2005). The relationship between preschoolers' sedentary behavior and obesity risk is mixed. Many studies have shown a positive relationship between sedentary behavior and obesity risk among preschoolers (B. A. Dennison et al., 2002; B. A. Dennison, Erb, & Jenkins, 2002; J. C. Lumeng, Rahnema, Appugliese, Kaciroti, & Bradley, 2006; Manios et al., 2009; Proctor et al., 2003; Sugimori et al., 2004). One study documented that TV viewing was positively associated with child BMI, only among those children at the 50th percentile or higher, indicating that sedentary behavior may have an exacerbating effect on those children who are on the upper tail of the BMI distribution (Beyerlein, Toschke, & Von Kries, 2010). Another study found that sedentary activity time was positively associated with waist circumference among preschool age children (España-Romero et al., 2013).

Contradicting the above studies, others have found no relationship between sedentary activity and a preschooler's BMI z-score (Byun, Liu, & Pate, 2013; Cliff, Okely, Smith, & McKeen, 2009). The discrepancy in the literature is most likely due to measurement differences. Only a small number of studies use objective accelerometer data, while most studies use parental reports of child activity. Parental reports are advantageous because they are cost-effective, easy to administer, and they have the ability of discriminating across different levels of physical activity (Sylvia, Bernstein, Hubbard, Keating, & Anderson, 2014). While objective accelerometer data has obvious benefits, using accelerometers with young children requires training with parents and possibly teachers, which can make data difficult to obtain or inaccurate, thus accelerometers are generally not recommended for younger children (Sylvia et al., 2014).

This indicates a need for longitudinal studies with various measurement methods (Byun et al., 2013).

Parental Influences

As stated previously, the prime time to prevent childhood obesity is the period before a child turns 5 years old. In addition, children younger than 5 years old are in the process of transitioning to adult food, learning about foods and mealtimes, and have relatively little control over the food provided and physical activity opportunities (L. Birch & Ventura, 2009; Small et al., 2007). Children at this age rely on parents for eating and, they value parents as role models. These early experiences can provide the foundations for eating behaviors for the rest of a child's life (S. Anzman et al., 2010; L. Birch & Ventura, 2009). Children have thousands of experiences with foods and meals by the time they enter school. These foods and meals are provided by the parents and shape their behaviors and food preferences for the long-term (S. Anzman et al., 2010).

Food preferences are learned during the transition to table foods (S. Anzman et al., 2010). Children readily accept foods that are high in salt and sweetness and tend to reject vegetables that may be bitter or any new foods (S. Anzman et al., 2010). By providing high fat, sugary, and salty foods that children prefer would result in a diet that is in abundance of energy dense foods and low in vegetables and any new fruits (S. Anzman et al., 2010). As children get older, these tastes and preferences are not as flexible and are more difficult to change (S. Anzman et al., 2010). By exposing children to vegetables earlier in life, they are more likely to accept them (S. Anzman et al., 2010). Because parents serve as the provider of the food and food role model, children can learn to like healthy foods if they are familiar with them, modeled by the parent, or eaten in a positive context (L. Birch & Ventura, 2009).

Aside from food and flavor preferences, children are also learning how much to eat (S. Anzman et al., 2010). By the time children are 3 to 5 years of age, they lose their innate ability to regulate caloric intake and instead, judge intake based on amount of food, similar to adults (L. Birch & Ventura, 2009). If parents are serving children large portions of energy dense foods and teaching them to focus on environmental cues instead of satiety cues, children can learn to overeat and eventually gain excess weight before their fifth birthday (L. Birch & Ventura, 2009). Thus, parents can further influence their child's eating behavior and dietary intake through feeding practices or parenting and feeding style (Mitchell, Farrow, Haycraft, & Meyer, 2013).

Feeding Practices

Due to confusion in the existing literature, it is important to take some time to define and describe the differences between feeding styles and feeding practices. Practices are goal directed behaviors and are defined by specific content such as restriction of certain foods or modeling eating behaviors (Darling & Steinberg, 1993). It is hypothesized that practices help parents directly achieve child feeding and eating skills while feeding style alters the effectiveness of these practices (Darling & Steinberg, 1993). Although these feeding practices are well intentioned, such as getting a child to eat vegetables or limiting high-calorie foods, they are often counterproductive (Savage et al., 2007). Three major feeding practices dominate the literature: pressure to eat, restriction, and instrumental feeding.

Pressure to eat or prompting a child to eat is used by a parent in hopes of encouraging the child to eat more food in general or a certain food, such as vegetables. Simple, direct prompts or open-ended offerings of more food has been associated with higher child weight status in observational studies (Klesges, Robert C. Malott, James M. Boschee, Pamela F. Weber, Jill M., 1986; R. C. Klesges et al., 1983; J. C. Lumeng et al., 2012). It appears to be a graded relation;

such that the more a parent prompts a child to eat, the faster the child eats and more calories are consumed by the child (Drucker, Lawrence, Hammer, Agras, & Bryson, 1999). However, these results are not consistent in the literature with some studies finding no association, or a negative relationship between pressure to eat and child BMI (Farrow & Blissett, 2008; Koivisto, Fellenius, & Sjöden, 1994; Lee & Keller, 2012; McKenzie et al., 1991).

Aside from counter-productive effects, pressure to eat has also been associated with increased neophobia (Orlet Fisher, Mitchell, WRIGHT, & Birch, 2002; Wardle, Carnell, & Cooke, 2005), food avoidance (Powell, Farrow, & Meyer, 2011), and decreased acceptance or preference of the target food (Galloway, Fiorito, Lee, & Birch, 2005; Galloway, Fiorito, Francis, & Birch, 2006). Interestingly, the use of pressure to eat may have lasting effects as evidenced by retrospective studies that have discovered that the foods adults dislike the most, are often the ones they were pressured to eat as children (L. Webber, Cooke, Hill, & Wardle, 2010). Pressure to eat may be successful in the short term for a parent's goals. Some studies have found that pressure to eat has been associated with increased intake of the target food (Orrell-Valente et al., 2007), and ultimately, calories consumed (Drucker et al., 1999). The hypothesis is that the constant pressure for a child to consume a given number of bites or finish a serving, will undermine the child's internal satiety and fullness cues, and the child will rely on environmental cues to stop eating, thus the potential for over eating (Carper, Orlet Fisher, & Birch, 2000).

Restriction is another controlling feeding practice found to have counterproductive effects that has been implicated in child obesity literature. Overt restriction, in which a parent restricts a child's access to specific foods, has been associated with excessive weight gain (Clark, Goyder, Bissell, Blank, & Peters, 2007), and overconsumption of the restricted food when it is made available (J. Fisher & Birch, 1999). Covert restriction, on the other hand, does not seem to

have the same effects as overt restriction (J. Ogden, Reynolds, & Smith, 2006). The relationship between overt restriction and child weight is a bit more complex than at first glance. It is hypothesized that a parent's perception of a child's weight may be related to his or her use of restriction (M. S. Faith, Scanlon, Birch, Francis, & Sherry, 2004). Although high restriction appears to be successful when a child is around 2 years old, by the time a child reaches 5 years of age, higher maternal restriction predicts higher child weight (Farrow & Blissett, 2008).

Instrumental feeding, or using food as a reward, is another commonly cited maladaptive feeding practice employed by parents. When a parent uses a food as a reward, the child places more value on the reward food (L. L. Birch, Zimmerman, & Hind, 1980), and this reward food becomes more desirable to a child and thus, more likely to be overeaten when freely available (Baughcum, Burklow, Deeks, Powers, & Whitaker, 1998). Using food to improve a child's emotions can also have detrimental effects, for example, this practice has been found to have a positive relationship with child BMI (Stifter, Anzman-Frasca, Birch, & Voegtline, 2011) and eating more food in the absence of hunger (J. Blissett, Haycraft, & Farrow, 2010).

The food that parents serve is not the only important factor. Parent feeding practices also shape children's early experiences with food and eating which may be drawn from the parent's own experience with food and eating as a young child (S. Anzman et al., 2010; L. Birch & Ventura, 2009). From these parental feeding practices children may learn to ignore satiety cues, overeat when served large portions, prefer unhealthy palatable foods, eat when upset, or dislike foods they have been pressured to eat (L. Birch & Ventura, 2009).

Parenting & Parenting Styles

For almost a century, parenting researchers have been trying to pinpoint the most effective parenting behaviors, attitudes, and beliefs for a child's development (Darling &

Steinberg, 1993). Most experts agree that specific parenting behaviors and practices influence child development, but it remains difficult to identify the magnitude of the influence and disentangle the practices from one another (Darling & Steinberg, 1993). It is recognized that certain parent practices and beliefs are part of a broader parenting environment, now called parenting style (Darling & Steinberg, 1993). Based on differing schools of thought, there are several different hypothesized dimensions of parenting style, however, most agree that competent children are a product of parents who set boundaries, show warmth, and enforce rationale rules (Darling & Steinberg, 1993). This style is most commonly referred to as, authoritative, and was defined by Diana Baumrind (1966).

Baumrind conceptualized parenting styles through direct observations and was the first to disentangle child influence on parenting behavior and practices and defined three styles of parenting: authoritative, authoritarian, and permissive (Baumrind, 1966). These three parenting styles, she suggested, vary in parental control. She redefined control from parental strictness to include the demands of behavioral compliance in the family and society that the parent places on the child (Baumrind, 1966). Through her observations, she also noted that parents who differ in authority or control also differed in other aspects of parenting, including communication (Baumrind, 1967). While Baumrind's typology provided the needed conceptualization of parenting styles, Lewis (1981) argued that reciprocal communication, not control, was unique to authoritative parents. Using Baumrind's typology, Lewis' response to the typology, and all of the previous definitions and dimensions of parenting, Maccoby and Martin (1983) provided a two-dimensional framework for parenting style.

Maccoby and Martin's parenting style typology serves as the basis for most parenting style research today. They blended Baumrind's typology with earlier definitions of parenting to

develop linear responsiveness and demandingness dimensions. The demands the parent makes on a child to become part of the family or society and the parent's response to noncompliant children is called demandingness (Darling & Steinberg, 1993). Responsiveness refers to the parent's awareness of their child's needs and how they foster a child's autonomy. Maccoby & Martin argued that responsiveness also reflects how open a child is to a parent's demand (Maccoby, 1992). Four parenting styles (Table 2.1) emerged from the linear break-up of responsiveness and demandingness (Maccoby & Martin, 1983). Authoritative (high demandingness, high responsiveness) parents have reasonable expectations for their child, foster child autonomy, respect the child's opinion, and provide warmth (Maccoby, 1992). Authoritarian (high demandingness, low responsiveness) parents are not sensitive to the child's opinion and place strict demands on their child without regard of the child's ability or maturity (Maccoby, 1992). Indulgent (low demandingness, high responsiveness) parents do not enforce demands on their child but show respect for their child and provide warmth (Maccoby, 1992). Neglectful (low demandingness, low responsiveness) parents do not place demands on their child and are unaware of their child's needs or opinions (Maccoby, 1992).

The relationship between parenting styles and child obesogenic behaviors and weight status is somewhat inconsistent (R. L. Vollmer & Mobley, 2013). In longitudinal studies, it was found that children of parents with the authoritative parenting style were at a lower risk of being overweight or obese (Berge, JM, Wall, M, Loth, K, Neumark-Sztainer, D, 2010; Olvera & Power, 2010; K. E. Rhee, Lumeng, Appugliese, Kaciroti, & Bradley, 2006). Other longitudinal studies found that the permissive and authoritarian parenting style increased a child's risk for overweight or obesity (J. M. Berge, Wall, Neumark-Sztainer, Larson, & Story, 2010; Berge, JM, Wall, M, Loth, K, Neumark-Sztainer, D, 2010; Fuemmeler et al., 2012; Lane, Bluestone, &

Burke, 2013; Olvera & Power, 2010; K. E. Rhee et al., 2006). Many other studies examining the influence of parenting style on child obesity risk have not replicated these findings.

Caution is needed when making any conclusions related to the relationship between parenting style and child obesity. Studies examining these relationships often conceptualize and measure parenting styles differently, making results difficult to compare (R. L. Vollmer & Mobley, 2013). Additionally, some researchers use child-reported parenting styles, while others use parent-reported measures, and only a small number of studies examine parenting style influences on the preschool age child (R. L. Vollmer & Mobley, 2013). Given this information, it is recommended that researchers focus on feeding style, not parenting style, because the feeding style is specific to the mealtime and environment around food (Mitchell et al., 2013; R. L. Vollmer & Mobley, 2013).

Feeding Style

Most researchers examining parental influences on child feeding and corresponding eating behaviors focus on specific parental feeding practices such as restriction. These practices are often generalized into feeding styles which do not capture the emotional climate of the meal (Hughes, Power, Fisher, Mueller, & Nicklas, 2005). Because feeding style was originally conceptualized as practices, there is a paucity of literature naming feeding style as a variable; however, often practices are being measured instead.

Hughes and colleagues (2005) were the first to conceptualize feeding styles based on Baumrind's and Maccoby and Martin's parenting style typology. Similar to Baumrind's methodology, Hughes and others conceptualized these styles by video recording observations of mother-child feeding interactions and reviewing existing literature related to feeding behaviors.

As a result, a list of feeding behaviors was developed that reflected Maccoby and Martin's typology (Hughes et al., 2005). Maccoby and Martin's responsiveness and demandingness linear dimensions were used to develop four different feeding styles. In feeding styles, demandingness refers to the number of demands that a parent places on a child to get him/her to eat (Hughes et al., 2005). Responsiveness refers to the type of demand the parent uses, which can be either parent-centered or child-centered (Hughes et al., 2005). Parent-centered demands, or low responsiveness techniques, are directive and include strategies such as rewards, punishments, or bribing. Child-centered demands, which are high responsiveness techniques, are nondirective and include rationale, reasoning, or complimenting. Based on these two dimensions, authoritative (high demandingness, high responsiveness), authoritarian (high demandingness, low responsiveness), indulgent (low demandingness, high responsiveness), and uninvolved (low demandingness, low responsiveness) feeding styles were identified (Table 2.1).

Overall, the authoritative parental feeding style is believed to be the most desirable (R. L. Vollmer & Mobley, 2013), as it has been positively associated with child vegetable and dairy intake (Hughes et al., 2007; H. Patrick, Nicklas, Hughes, & Morales, 2005), and lower child intake of low-nutrient dense foods and fats and oils (Hennessy, Hughes, Goldberg, Hyatt, & Economos, 2012). The authoritative feeding style has also been associated with a lower risk of child overweight or obesity (Hughes et al., 2005; Tovar et al., 2012). Conversely, the indulgent feeding style has been positively linked to child weight status (Hennessy, Hughes, Goldberg, Hyatt, & Economos, 2010; Hughes et al., 2005; Hughes, Shewchuk, Baskin, Nicklas, & Qu, 2008; Hughes et al., 2011; Tovar et al., 2012), even explaining up to 26 percent of the variance in child weight after controlling for parent BMI (Tovar et al., 2012). A relationship between the authoritarian feeding style and child weight status has not been found by any study (Berge, JM,

Wall, M, Loth, K, Neumark-Sztainer, D, 2010; Fuemmeler et al., 2012; Lane et al., 2013). Based on the existing literature, children of parents with an indulgent feeding style are at a higher risk of becoming obese compared to those children who have parents with the authoritative feeding style (R. L. Vollmer & Mobley, 2013), although this is not found in all studies.

Role modeling

The home meal environment, and what children observe their parents eating can also influence child eating behaviors and food preferences (Mitchell et al., 2013). The foods that are offered to a child are ultimately linked to the food preferences of his or her parent (Mitchell et al., 2013). For example, if a parent dislikes vegetables, or only eats 1 or 2 different vegetables, it is highly unlikely that the parent will purchase and prepare any new vegetables for the child to be exposed to (Carruth & Skinner, 2000; Wardle et al., 2005). And, without enough exposures to novel foods, children will not accept these foods and their diets will be just as limited as their parent's diet (A. Jansen & Tenney, 2001; Palfreyman, Haycraft, & Meyer, 2012). In a lab setting, preschool age children accepted a novel food more readily if the present adult was eating the same food or a similar food compared to adults eating different foods (Adnessi, Galloway, Visalberghi, & Birch, 2005). On the flip side, negative behaviors modeled by parents can also be adopted by children. For example, children were more likely to develop emotional eating, snacking, and body satisfaction if it was displayed by their parent (Brown & Ogden, 2004). Thus, while exposure to new foods is necessary for preschool age children to even taste a food, if the behaviors of parents are encouraging, it can increase a child's preference for that food (Mitchell et al., 2013).

The degree of influence of parental modeling is best illustrated in obesity prevention or treatment programs in which only the parent is targeted. The goal of such programs are to change

parenting behavior related to food, improve the food environment of the home, and model the healthy behavior changes themselves. By indirectly targeting children through their parents, these programs have been successful (Epstein, McCurley, Wing, & Valoski, 1990; Epstein, Valoski, Wing, & McCurley, 1990; M. Golan & Crow, 2004; M. Golan, Weizman, Apter, & Fainaru, 1998).

Physical Activity Modeling

Parents are important role models for physical activity during a child's preschool years (Xanthopoulos, Hart, & Jelalian, 2008). In fact, parents believe that their own physical activity levels are associated with their preschool age child's physical activity levels (J. Dwyer et al., 2008; Irwin et al., 2005). As parents, they also believe that they serve as role models for their children by making time for physical activity themselves, and engaging in active play with their children (J. Dwyer et al., 2008). If a parent helps to establish physical activity patterns during a child's preschool years, it would promote a healthy lifestyle for their child (Irwin et al., 2005).

When examining a preschooler's participation in weekly family-based physical activity, no differences were found between obese and non-obese children (Maher, Li, Carter, & Johnson, 2008). Parents, especially mothers, reported that if they used creative physical play and displayed role modeling it promoted physical activity among their preschool age children (J. Dwyer et al., 2008; Irwin et al., 2005). One study found that 12 percent of parents reported engaging in only sedentary activities with their preschool aged child (Rich et al., 2005). Barriers to engaging in physical activity with their child included being single parents, having a busy schedule, and feelings of fatigue (J. Dwyer et al., 2008). It is clear from these studies that parents can serve as role models or gatekeepers for a child's food preferences, physical activity or sedentary activity behaviors.

Fatherhood & Paternal Influence on Childhood Obesity Prevention

Over the last few decades, the topic of fatherhood has gained popularity in research and professional practice in hopes of understanding father-child interactions and the impact of these interactions on child development (M. Lamb, 2008). Over this time, the conceptualization of the role of the father has evolved, including a father's role as the moral teacher, the breadwinner, the sex-role model, and, and finally, the nurturing father (M. Lamb, 2008). Within these different roles, the definition of what a "good father" does also evolved. For example, when a father was defined as the moral teacher, a "good father" then, served as a model of a good Christian and whose children also behaved as good Christians (Demos, 1982; M. Lamb, 2008). The new definition of the nurturing father is important because it emphasizes that dad can, and should be involved in the day to day care of his child (Cabrera, Tamis-LeMonda, Bradley, Hofferth, & Lamb, 2000; M. Lamb, 2008). This new definition was brought about by a number of trends that forced researchers to focus on dads, including: women's increased employment outside of the home, father absence in many homes, involvement of non-biological fathers in children's lives, and ever increasing cultural diversity in the United States (Cabrera et al., 2000). In fact, only approximately 25 percent of children live in two-parent households in which the father is the sole breadwinner, and more household incomes are now considered dual-earner (Hofferth, 1998; Raley, Mattingly, & Bianchi, 2006).

Studies have shown that fathers are spending more time with their children than they have in the past (Cabrera et al., 2000), and fathers spend more time caring for their children if their wives earn more money or if their work schedules differ (Cabrera et al., 2000; R. Parke, 2008). The cultural diversity in the U.S. has also helped shaped the evolving role of the father,

because as new views and beliefs about the role of the father are introduced, it challenges the existing belief about the role of the father (Cabrera et al., 2000).

Paternal involvement has been implicated in many, positive aspects of child and/or adolescent development, including improved cognitive development, emotional regulation, greater academic achievement, and behavioral outcomes (Cabrera et al., 2000; M. Lamb, 2008; R. Parke, 2008; Pleck, JH. & Masciadrelli, BP., 2004; Tamis-LeMonda, CS. & Cabrera, N., 1999); although a clear distinction needs to be made between quantity versus quality. One study found that when fathers experience job loss and are forced into caring for their child, they parent rather harshly, and children do not benefit from the extra quantity of involvement (Cabrera et al., 2000; M. E. Lamb, Pleck, Charnov, & Levine, 1987; Pleck, JH. & Masciadrelli, BP., 2004).

It is clear that fathers have an important role in the family and in their children's lives, and it is interesting to note that there is much left unknown about what it means to a man to be a father (Cabrera et al., 2000; Tamis-LeMonda, CS. & Cabrera, N., 1999). For example, the meaning of fatherhood depends upon a man's gender identity or his relationship with his own father (Cabrera et al., 2000; Lemay, Cashman, Elfenbein, & Felice, 2010). The end point of development of fatherhood is also unknown, and the tasks needed to become a successful father have not been uncovered by research (Cabrera et al., 2000). Additionally, fathers do not parent in isolation, as a child ages and interacts with his or her father, this in turn, will influence father development (Cabrera et al., 2000; R. D. Parke, 2004).

Although fathers, overall, spend less time with children compared to mothers, fathers are spending more time with their children than they have in the past (M. Lamb, 2008; Pleck, JH. & Masciadrelli, BP., 2004). This means that father involvement and fathers' responsibility for children will most likely increase and fathers will become much more integral in the organization

and planning of their child's life (Cabrera et al., 2000). Thus, future generations of children may grow up in households in which mothers work full-time and fathers shop, plan, and prepare meals (Cabrera et al., 2000).

Some studies have found fathers have an influence over his child's diet, eating behavior, physical activity, and/or weight. For instance, about a third of fathers have reported that they had primary or shared responsibility for meal planning, shopping, and preparation (Harnack, Martinson, Neumark-Sztainer, Stang, & Story, 1998; Snethen et al., 2008), and are responsible for child feeding half of the time (J. Blissett, Meyer, & Haycraft, 2006; Harnack et al., 1998). Interestingly, lower SES men are more likely to be involved in meal planning, shopping, and preparation (Harnack et al., 1998). Approximately 53 percent and 71 percent of children younger than 6 years old eat breakfast and dinner with their father each day, respectively, which is not significantly different from mom (United States Census Bureau News, 2011).

Fathers may have a distinct influence over their child's weight, as evidenced by one study that found if a child had an overweight or obese father and a normal weight mother, the child was four times more likely to obese (Freeman et al., 2012). Although, in the reverse scenario, if a child had a normal weight father and an overweight or obese mother, it was not a significant predictor of child weight (Freeman et al., 2012). Similar to mothers, fathers have expressed difficulty and frustration with children being picky eaters, and report using maladaptive feeding practices, such as bribing, to get their child to eat (Horodyski & Stommel, 2005). Relatively few studies have examined the influence of paternal feeding practices and paternal feeding styles on child diet, eating behavior, physical activity, or weight, especially among preschoolers.

Paternal parenting styles have been implicated in child obesity, in which high paternal control predicted lower child weight status and permissive or disengaged styles increased the risk

of a child being in a heavier BMI category (Taylor et al., 2011; Wake et al., 2007). In another study it was found that the paternal authoritative parenting style predicted more frequent family meals in daughters only, suggesting a gender effect (Berge, JM, Wall, M, Loth, K, Neumark-Sztainer, D, 2010).

Similar to mothers, a study of paternal feeding practices found that paternal use of pressure to eat was inversely associated with child BMI z -score (J. Blissett et al., 2006). Paternal use of restriction has been linked to higher child weight status (Johannsen, Johannsen, & Specker, 2006; Musher-Eizenman, de Lauzon-Guillain, Holub, Leporc, & Charles, 2006), and higher concern for their child's future overall health (Johannsen et al., 2006) while other studies have found no significant relationship between paternal controlling feeding practices and child BMI (J. Blissett et al., 2006). Gender effects were found in one study in which fathers of overweight or obese school-age boys perceived their sons as more overweight, used pressure to eat less often, and monitored their sons eating less compared to fathers of children with a healthy BMI (Brann, LS. & Skinner, JD, 2005).

Fathers may also serve as role models for a child's diet or physical activity. Moderately-strong, positive correlations have been found between father-child fruit, cookies, and potato chip consumption (Hall et al., 2011). In a French study, the relationship between father-adolescent macronutrient and energy intake was stronger than the relationship between the mother-adolescent intake (Vauthier, Lluch, Lecomte, Artur, & Herbeth, 1996). However, these studies did not assess overall quality of diet, and thus, did not control for quantity of calories consumed. As mentioned previously, an even more convincing illustration of the power of paternal role modeling is the 'Healthy Dads, Healthy Kids' program (Morgan et al., 2011). This program only targeted overweight or obese fathers, however, eating and physical activity behaviors were

improved in children, such as increased physical activity and smaller portion sizes (Burrows et al., 2012; Lubans et al., 2012). It is clear from these studies that fathers may have an influence over their child's diet, eating behavior, physical activity, and weight, and thus, they should not be continually ignored in childhood obesity prevention literature.

Table 2.1. Four Major Parenting/Feeding Styles Based on Responsiveness and Demandingness.

Parenting/Feeding Style Dimensions		Responsiveness	
		Low	High
Demandingness	Low	Neglectful/Uninvolved	Permissive/Indulgent
	High	Authoritarian	Authoritative

Chapter III: Influence of paternal feeding practices and/or style on child diet quality, eating behavior, and weight status

Abstract

The association of parental feeding practices and styles with childhood obesity have gained more attention in the literature recently; however, fathers are rarely included within these studies. The aims of this research were to identify the relationship of paternal feeding practices and feeding style to their preschool children's eating behavior, diet quality, and weight status. This study included a one-time, one-on-one interview with biological fathers of preschoolers (n=150) to assess feeding practices (Child Feeding Questionnaire), feeding style (Caregiver Feeding Style Questionnaire), child eating behaviors (Child Eating Behavior Questionnaire), and diet quality (24 hour recall, Healthy Eating Index). Height and weight for each father and child were also measured and Body Mass Index (BMI) or BMI z-score calculated. Linear regression was used to test the relationship between paternal feeding practices, style and child diet quality and/or body weight.

Overall, the findings revealed that a father's feeding practices and style is not associated with a child's diet quality or weight status. However, child eating behaviors are associated with child BMI z-score and these relationships are moderated by paternal feeding practices. For example, child satiety responsiveness is inversely ($\beta = -.421$, $p = 0.031$) associated with child BMI z-score, only if paternal restriction scores are high. This relationship is not significant when paternal restriction scores are low ($\beta = -.200$, $p = 0.448$). These results suggest that some child appetitive traits may be related to child weight status when exposed to certain paternal feeding practices. Future studies should consider the inclusion of fathers as their feeding practices and/or style may influence a child's eating behavior.

Introduction

Parental feeding style and practices are now recognized as a potential influence on child dietary intake, child eating behaviors, and risk of child obesity, although most define “parent” as the mother (L. Birch, McPhee, Shoba, Steinberg, & Krehbiel, 1987; L. Birch et al., 2001); (Birch, L., Fisher, J., Davison, K., 2003; Fisher, JO. & Birch, LL., 1999; Hoerr et al., 2009; Hughes et al., 2008). While it is true that women still have primary responsibility for feeding children (U.S. Department of Agriculture, 2000), women’s employment patterns have changed in that they have less time to devote to feeding their young children (Savage et al., 2007), thus fathers may be more involved in child feeding than they have been previously.

Fathers feeding styles are rarely studied and relatively few studies have examined the impact of paternal feeding practices alone on child obesogenic behaviors or child weight status. Studies including data on the impact of paternal feeding practices on children have found that similar to mothers, paternal restriction and control were associated with higher child body weight (Johannsen et al., 2006; Musher-Eizenman et al., 2006); (Loth, MacLehose, Fulkerson, Crow, & Neumark-Sztainer, 2013) and paternal pressure to eat was associated with lower child body weight (Blissett, J. & Haycraft, E., 2008; Brann, LS. & Skinner, JD, 2005). These studies must be interpreted with caution due to the homogenous sample of white, non-Hispanic, educated, mid- to high-income parents and the age group of the children studied (8-12 years old) (Blissett, J. & Haycraft, E., 2008; J. Blissett et al., 2006; Haycraft, E. & Blissett, J., 2008; Johannsen et al., 2006; Musher-Eizenman et al., 2006).

The sole influence of father’s feeding style on child diet, eating behavior, or weight has not been studied. In studies of mostly mothers, the authoritative feeding style is believed to be the most desirable for parents (R. L. Vollmer & Mobley, 2013), as it has been positively

associated with child vegetable and dairy intake (Hughes et al., 2007; H. Patrick et al., 2005), and lower child intake of low-nutrient dense foods and fats and oils (Hennessy et al., 2012). The authoritative feeding style has also been associated with a lower risk of child overweight or obesity (Hughes et al., 2005; Tovar et al., 2012). Conversely, the indulgent feeding style has been positively linked to child weight status (Hennessy et al., 2010; Hughes et al., 2005; Hughes et al., 2008; Hughes et al., 2011; Tovar et al., 2012), even explaining up to 26 percent of the variance in child weight after controlling for parent BMI (Tovar et al., 2012). Based on the existing literature, children of parents with an indulgent feeding style are at a higher risk of becoming obese compared to those children who have parents with the authoritative feeding style (R. L. Vollmer & Mobley, 2013).

The relationship between parent-child interactions at mealtime is very complex (K. Rhee, 2008; Ventura, AK. & Birch, LL., 2008), and even though it is assumed that the child and parent influence each other during meal times, aspects of a child's eating behavior are rarely examined in conjunction with parent feeding practices or styles. Generally, child eating behaviors have been divided into two groups, food approach and food avoidant. Food approach eating behaviors increase a child's risk for obesity and include food responsiveness, emotional over eating, desire to drink liquids, and enjoyment of food (Carnell, S. & Wardle, J., 2007). Conversely, food avoidant behaviors are believed to lower a child's risk for obesity and include satiety responsiveness, slowness in eating, food fussiness, and emotional under eating (Carnell, S. & Wardle, J., 2007). Lower satiety responsiveness and higher food cue responsiveness of children have been associated with increased weight status in children, although it's not clear how parent feeding behaviors may influence the development of these child eating behaviors (Carnell, S. & Wardle, J., 2007; Carnell, S. & Wardle, J., 2008).

Because the relationship between parent feeding behaviors, child eating behaviors and food preferences is complex, there are many corresponding gaps in the current literature regarding the relationship of paternal influences on child diet and weight as well as the relationship between parental feeding behaviors and child eating behaviors. Thus, the aims of this study are: 1) Determine the relationship of paternal feeding practices on child diet quality and weight status, and the moderating effect of paternal feeding style on these relationships in preschool age children, 2) Determine the relationship between paternal feeding practices and child eating behavior, and 3) Evaluate the relationship of paternal concern for a child's weight on paternal feeding practices. It was hypothesized that 1) Paternal restrictive feeding practices will be inversely associated with child diet quality scores and positively associated with child body weight, but will be attenuated by the authoritative feeding style, 2) Paternal controlling and restrictive feeding practices will have a positive relationship with child emotional under eating, emotional over eating, slowness in eating, and food fussiness but a negative relationship with child enjoyment of food, and 3) Fathers concerned about child overweight will utilize more restrictive practices while fathers concerned about child underweight will use more pressuring feeding practices.

Material and Methods

Subject Population & Recruitment

Sample size was determined using G*Power analysis software. To test the relationship between paternal feeding practices and feeding style on overall child diet quality scores, with .80 power, significance set at 0.05, and effect size between .3 and .4 (medium), the minimum sample size was determined to be 128 fathers. This number was rounded up to 150 fathers to account for incomplete interviews/questionnaires.

The study was approved by the University of Connecticut-Storrs Institutional review Board for Human Subjects. A convenience sample of fathers was recruited primarily from local preschool centers. Inclusion criteria were: biological father of at least one child between 3 and 5 years old who eats at least 1 meal per week with that child, at least 18 years of age, able to read and understand English. Fathers could be of any race or ethnicity, education level, or income level.

Data Collection and Measures

Written informed consent (Appendix D) was obtained from each father prior to the interview. Fathers also provided consent for their preschool age child and were offered a copy of the consent form once it was signed. Each father completed a one-time, one-on-one interview with a trained researcher that lasted 60 to 90 minutes. A \$25 gift card incentive was provided at the end of the interview to each father. Each father reported demographic information, including race, ethnicity, education level, and age (APPENDIX N). To establish income levels, each father was asked if he or his child were eligible for government assistance programs, such as Head Start, Supplemental Nutrition Assistance Program, or Women, Infants, and Children. If a father had more than one preschool age child, the interviewer specified that the father should answer the questions regarding his youngest child between the ages of 3 and 5 years old. Father and child height and weight was measured using standard techniques (Centers for Disease Control, January 2009) using a portable digital scale (Seca 869 or 874) and stadiometer (Seca 217) to calculate Body Mass Index (BMI), and BMI z-score (for child) using the Philadelphia Children's Hospital calculator (The Children's Hospital of Philadelphia Research Institute, 2014), which was based on the Centers for Disease Control growth charts (Kuczmarski et al., 2002). Because children over 2 years of age were measured, overweight BMI z-score was defined as ≥ 1 standard

deviation and obese BMI z-score was defined as ≥ 2 standard deviations (Kuczmarski et al., 2002). Additionally, fathers answered questions regarding their feeding style, feeding practices, concern for child weight, child eating behavior, and diet quality.

Paternal feeding style

The Caregiver Feeding Style questionnaire (CFSQ) was used to assess paternal feeding style and has been previously validated with low-income parents of preschool children (Hughes et al., 2005). The CFSQ is a 19-item questionnaire (APPENDIX I) that determines a caregiver's feeding style based on demandingness ($\alpha = .87$) and responsiveness subscales (Hughes et al., 2005). The responsiveness subscale is split into parent-centered ($\alpha = .81$) and child-centered ($\alpha = .68$) techniques. Responses for the items are "Never, Rarely, Sometimes, Often, or Always." To categorize each father into a feeding style, the sample median for demandingness and responsiveness is calculated and each father is assigned as high or low demandingness and high or low responsiveness. Based on the dichotomous assignment, fathers feeding styles are categorized as authoritarian (high demandingness, low responsiveness), authoritative (high demandingness, high responsiveness), indulgent (low demandingness, high responsiveness, or uninvolved (low demandingness, low responsiveness).

Paternal feeding practices and concern for child weight

Paternal child feeding practices and concern for child's weight was assessed using the Child Feeding Questionnaire (CFQ), a 31-item questionnaire (APPENDIX H) that determines a parent's responsibility for child feeding ($\alpha = .80$), perceived parent weight ($\alpha = .77$), perceived child weight ($\alpha = .75$), concern for child weight ($\alpha = .75$), restriction ($\alpha = .75$), pressure to eat ($\alpha = .72$), and monitoring of child's eating ($\alpha = .88$) using a 7-point Likert scale with word anchors. One item was removed from the pressure to eat subscale because it was not performing well with

other items and reliability was low ($\alpha = .68$). This questionnaire has been validated in a diverse sample of parents with children between the ages of 2 and 11 years old (L. Birch et al., 2001).

Child eating behavior

Child eating behavior was assessed with the Child Eating Behavior Questionnaire (CEBQ), a 35-item questionnaire (APPENDIX J) to determine a parent's perception of their child's eating behavior based on satiety responsiveness (SR) ($\alpha = .65$), emotional over-eating (EOE) ($\alpha = .72$) and under eating (EUE) ($\alpha = .79$), food fussiness (FF) ($\alpha = .87$), enjoyment of food (EF) ($\alpha = .86$), food responsiveness (FR) ($\alpha = .62$), desire to drink (DD) ($\alpha = .876$), and slowness in eating (SE) ($\alpha = .75$) subscales. The response categories are "never, rarely, sometimes, often, and always." This instrument has been validated with parents of children 4 and 5 years old (Carnell, S. & Wardle, J., 2007).

Child diet quality

To assess a child's dietary intake, a 24 hour dietary recall was completed with the participating father to collect information about his child's food and beverage intake for one weekend day or a day that the father was involved with feeding the child. The 24-hour dietary recalls were collected using the Nutrition Data System for Research (NDSR), a computer based software application developed at the University of Minnesota Nutrition Coordinating Center (NCC) that facilitates the collection of recalls in a standardized fashion (Feskanich, Sielaf, Chong, & Bartsch, 1989). Dietary intake data was gathered during the interview using a multiple-pass interview approach (R. Johnson, Driscoll, & Goran, 1996). Five distinct passes provided multiple opportunities for the father to recall food intake (APPENDIX K).

The Healthy Eating Index (HEI-2010) was calculated from the child's 24 hour dietary recall to assess diet quality of the child. Components of the index (adequacy score) include total

fruit, total vegetables, dairy including soy beverages, and total protein including plant and seafood sources, whole fruit, dark green vegetables and beans, whole grains, oils including non-hydrogenated vegetable oils and oils in fish, nuts, and seeds. The moderation component is comprised of saturated fat, refined grains, sodium, and calories from solid fats, alcoholic beverages, and added sugars. The measure has been validated with populations 2 years of age and over. One 24 hour diet recall has been deemed sufficient to evaluate and compare diet quality within diverse samples (Guenther et al., 2008).

Statistical analyses

All statistics were analyzed using the Statistical Package for the Social Sciences (SPSS for Windows version 21, SPSS, Inc, Chicago, IL). Descriptive statistics including means and standard deviations, were conducted for participant demographic data. Linear regression was used to examine relationships between paternal feeding practices, feeding styles, fathers' concern for child weight, child eating behaviors, child diet quality, and child weight status (Table 3.1). In each regression, father's race, ethnicity, and income (low vs. non-low) were entered as covariates. Because there was a small number of Asian (n=7) fathers, father's race categories were collapsed into three categories: white, black, and other/multiple. To run feeding styles as moderators, dichotomous dummy codes were used for each style (i.e. indulgent = 1, non-indulgent = 0), for k-1=3 categories. Thus, the authoritative feeding style was used as the referent category. When testing the moderation influence of feeding style, the remaining 3 feeding styles were entered into the model as comparisons against the authoritative feeding style.

In step 1, all covariates, including race, ethnicity, and income level were entered into the model. Predictor variables (i.e. feeding style, feeding practices, child eating behavior) were entered into the regression in step 2. In step 3, the interaction term was entered to test for

moderation. Multiplication of the centered independent variables was used to calculate interaction variables to eliminate any collinearity issues. If the interaction term was significant, post hoc analyses were performed. Using a median split, the hypothesized moderating predictor was categorized into high or low levels (i.e. low vs. high restriction) and then relationships between predictor variable and outcome variable were examined under each high or low condition.

Results

The final sample consisted of 150 father-child dyads, however, one child's diet quality data were omitted because the father was only able to report one meal, and thus a composite HEI score could not be calculated. Demographic characteristics for fathers and children are displayed in Table 3.2. The majority (53%) of fathers were classified as low-income, but had a college education (51%) and were non-Hispanic (81%) and white (57%). A majority of the fathers were categorized as authoritarian (33%) or indulgent (31%) feeding style, while a smaller proportion were categorized in the authoritative (21%) and uninvolved (15%) feeding style.

Paternal feeding practices and child diet quality or body weight as moderated by paternal feeding style

As the model was not tested simultaneously, part A of the proposed model (Figure 3.1) was tested first. Neither paternal pressure to eat nor restriction were associated with child BMI z-score or child diet quality. Paternal feeding style did not moderate any of these relationships.

Paternal feeding practices and child eating behavior

There were significant relationships found when Part B of the proposed model (Figure 3.2) was tested, between paternal feeding practices and child eating behaviors (Table 3.3). Paternal restriction was significantly, positively associated with certain child food avoidant

eating behaviors including, child food fussiness ($\beta = .21$, $p = 0.006$), satiety responsiveness ($\beta = .12$, $p = 0.027$), emotional under eating ($\beta = .42$, $p < 0.0001$), as well as food approach behaviors including, desire to drink ($\beta = .24$, $p = 0.01$), emotional over eating ($\beta = .18$, $p < 0.0001$), and food responsiveness ($\beta = .18$, $p = 0.006$). Paternal pressure to eat was significantly, positively associated with food avoidant behaviors including, child food fussiness ($\beta = .18$, $p = 0.001$), satiety responsiveness ($\beta = .17$, $p < 0.0001$), slowness in eating ($\beta = .18$, $p < 0.0001$), and significantly, inversely associated with enjoyment of food ($\beta = -.16$, $p = 0.002$), a food approach behavior.

The relationship between child eating behavior and child diet quality or weight status (Figure 3.2) was also examined (Table 3.4). Child satiety responsiveness was associated with lower child BMI z-score ($\beta = -.32$, $p = 0.039$), while emotional over eating ($\beta = .34$, $p = 0.046$) and food responsiveness ($\beta = .27$, $p = 0.045$) both were associated with higher child BMI z-score. There was a significant, inverse relationship between child food fussiness ($\beta = -2.87$, $p = 0.05$) and child diet quality.

Paternal concern for child weight and paternal feeding practices

When examining the relationship between paternal concern for a child's weight and paternal feeding practices (Figure 3.3), paternal concern was only significantly, positively related to a father's use of restrictive feeding practices ($\beta = 0.31$, $p < 0.0001$) and monitoring of a child's intake ($\beta = 0.19$, $p < 0.017$). There was no significant relationship between paternal concern for a child's weight and perceived responsibility for child feeding or paternal pressure to eat.

Child eating behaviors and child weight status as moderated by paternal feeding practices

Because paternal feeding practices were not significantly related to child diet quality or BMI z-score, a revised model (Figure 3.4) was hypothesized and tested in which paternal feeding

practices moderated the relationship between eating behaviors and child weight status. When examining moderating effects of feeding practices, it was found that paternal restriction ($R^2 = .098$, $F(6, 142) = 3.682$, $p = 0.002$) was a significant moderator in the relationship between child satiety responsiveness and child BMI z-score (Figure 3.5). Specifically, child satiety responsiveness was associated with lower BMI z-score, only when paternal restriction was high ($\beta = -.42$, $p = 0.003$), which was not significant when paternal restriction scores were low ($\beta = -.20$, $p = 0.448$). Paternal restriction was also a significant moderator in the relationship between child emotional over eating and child BMI z-score ($R^2 = .061$, $F(6, 142) = 2.599$, $p = 0.020$) as shown in Figure 3.6, in which child emotional over eating was associated with higher child BMI z-scores ($\beta = .64$, $p = 0.005$), only when a father exercised high levels of restriction. This relationship was not significant when a father utilized low levels of restriction ($\beta = -.07$, $p = 0.80$).

Paternal feeding practices and child eating behavior as moderated by paternal feeding style

As stated previously, paternal feeding style was not a significant moderator in the relationship between paternal feeding practices and child diet quality or weight status. Post hoc analysis tested a hypothesized model in which paternal feeding style moderated the relationship between paternal feeding practices and child eating behaviors (Figure 3.4). Paternal feeding style was found to be a significant moderator in the relationship between paternal restriction and child slowness in eating and/or food responsiveness. When predicting child slowness in eating scores with paternal restriction, there was a significant difference between the moderating effect of uninvolved feeding style compared to the authoritative feeding style, such that high paternal restriction was associated with lower child slowness in eating scores only when dad had the uninvolved feeding style ($\beta = -.46$, $p = 0.047$) vs. authoritative feeding style (Figure 3.7).

When predicting child food responsiveness scores with paternal restriction, there was a significant difference between the uninvolved and authoritarian feeding styles compared to the referent authoritative feeding style. The slope of the interaction between restriction and uninvolved style ($\beta = -.63$, $p = 0.003$) and restriction and the authoritarian style ($\beta = -.51$, $p = 0.016$) were significantly lower compared to the effect of the authoritative feeding style in the relationship between restriction and food responsiveness (Figures 3.8 and 3.9).

Discussion

This is the first study, to our knowledge, to examine the complex relationship between a father's feeding practices and style on his preschool age child's eating behaviors, diet, and weight status among a group of diverse fathers. Although there were no significant direct relationships between paternal feeding practices and child diet quality or weight status, there were significant relationships between a father's feeding practices and child eating behaviors. Overall, paternal restriction was associated with higher scores on both food avoidant and food approach child eating behaviors, while pressure to eat was associated with higher scores on the food avoidant eating behaviors, and lower scores on food approach eating behaviors. This is consistent with studies among only mothers, in which pressure to eat has been consistently positively correlated with food fussiness (Gregory, Paxton, & Brozovic, 2010; E. Haycraft & Blissett, 2012; Powell et al., 2011; L. Webber et al., 2010), slowness in eating (Farrow & Blissett, 2008; E. Haycraft & Blissett, 2012; Powell et al., 2011), emotional under eating (Farrow & Blissett, 2008; E. Haycraft & Blissett, 2012; Powell et al., 2011; L. Webber et al., 2010; L. Webber, Hill, Cooke, Carnell, & Wardle, 2010), and satiety responsiveness (Farrow & Blissett, 2008; Powell et al., 2011; L. Webber et al., 2010), while the relationship between restriction and child eating behaviors have been inconsistent (Morrison, Power, Nicklas, & Hughes, 2013).

Laboratory studies have found that maternal restriction is associated with poor child compensation and greater child eating in the absence of hunger (Birch, L., Fisher, J., Davison, K., 2003; M. S. Faith et al., 2004; Ventura, AK. & Birch, LL., 2008). This suggests that overall, paternal pressure to eat may be associated with non-obesogenic eating behaviors while paternal restriction may be associated with both obesogenic and non-obesogenic eating behaviors, indicating that the relationship between paternal restriction and obesity risk is very complex.

In this study, child emotional over eating and food responsiveness were significantly positively related to higher child BMI z -scores, while child satiety responsiveness significantly associated with lower child BMI z -scores. This is important considering higher child satiety responsiveness and slowness in eating and lower child enjoyment of food and food responsiveness have been shown in previous studies to be robust predictors of lower child weight status and energy intake (Carnell, S. & Wardle, J., 2007; Carnell, S. & Wardle, J., 2008; M. Faith et al., 2013; K. M. Mallan, Nambiar, Magarey, & Daniels, 2014). Furthermore, these traits have been shown to be stable and persist over time, very similar to other personality traits such as shyness (Asendorpf, 1992; Ashcroft, Semmler, van Jaarsveld, & Wardle, 2008; Fraley & Roberts, 2005; Roberts & DelVecchio, 2000).

Post hoc analyses revealed a complex set of relationships between paternal feeding practices, feeding styles, child eating behaviors, and child weight status. Child satiety responsiveness has been continually associated with lower child weight status (Carnell, S. & Wardle, J., 2007; Carnell, S. & Wardle, J., 2008; M. Faith et al., 2013), however, in the present study, when examining the moderating influence of paternal feeding practices, this relationship only existed if a father utilized high restriction, and was not significantly related to child body weight if the father exercised low levels of restriction. Child appetitive traits, such as satiety

responsiveness, are hypothesized to be genetic and certain parental feeding behaviors may attenuate or exacerbate the relationship between these appetitive traits and child weight status (M. Faith et al., 2013). In this study, the relationship between paternal restriction and child slowness in eating was exacerbated by the uninvolved feeding style, such that high paternal restriction was associated with lower child slowness in eating scores when a father had an uninvolved feeding style vs. the authoritative feeding style. Generally, faster eating is thought to be associated with higher energy intake (Kaplan, 1980), although some argue that the same amount of food can be eaten, it is just eaten in a shorter period of time (M. Faith et al., 2013). However among preschoolers, increased adiposity has been observed among children who had faster eating rates (Drabman et al., 1977; Drabman, 1979). Furthermore, not only has it been found that obese children tend to eat faster than their lean counterparts, obese children do not slow their eating rate towards the end of a meal (Laessle et al., 2001; Lindgren et al., 2000). Another study found faster eating rates among 4 year old children significantly predicted excess adiposity at age 6 years (Berkowitz et al., 2010). This is not surprising considering that the authoritative feeding style is often deemed the most desirable parental feeding style (R. L. Vollmer & Mobley, 2013).

Interestingly, the authoritative feeding style did not attenuate the positive relationship between paternal restriction and child food responsiveness. In this study, it was found that the authoritarian and uninvolved feeding styles attenuated the relationship between high paternal restriction and high child food responsiveness. In fact, the authoritative feeding style exacerbated the relationship between paternal restriction and child food responsiveness. The uninvolved feeding style has not been implicated in increasing a child's obesity risk in any studies (R. L. Vollmer & Mobley, 2013). A recent study found that compared to children of parents with the

indulgent feeding style, children of parents with authoritarian, authoritative, and uninvolved feeding style had lower BMI z -scores, which was mediated by higher child satiety responsiveness and lower child enjoyment of food (Frankel et al., 2014). Interestingly, Frankel and others (2014), also found that child food responsiveness did not differ across parental feeding styles. Research has suggested that restricting a child's access to a certain food can increase that child's preference for the food and lead to overconsumption when the food is made available (Birch, L., Fisher, J., Davison, K., 2003; J. Fisher & Birch, 1999; Fisher, JO. & Birch, LL., 1999). It is not surprising that paternal restriction and child food responsiveness are positively related because children who score higher on food responsiveness are more susceptible to food cues, especially coupled with the counterproductive effects of paternal restriction.

What is most intriguing is the moderating effect of the authoritative feeding style, which has been consistently correlated with desirable child weight and/or behaviors (Hoerr et al., 2009; H. Patrick et al., 2005), although all of the existing literature includes samples of mothers, and it's possible there are differing influences of mother and father feeding styles. For example, it was found that teenagers of fathers with a permissive parenting style consumed more fruits and vegetables (Berge, JM, Wall, M, Loth, K, Neumark-Sztainer, D, 2010). Although parenting style and feeding style are not interchangeable, this gives some evidence that influence of paternal and maternal feeding styles may not be identical, and provides the possibility that the authoritative feeding style is not the most desirable in all circumstances. Thus, this finding substantiates the need for future studies.

The relationship between high paternal restriction and child satiety responsiveness is complex. In previous studies, high maternal restriction has been associated with poor

compensation (L. L. Birch & Fisher, 2000; Fisher, JO. & Birch, LL., 1999) and higher weight status of children (Lewis & Worobey, 2011; Ventura, AK. & Birch, LL., 2008). Although in other studies, different forms of restriction have been shown to be protective against child adiposity (S. Carnell, Kim, & Pryor, 2012). Brann & Skinner (2005), found that among fathers, those who scored high on the monitoring subscale, a softer form of restriction, had sons (8-10 years old) with lower BMIs, suggesting that in some families, restriction may protect some children from gaining excess weight (Campbell et al., 2010). Not only is it hypothesized that different forms of parental restriction may have differing outcomes, but the goals underlying restriction may also influence how the practice impacts child-related parameters. For example, if mothers reported using restriction for weight-based reasons as opposed to health-based reasons, children scored higher on food approach behaviors (Rodgers et al., 2013). Additionally, in a study of only mothers, it was found that maternal weight status moderated the relationship between restriction and child weight, such that maternal restriction predicted lower child BMI, only when the mother was not obese, however this study did not include fathers (Powers, Chamberlin, van Chaick, Sherman, & Whitaker, 2006). Current evidence suggests that parental restriction is associated with child obesogenic behaviors; however, this study provides evidence that certain feeding practices, such as restriction, can influence the relationship between child eating behaviors and child body weight status (Kiefner-Burmeister, Hoffman, Meers, Koball, & Musher-Eizenman, 2014). Furthermore, in this study, it was revealed that the positive relationship between emotional over eating and child BMI z -score was exacerbated by high paternal restriction, similar to a study among a diverse sample of low-income parents that found high parental restriction and high child disinhibited eating predicted higher child BMI (Sparks & Radnitz, 2013). These results further support the notion that some feeding practices can influence

the way in which child eating behaviors predict child body weight (S. Anzman & Birch, 2009), although future studies are needed to test this hypothesis.

Similar to studies exclusive to mothers (Wehrly, Bonilla, Perez, & Liew, 2014) and a study of Australian fathers (K. M. Mallan et al., 2014), paternal restriction was associated with higher paternal concern about a child's weight, however, it was not related to paternal perception of his child's weight. A father's use of pressure to eat feeding practices was not related to his concern for a child's weight or his perception of his child's weight. These results are different from an Australian study that found that fathers who were concerned about their child's weight used more pressure to eat feeding practices and perceived greater responsibility for feeding (K. M. Mallan et al., 2014). This suggests that paternal feeding practices may be a reaction to a father's concern about a child's weight rather than a result of a child's weight status (K. M. Mallan et al., 2014; L. Webber, Hill et al., 2010; Wehrly et al., 2014).

In the original proposed model (Figure 3.10), it was more conceivable that child eating behaviors directly influence child weight status, instead of the proposed direct relationship between paternal feeding practices and child weight status, as moderated by feeding style (Figure 3.4). Instead, paternal feeding practices may moderate the relationship between child eating behaviors and child weight status. In the current literature, restriction is generally thought of as a counterproductive feeding practice (S. Anzman et al., 2010; Mitchell et al., 2013), however, this study provides evidence that the influence of restriction is dependent on characteristics of the child. It has been suggested that children with higher approach behaviors show more reactivity to restriction, especially when exposed to highly palatable foods (S. Anzman et al., 2010; Rollins, Loken, Savage, & Birch, 2014). However, it is most likely these high approach and reactive behaviors influence parents to be highly restrictive. Thus, in the current food environment where

children are exposed to affordable and highly palatable foods, high parental restriction of those foods may not be an effective strategy to limit a child's intake of those foods, and other strategies are needed (Rollins et al., 2014).

Additionally, the relationship between paternal feeding practices and child eating behaviors may also be influenced by paternal feeding style. Although the authoritative feeding style has been deemed the most optimal, this may not always be true. As originally conceptualized, feeding style may influence the how open the child is to parental feeding practices, thus making feeding practices more or less effective dependent upon the parental feeding style (Darling & Steinberg, 1993; Hughes et al., 2005). The responsiveness dimension of feeding style is hypothesized to alter how receptive children are to the feeding practices, specifically, the high responsiveness of authoritative and indulgent feeding styles makes children more receptive to feeding practices (Darling & Steinberg, 1993). It is possible then, that the authoritative feeding style is not optimal under the circumstances in which children have high food approach behaviors, they will react poorly to highly restrictive parental feeding practices compared to low responsiveness feeding styles such as authoritarian or uninvolved. This is further evidence that optimal feeding practices or style are dependent upon children characteristics, and without measuring or assessing child eating behaviors, the true influence of parental feeding behaviors on child obesogenic behaviors cannot be determined. This proposed model requires additional studies with larger samples of fathers, as well as observational and longitudinal studies to understand the direction of these behaviors and which behaviors should be targeted for interventions, parent feeding practices or child eating behaviors.

Limitations

Although this study fills a void in the literature by examining a father's influence, it is not without limitations. Limitations of the study included the use of a convenience sample of fathers within one geographic region. Therefore, fathers that participated may be more interested in nutrition or involved in feeding their children, only representing a certain subgroup of fathers. All questionnaires have been validated in parents of preschoolers, which includes both mothers and fathers. These questionnaires have not, however been validated just for fathers.

Because only one 24 hour recall was performed, habitual intake of the child could not be assessed. The accuracy of the child's dietary intake is limited due to only one 24 hour recall collected and its dependence on a father's report of his child's dietary intake. Steps were taken to include only data that the father could verify as reliable. Only two fathers in the sample were deemed "unreliable" because they were only able to report the dinner meal for their child, and these children's diet quality score was omitted from the final sample.

If the participating fathers are not actively involved in feeding their children, but are still present at meals, it could impact data quality, because the influence of the mother is missing. Because we were only interested in examining paternal influences, relationships between parental feeding behaviors and child diet quality and/or weight in 2-parent families may be overlooked. However, this study fills a necessary gap in the feeding literature and provides rationale to include paternal feeding influences on child eating behavior in future studies.

Conclusions

This study provides evidence that a father's feeding practices and style have an influence over his preschool age child's eating behaviors. There are relatively few studies examining a father's influence on a child's diet, eating behavior, or weight status, and most studies often

define the “parent” as the mother. More studies need to include fathers, as well as moms and dads who cohabitate to gain an understanding of synergistic feeding and its influence on child diet, eating behavior, and weight status. In this study, paternal feeding practices and style were not associated with child diet quality or weight status, however, they were associated with child appetitive traits. This indicates that there may be an unknown factor between parent feeding behaviors, child appetitive traits, and child diet quality and/or weight status that was not measured. As evidenced by this study, there are many factors that can moderate a parent’s feeding behaviors on child related outcomes. Thus future studies are needed to understand the complex relationship between parent feeding behaviors, particularly paternal, and their influence on a child’s eating behavior, diet, and/or weight status, and more specifically, longitudinal studies are especially needed to understand the direction of these relationships.

Table 3.1. Summary of regression equations by dependent variable ^a

Dependent Variables	Predictor Variables
Child BMI z-score	Paternal feeding practices
	Paternal feeding practices + paternal feeding style + practicesXfeeding style
	Child eating behaviors + paternal feeding practices + eating behaviorsXfeeding practices
	Child eating behaviors + paternal feeding style + eating behaviorsXfeeding style
Child diet quality	Paternal feeding practices
	Paternal feeding practices + paternal feeding style + practicesXfeeding style
Child eating behaviors	Paternal feeding practices
	Paternal feeding practices + paternal feeding style + feeding practicesXfeeding style
Paternal feeding practices	Paternal concern for child's weight

^a Paternal race, ethnicity, and income level were included as covariates in all regression equations.

Table 3.2. Characteristics of fathers and their preschool age children^a

Variable	Mean	SD
Father (n=150)		
Age (years)	37.4	(7.52)
BMI (kg/m ²)	29.63	(5.75)
BMI classification	n	(%)
Underweight	3	(2)
Healthy	30	(20)
Overweight	47	(31)
Obese	70	(47)
Race		
White	86	(57)
Black or African American	28	(19)
Asian or Asian American	7	(5)
Other/Multiple Races	29	(19)
Ethnicity		
Hispanic	28	(19)
Non-Hispanic	122	(81)
Income Level		
Low-income	79	(53)
Mid- to High-income	71	(47)
Education level		
Less than high school	4	(3)
High school diploma/GED	23	(15)
Some college/technical school	47	(31)
4 year degree or more	76	(51)
Feeding Style		
Authoritarian	49	(33)
Authoritative	32	(21)
Indulgent	46	(31)
Uninvolved	23	(15)

Children	Mean	SD
Age (months)	49.1	(8.2)
BMI z-score (kg/m ²) (n=149)	.44	(1.1)
	n	(%)
Gender (Male)	83	(55)
BMI Classification		
Underweight	5	(3)
Healthy	108	(72)
Overweight	21	(14)
Obese	15	(10)

^a Not all percentages may round to 100 due to either rounding or fathers choosing multiple categories (e.g. race)

Table 3.3. Relationship between paternal feeding practices and child eating behavior

		Paternal Feeding Practices (Predictor Variables)			
		Restriction		Pressure to Eat	
		β	(SE) ^a	B	(SE) ^a
Child Eating Behaviors (Dependent Variables)	Emotional Over Eating	.18	(.05)***	.00	(.04)
	Food Responsiveness	.18	(.06)**	-.04	(.05)
	Enjoyment of Food	-.04	(.07)	-.16	(.05)**
	Desire to Drink	.24	(.09)*	-.05	(.07)
	Satiety Responsiveness	.12	(.06)*	.17	(.04)***
	Slowness in Eating	.07	(.07)	.18	(.05)***
	Emotional Under Eating	.42	(.08)***	.14	(.06)*
	Food Fussiness	.21	(.08)**	.19	(.06)**

^a* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3.4. Relationship between child eating behaviors, weight status, and diet quality

Dependent Variables	Child Eating Behavior (Predictor Variables): β (SE) ^a															
	Food Responsiveness		Emotional Over Eating		Enjoyment of Food		Desire to Drink		Satiety Responsiveness		Slowness in Eating		Emotional Under Eating		Food Fussiness	
Child BMI z-score	.27	(.13)*	.34	(.17)*	.11	(.12)	.18	(.09)	-.31	(.15)*	-.19	(.12)	.00	(.10)	-.04	(.11)
Child diet quality score	-.54	(1.83)	-.60	(2.36)	2.01	(1.70)	-1.31	(1.26)	-.29	(2.10)	1.87	(1.63)	-.24	(1.32)	-2.87	(1.56)*

^a* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

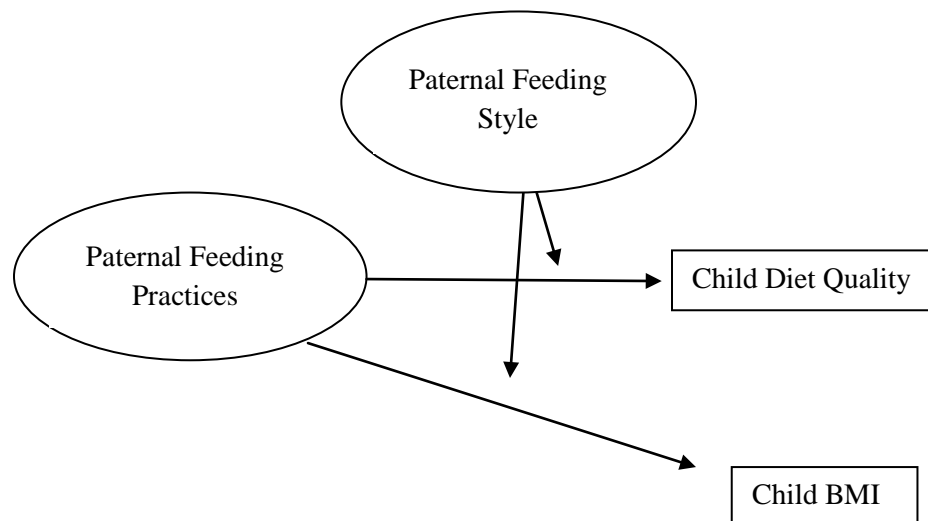


Figure 3.1 Part A of proposed model for study 1

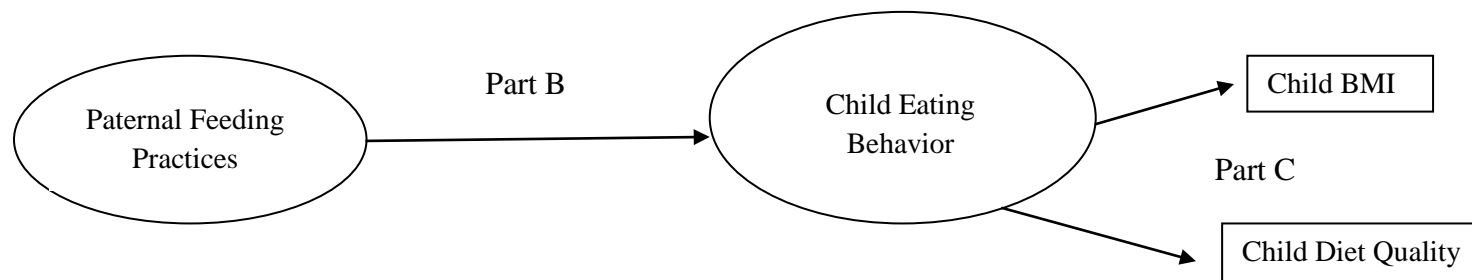


Figure 3.2 Parts B and C of proposed model for study 1

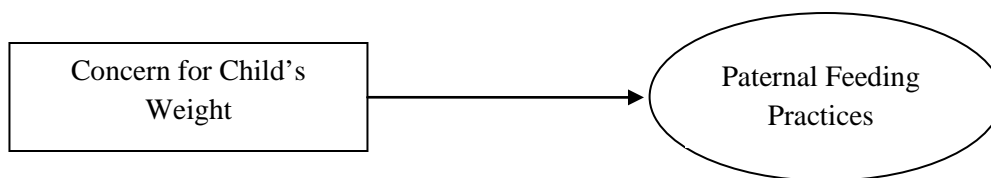


Figure 3.3 Part D of proposed model for study 1

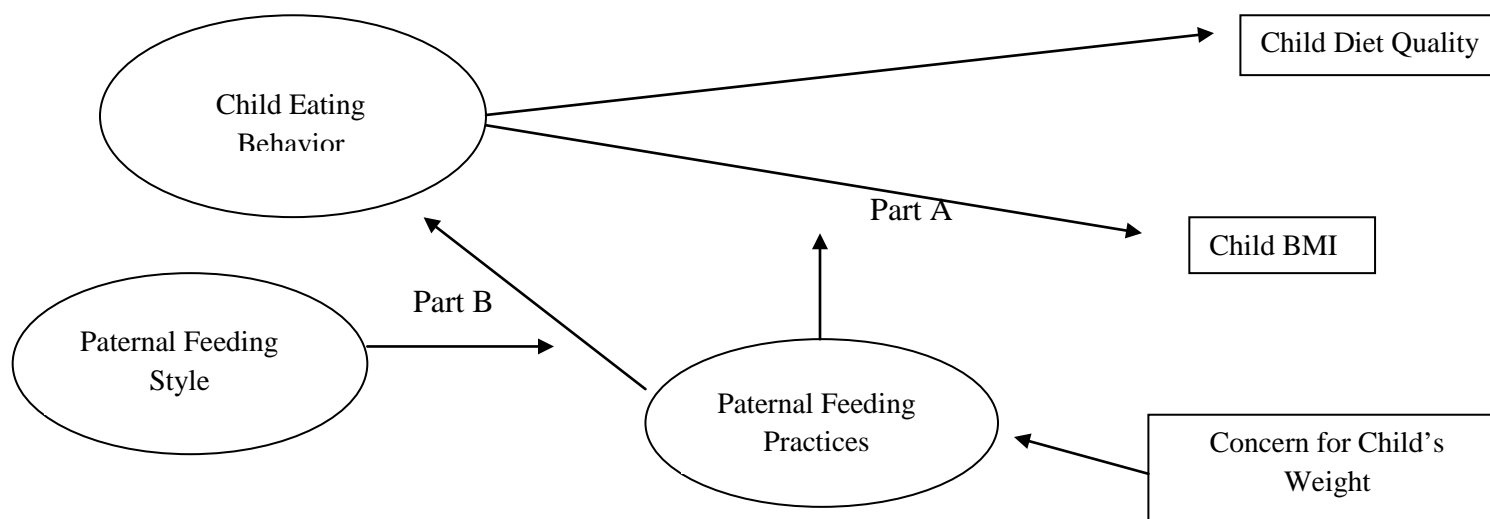


Figure 3.4 Parts A & B of hypothesized revised model for study 1

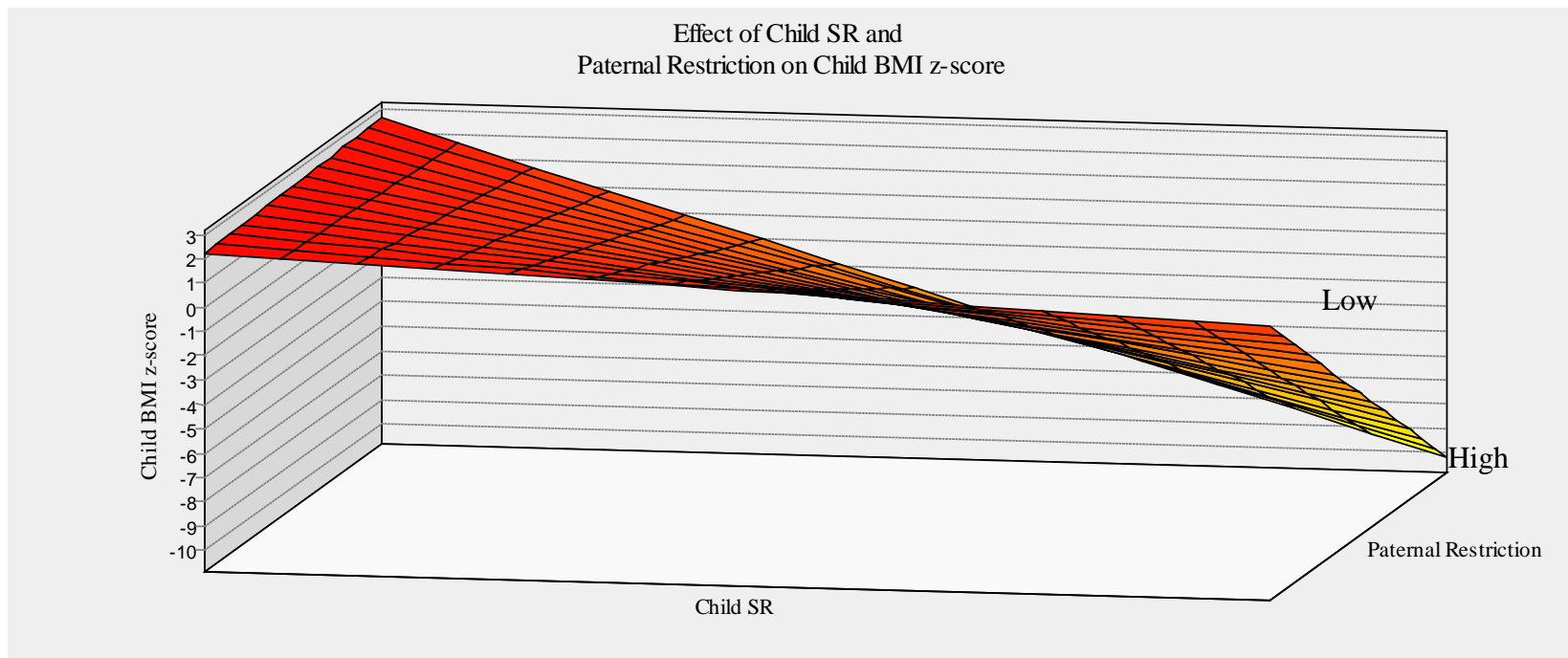


Figure 3.5. The effect of child satiety responsiveness (SR) and paternal restriction (high vs. low) on child BMI z-score

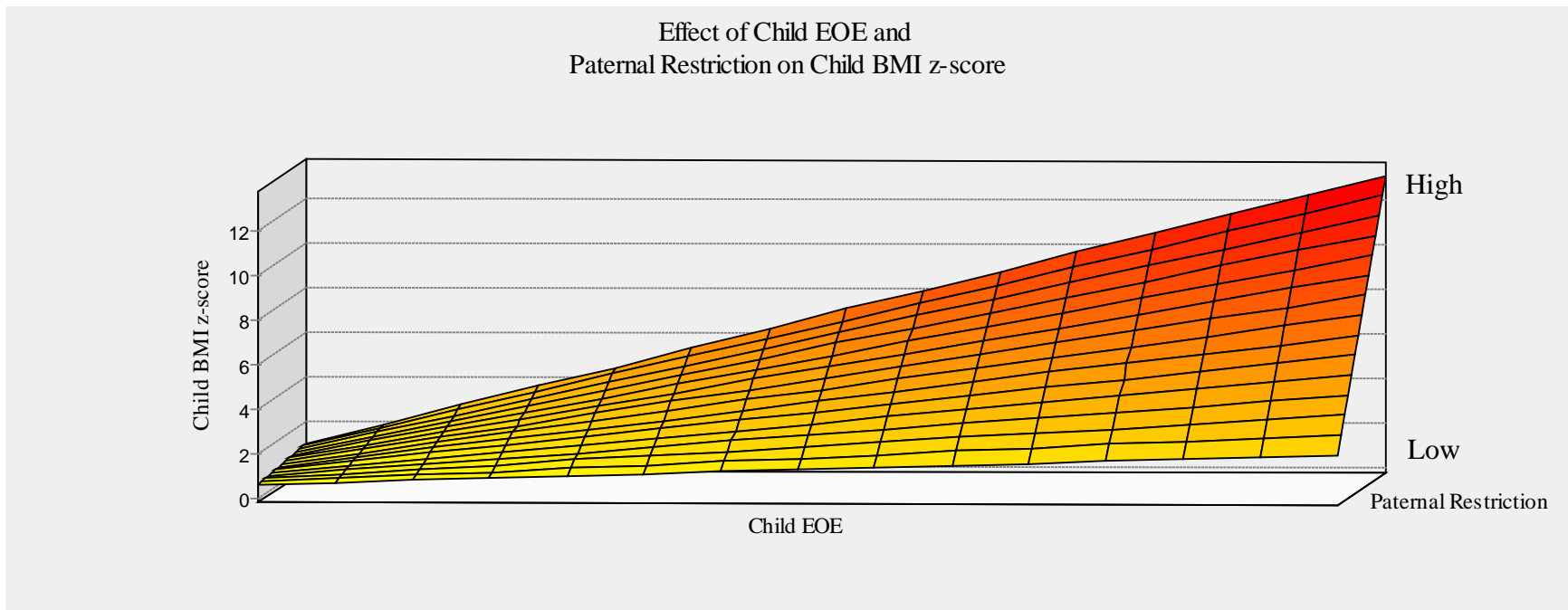


Figure 3.6 The effect of child emotional over eating (EOE) and paternal restriction (high vs. low) on child BMI z-score.

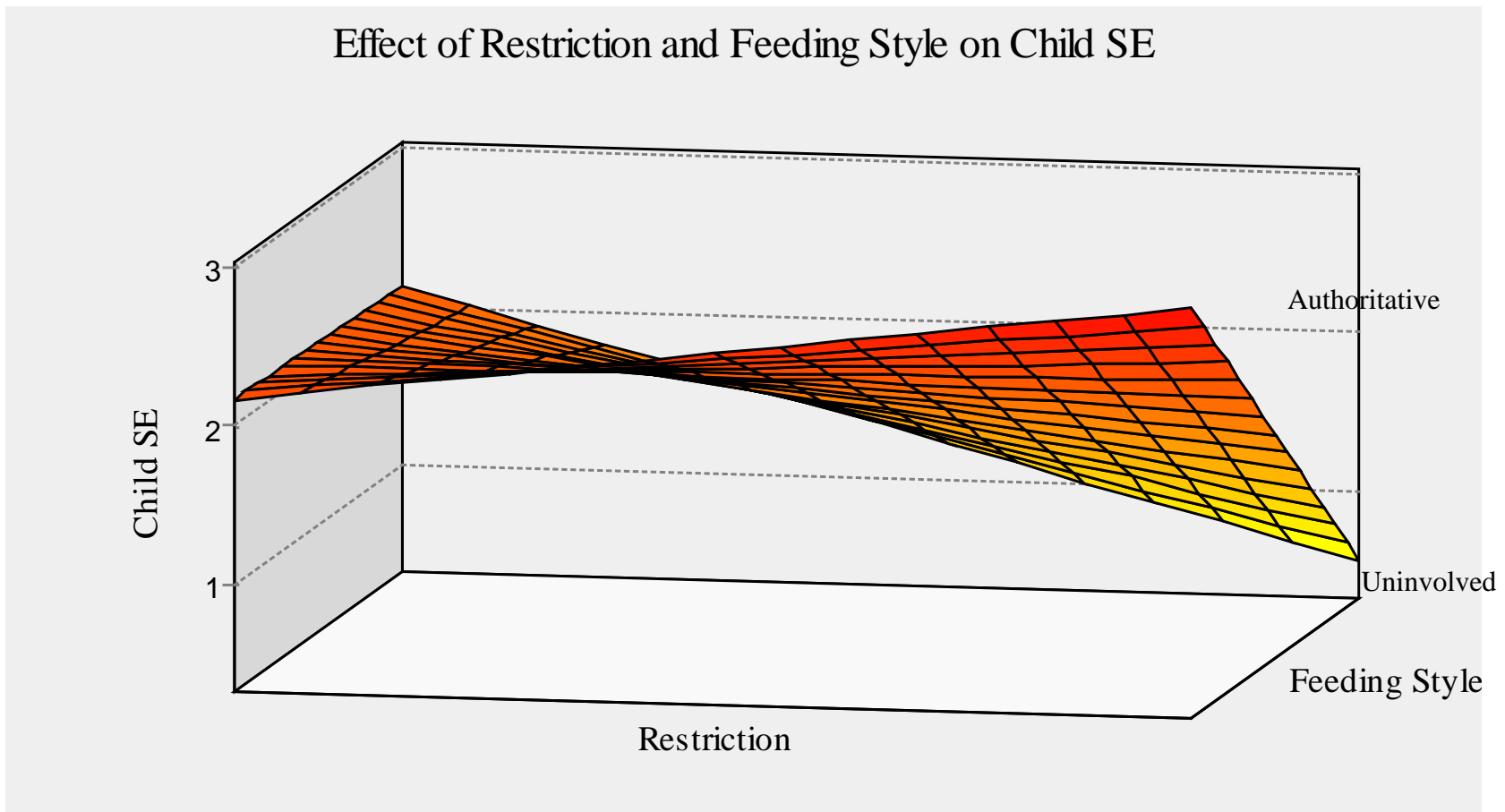


Figure 3.7 The effect of paternal restriction and feeding style (authoritative vs. uninvolved) on child slowness in eating scores (SE).

Effect of Restriction and Feeding Style on Child FR

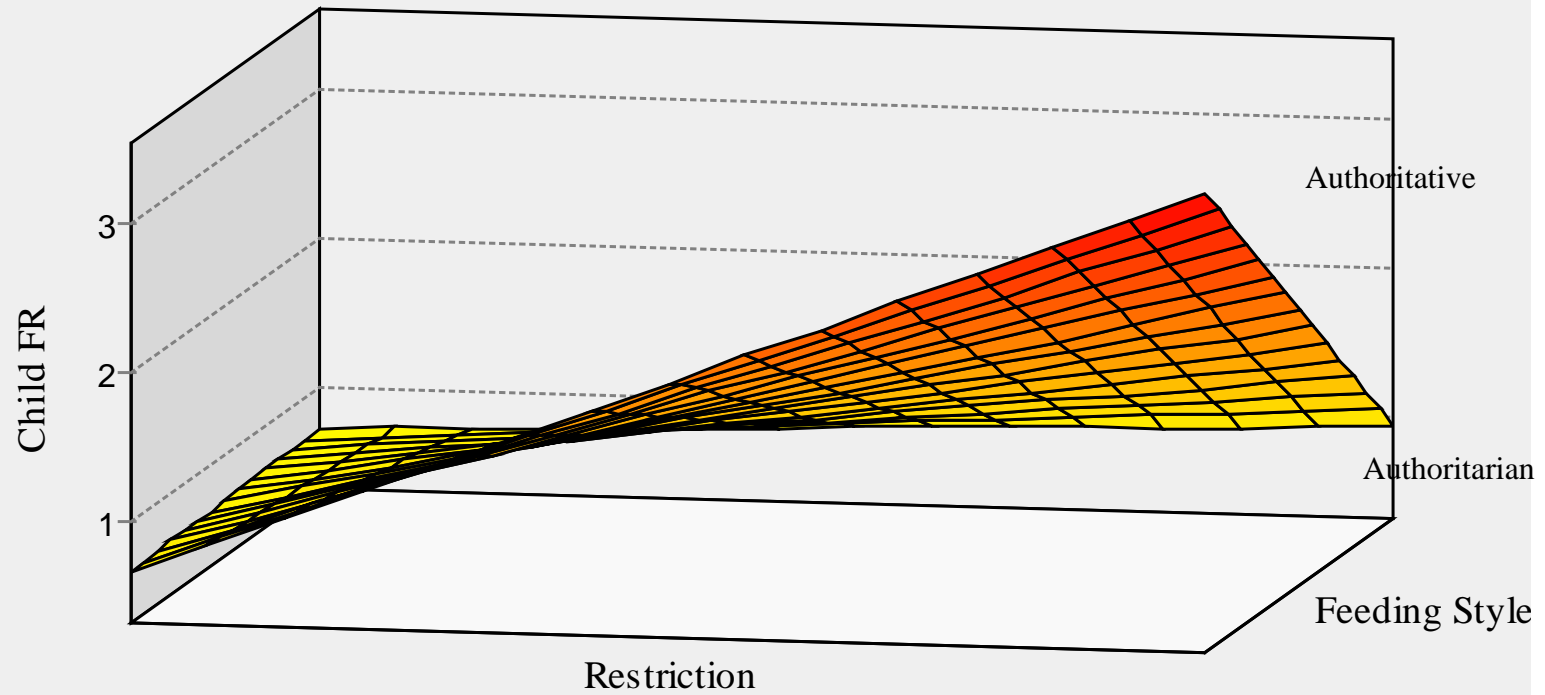


Figure 3.8 The effect of restriction and feeding style (authoritative vs. authoritarian) on child food responsiveness scores (FR).

Effect of Restriction and Feeding Style on Child FR

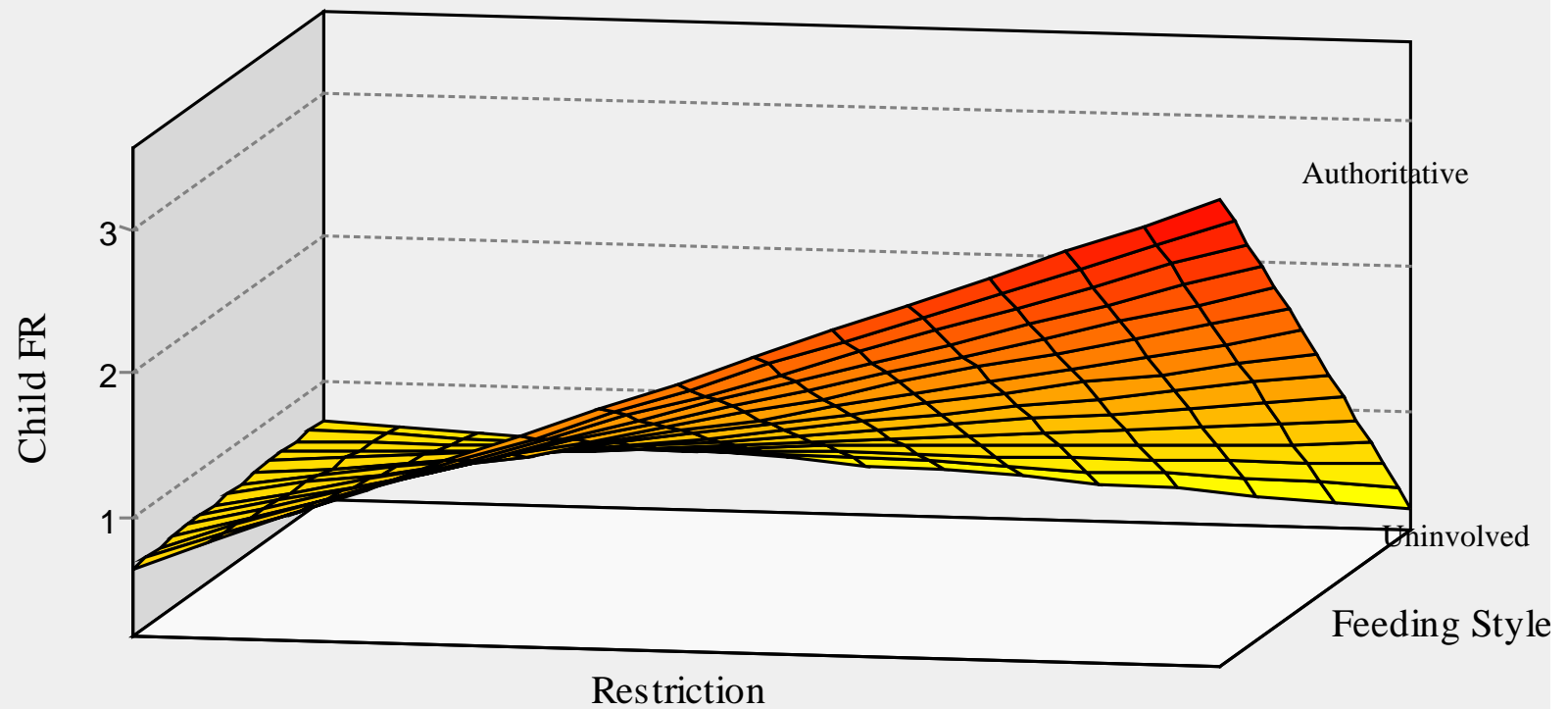


Figure 3.9. Effect of paternal restriction and feeding style (authoritative vs. uninvolved) on child food responsiveness scores (FR).

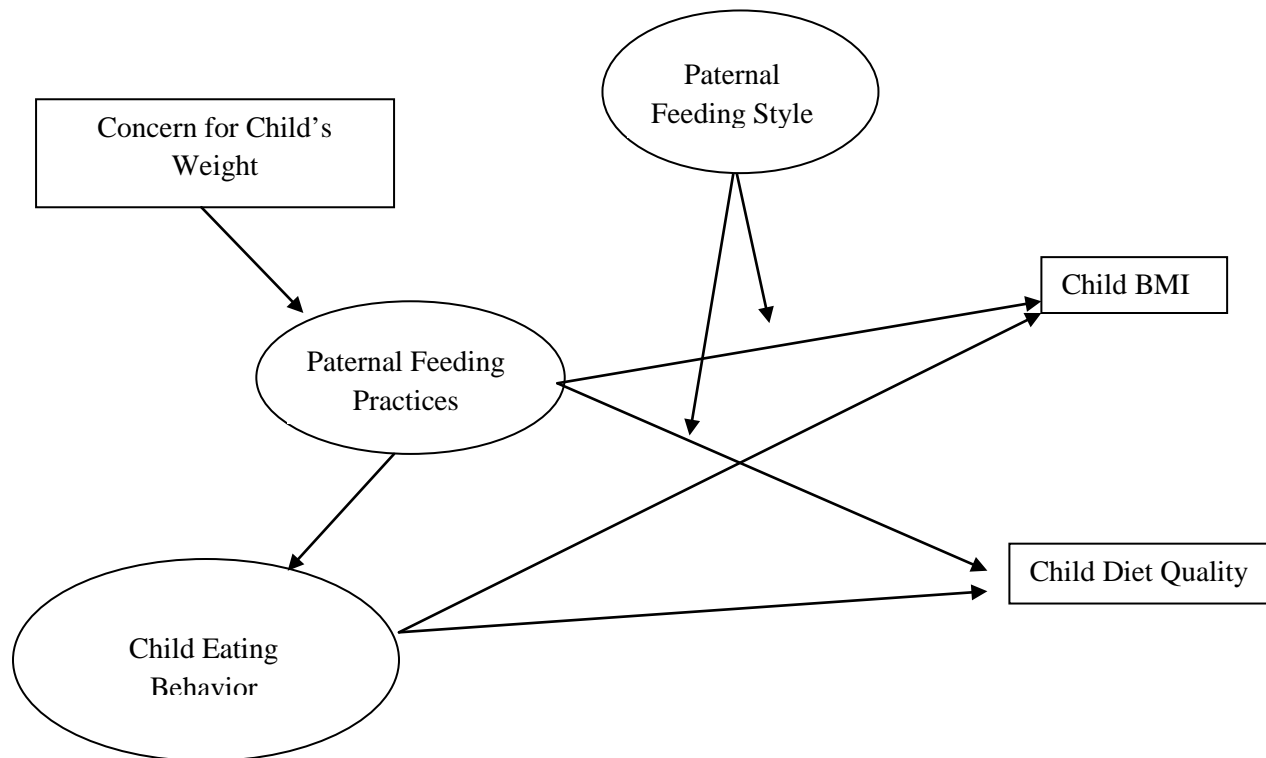


Figure 3.10. Original proposed model for study 1.

Chapter IV: Relationship between father-child diet quality, physical activity, and body weight

Abstract

Diet quality and physical activity are two important factors in determining a child's risk for obesity. In early childhood, parents may serve as role models for these behaviors. However, few studies have examined associations of diet and physical activity between father and child. The purpose of this cross-sectional study was to examine relationships between father and child body weight, diet quality, and physical activity. One-on-one interviews with biological fathers (n=150) of children (ages 3-5 years old) were conducted by a trained interviewer to assess diet quality via 24 hour recall and Healthy Eating Index-2010, and physical activity using the Pre-Physical Activity Questionnaire. Height and weight for each father and child were also measured. Linear regression was used to test relationships between father and child body weight, diet quality, and physical activity. Overall, the findings revealed that there were significant, positive relationships between father-child weight status ($\beta = .03$, $p=0.05$), overall diet quality ($\beta = .39$, $p<0.0001$), and weekday ($\beta = .27$, $p=0.002$) and weekend ($\beta = .62$, $p=0.001$) vigorous physical activity. These results suggest that fathers may have an influence on their child's dietary intake and physical activity level. Future research should consider the inclusion of fathers in obesity prevention programs for young children.

Introduction

Children with at least one overweight or obese parent are at higher risk for becoming obese or overweight themselves compared to children with normal weight parents (Whitaker et al., 1997). Interestingly, one Australian study found that having an overweight or obese father and a normal weight mother increased the child's risk for being overweight by four times (Freeman et al., 2012). However, the reverse scenario in which the father was normal weight, and the mother was overweight or obese was not a significant predictor of child weight (Freeman et al., 2012). Two of the most important contributors to a child's weight are dietary intake and physical activity (Hall et al., 2011). These behaviors are especially important because they are shaped early and continue through adulthood (Kelder, Perry, Klepp, & Lytle, 1994; Mikkila, Rasanen, Raitakari, Pietinen, & Viikari, 2004).

Studies examining the relationship between parental dietary intake and child dietary intake have found weak to modest associations between parent and child diet intake with similarities mostly in fat and fruit and vegetable intake (Van der Horst et al., 2007). However, similar to other research focusing on parental influence on child diet and weight, these studies did not examine the relationship between a father and child's diet (Van der Horst et al., 2007). In a study of Australian fathers and their school-age children, a positive, moderate association was found between father-child intakes of fruit, cookies, and potato chips (Hall et al., 2011). Furthermore, a French study found that the relationship between father-adolescent macronutrient and energy intake was stronger than that relationship of mother-adolescent, suggesting that fathers have a unique influence on their child's dietary intake (Vauthier et al., 1996). An additional pilot study found significant associations between father-child intakes of vegetables and soda (R. Vollmer, Sigman-Grant, & Mobley, 2012).

Morgan and colleagues (2011) specifically targeted overweight fathers in a research program that resulted in significant weight loss for fathers in an intervention group. Fathers in the intervention groups significantly decreased their portion sizes (Burrows et al., 2012; Morgan et al., 2011) and increased their physical activity (Lubans et al., 2012; Morgan et al., 2011). Although children were not targeted in this project, children of intervention fathers significantly reduced their energy intake (Burrows et al., 2012) and increased their physical activity (Lubans et al., 2012). The increase in father physical activity accounted for 47% of the intervention effect, indicating that the relationship of father-child physical activity may be especially important in weight management (Lubans et al., 2012).

While aforementioned studies provide some evidence of a father's influence on child diet, physical activity, and body weight, there are many remaining gaps in the literature. Most studies have been conducted outside of the U.S. with non-diverse samples. In addition, many of the children are school age or adolescents, far beyond the age when food preferences and eating behaviors are being formed. Thus, the aims of this study are to determine the relationship between a father and his preschool age child's: 1) Body weight, 2) Physical activity amount by intensity level, and 3) Diet quality. It was hypothesized that there would be significant, positive associations between father and child body weight, father and child sedentary and physical activity at all intensity levels, and father and child diet quality.

Material and Methods

Subject Population & Recruitment

The study was approved by the University of Connecticut-Storrs Institutional Review Board for Human Subjects. A convenience sample of fathers was recruited primarily from local preschool centers. Inclusion criteria were: biological father of at least one child between 3 and 5

years old who eat at least 1 meal per week with that child, at least 18 years of age, able to read and understand English. Fathers could be of any race or ethnicity, any education level, and any income level.

Data Collection and Measures

Written informed consent (Appendix D) was obtained from each father prior to the interview. Fathers also provided consent for their preschool age child and were offered a copy of the consent form once it was signed. Each father completed a one-time, one-on-one interview with a trained researcher that lasted 60 to 90 minutes. A \$25 gift card incentive was provided at the end of the interview to each father. Each father reported demographic information, including race, ethnicity, education level, and age (APPENDIX N). To establish income levels, each father was asked if he or his child were eligible for government assistance programs, such as Head Start, Supplemental Nutrition Assistance Program, or Women, Infants, and Children. If a father had more than one preschool age child, the interviewer specified that the father should answer the questions regarding his youngest child between the ages of 3 and 5 years old. Father and child height and weight was measured using standard techniques (Centers for Disease Control, January 2009) using a portable digital scale (Seca 869 or 874) and stadiometer (Seca 217) to calculate Body Mass Index (BMI), and BMI z-score (for child) using the Philadelphia Children's Hospital calculator (The Children's Hospital of Philadelphia Research Institute, 2014), which was based on the Centers for Disease Control growth charts (Kuczmarski et al., 2002). Because children over 2 years of age were measured, overweight BMI z-score was defined as ≥ 1 standard deviation and obese BMI z-score was defined as ≥ 2 standard deviations (Kuczmarski et al., 2002). Additionally, fathers answered questions regarding their diet and physical activity as well

as their child's diet and physical activity. A \$25 gift card incentive was provided at the end of the interview to each father.

Diet Quality

To assess a child's and father's dietary intake, a 24 hour dietary recall was completed with the participating father to collect information about his own and his child's food and beverage intake for one weekend day or a day that the father was involved with feeding the child. Each father reported his food and beverage intake for the previous day. The 24-hour dietary recalls were collected using the Nutrition Data System for Research (NDSR), a computer based software application developed at the University of Minnesota Nutrition Coordinating Center (NCC) that facilitates the collection of recalls in a standardized fashion (Feskanich et al., 1989). Dietary intake data was gathered during the interview using a multiple-pass interview approach (R. Johnson et al., 1996). Five distinct passes provided multiple opportunities for the father to recall food intake (APPENDIX F).

The Healthy Eating Index (HEI-2010) was calculated from the child's and father's 24 hour dietary recall to assess diet quality of the child and father. Thus, each father and child had separate scores. Components of the index (adequacy score) include total fruit, total vegetables, dairy including soy beverages, and total protein including plant and seafood sources, whole fruit, dark green vegetables and beans, whole grains, oils including non-hydrogenated vegetable oils and oils in fish, nuts, and seeds. The moderation component is comprised of saturated fat, refined grains, sodium, and calories from solid fats, alcoholic beverages, and added sugars. The measure has been validated with populations 2 years of age and over. One 24 hour diet recall has been deemed sufficient to evaluate and compare diet quality within diverse samples (Guenther et al., 2008).

Physical Activity

The preschool-age physical activity questionnaire (Pre-PAQ) was completed with the participating father to collect information about his child's as well as his own physical activity (APPENDIX M). The Pre-PAQ is a 37-item, 3-day parent-reported questionnaire that measures regular physical activity and sedentary behaviors of the parent and the preschool age child in the home environment (G. Dwyer, Hardy, Peat, & Baur, 2011). Physical activity was classified into one of three intensity levels including light, moderate, or vigorous. Items also assessed child and father sedentary activities. These items include different movements or activities that children engage in and the parent reports whether or not the child had engaged in the activity within the past 3 days and if so, the minutes the child engaged in that activity. The Pre-PAQ has shown to have acceptable validity and reliability in a sample of parents of preschool age children (G. Dwyer et al., 2011).

Statistical Analyses

All statistics were analyzed using the Statistical Package for the Social Sciences (SPSS for Windows version 21, SPSS, Inc, Chicago, IL). Descriptive statistics including frequencies, means and standard deviation, were conducted for participant demographic characteristics. Linear regression, with $p < 0.05$ significance level, was used to examine the relationships between 1) father and child BMI, 2) father and child diet quality, and 3) father and child physical activity. In each regression, father's race, ethnicity, and income (low vs. non-low) were entered as covariates due to disparities in child obesity prevalence rates among these variables (C. L. Ogden et al., 2014; Fryar et al., 2012). Because there was a small number of Asian ($n=7$) fathers, and no Alaskan Native or American Indian fathers, father's race categories were collapsed into three categories: white, black, and other/multiple.

In step 1, all covariates, including race, ethnicity, and income level were entered into the model. Predictor variables (i.e. father BMI, diet quality, or physical activity) were entered into the regression in step 2. Child-related variables, such as BMI *z*-score, diet quality, and physical activity served as the dependent variables. Physical activity intensity levels and sedentary activity minutes were analyzed separately according to weekday or weekend minutes. In post hoc analysis, father-child relationships between each component of the HEI score were examined including: total fruit, whole fruit, total vegetables, greens and beans, whole grains, dairy, total protein, plant and seafood protein sources, fatty acids, adequacy, refined grains, sodium, empty calories, and moderation. The moderating influence of child gender on these relationships was explored in post hoc analyses.

Results

A total sample of 150 fathers with preschool age children were measured and interviewed. Characteristics of the fathers and children are displayed in Table 4.1. A majority (53%) of the fathers were classified as low-income, but had a college education (51%) and were non-Hispanic (81%) and white (57%). A summary of diet quality scores and physical activity amounts for the fathers and children are detailed in Table 4.2. A majority (78%) of the fathers in this sample were overweight or obese and 24% of the preschool age children were overweight or obese. On average, children scored 59.2 points while fathers scored 53.2 points out of a possible 100 points on the HEI-2010. There were significant, positive relationships between father-child BMI, father-child diet quality, and father-child physical activity.

Body Weight

Father BMI was positively, significantly associated with child BMI *z*-score ($\beta = .03$, $p = 0.05$) even after controlling for father race, ethnicity, and income. Post hoc analyses using child

gender as a moderating variable did not reveal any gender-specific relationships between father and son body weight or father and daughter body weight.

Diet Quality

Although average scores of all dietary components for fathers and children are presented as Healthy Eating Index (HEI) scores, an index by definition is a composite, single score so readers should interpret these numbers with caution (Guenther et al., 2008). As shown in Table 4.2, total father HEI score was positively associated with child HEI score ($\beta = .39$, $p < 0.0001$). Post hoc analysis revealed that there were significant, positive relationships between all father diet quality score components and child diet quality score components, excluding dairy and total protein (Table 4.3).

Physical Activity

Relationships between father-child sedentary activity and light-, moderate, and vigorous-physical activity were calculated and examined separately for weekdays and weekends, as weekend and weekday activity patterns may vary among children and adults (G. Dwyer et al., 2011)(Table 4.3). Father weekday and weekend sedentary, light and moderate-physical activity were not significantly related to the same type of activity for their child. However, father weekday and weekend vigorous physical activity was significantly, positively associated with child weekday ($\beta = .27$, $p = 0.002$) and weekend vigorous physical activity ($\beta = .62$, $p = 0.001$), with the relationship between weekend minutes more pronounced versus the relationship between the weekday minutes.

Discussion

In this study, a relationship between father and child weight, diet quality, and vigorous physical activity was found. This is the first study to the author's knowledge to examine the

extent of paternal-preschool age child relationships between body weight, overall diet quality, and physical activity among a sample of U.S. fathers. These relationships are important because, a recent qualitative study found that fathers who are involved in their child's healthcare are open to advice regarding their child's weight, diet, and physical activity. Although, these fathers often felt left out or completely ignored by the physician (Lowenstein et al., 2013). If fathers are open to advice, but they are being ignored, practitioners may be missing key opportunities to change a child's behavior or home environment, and thus prevent child obesity.

Many studies have documented the increased risk of child obesity when both parents are overweight or obese (Burke et al., 2005; Semmler, Ashcroft, Jaarsveld, Carnell, & Wardle, 2009; Whitaker et al., 1997). These studies are limited, however, by the use of self-reported height and weight (Freeman et al., 2012; Semmler et al., 2009). Additionally, many studies focus child weight status during the age of 4 to 11 years old (Freeman et al., 2012; Leary, Smith, & Ness, 2010; Semmler et al., 2009), often missing the critical time period from birth to 5 years old. Although the study by Burke and others (2005) followed children from 16 weeks gestation to 8 years of age, it was limited by its small number of fathers. The present study adds to the existing literature by focusing on fathers of preschool age children and by using standard measuring techniques for the accurate measurement of father and child weight status. Other studies have also found gender-specific influences in which the relationship between father-son BMI or mother-daughter BMI is stronger than the relationships between father-daughter BMI or mother-son BMI (Perez-Pastor et al., 2009), although this was not found in a larger study (Leary et al., 2010) or in the present study.

There was a significant relationship between father and child diet quality. This finding is consistent with past studies using the HEI-2005. In a study of overweight and obese mothers and

their preschool age child, a significant, positive correlation ($r = 0.44$) was found between mother and child diet quality (Laster et al., 2013). In a separate study, a significant, positive albeit, weaker association ($r = 0.31$) was found between parents and their child aged 2 to 10 years old (Beydoun & Wang, 2009). This suggests that parents may have a stronger influence over their child's diet at the preschool age compared to school age children or adolescents, as peers may become a stronger influence as children age (Vereecken, Inchley, Subramanian, Hublet, & Maes, 2005), thus to change the diet quality of young children, researchers and practitioners also should consider the diet quality of parents, including fathers. The study by Beydoun and others (2009) suggested gender specific influences in which the relationship was strong among same sex parent-child pairs (Beydoun & Wang, 2009), although there were no such relationships found in this study.

Although separate components of the HEI need to be interpreted with caution, no significant relationship was found between father and child dairy and total protein component scores. The dairy relationship between father and child is not surprising. A larger study found that the relationship between mother and child intake of dairy and milk was significantly stronger than the relationship between father and child intake (Beydoun & Wang, 2009). In this study, on average, children scored more points on the dairy component compared to fathers, indicating that children are consuming more dairy per 1,000 calories. Post hoc analysis revealed that there was a significant, inverse relationship between number of meals fathers ate with their child each week and child dairy scores. This relationship did not exist for any other diet quality component. Because fathers on average had lower dairy scores, it could be that fathers may not serve or offer their child milk at meal times because they do not consume it themselves. Thus, fathers of

preschoolers may be a unique target for future dairy interventions, with a focus on serving dairy at family mealtimes.

Fathers, on average, scored more points on the total protein component compared to children. This is consistent with a similar sample, in which only about one third of preschool age children met the recommendation for meat and beans (Laster et al., 2013). Interestingly, the study by Laster and others (2013) found that although most children did not consume enough meat and beans, they were able to meet their protein requirement by substituting with dairy. This is further supported by a study that identified an eating pattern among children, termed the substituters, in which young children had higher intakes of dairy and lower intakes of meats and beans (Knol, Haughton, & Fitzhugh, 2005). This may indicate that parents are making dietary decisions for their child based on what foods their child dislikes. For example, a parent may observe that the child does not like meat, and to fill the protein void, may offer the child more milk products (Knol et al., 2005). Thus, parents, including fathers, may benefit from interventions focusing on introducing new foods including protein options to young children and how to deal with picky eaters.

This study also documented a significant, positive relationship between father-child vigorous physical activity, and no relationship between father-child sedentary activity or light- or moderate- physical activity. This relationship is important to obesity prevention. Among adults an inverse relationship has been found with time spent in vigorous physical activity and waist circumference, systolic blood pressure, triglycerides, adiposity, metabolic syndrome, and cardiovascular function, thus decreasing risk for several chronic diseases (Janssen & Ross, 2012; Tjonna et al., 2008; Wisloff et al., 2007). Furthermore, vigorous physical activity has positive cardiometabolic effects for children as well. A longitudinal study found that time spent in

vigorous physical activity at baseline predicted lower BMI z -score velocity, systolic blood pressure, and waist circumference 2 years later, while there were no benefits of light intensity physical activity (Carson et al., 2014). This indicates that time spent in vigorous physical activity is especially important in reducing an adult's and a child's risk for developing several chronic diseases, including heart disease and obesity.

When fathers are viewed as playmates for children (R. Parke, 2008), one might assume that a relationship would exist for all physical levels between a father and his child's activity. This may be partly due to the Pre-PAQ tool, as it has poor reliability with sedentary activity and better reliability with moderate- to vigorous- physical activity. Additionally, in general, self-report measures are not as robust in capturing light or moderate physical activity (Jacobs, Ainsworth, Hartman, & Leon, 1993; Sylvia et al., 2014). It may be assumed that preschool age children engage in adequate amounts of physical activity (Hodges et al., 2013), although recent studies have suggested that the levels of moderate to vigorous physical activity among preschool children is quite low (Alhassan et al., 2007; Dowda et al., 2009; Trost et al., 2008). A father's role in increasing his child's vigorous physical activity may be especially important and influential because fathers have reported more vigorous and rough and tumble play compared to mothers (Fletcher, May, St George, Morgan, & Lubans, 2011; R. D. Parke, 2002). Furthermore, fathers perceive that this vigorous, rough and tumble play enhances their relationship with their child (Fletcher et al., 2011). In the present study, qualitative information regarding physical activity was not obtained. Therefore, it could not be assessed whether or not fathers and children were participating in the reported levels of activity together or separately. Thus, future studies should employ the use of a physical activity diary to assess if vigorous rough and tumble play, or any other activities, is unique to the father-child relationship. In a program targeting overweight or

obese fathers, ‘Healthy Dads, Healthy Kids’, it was found that physical activity accounted for 47 percent of the intervention effect for the overweight fathers, and child physical activity also increased as a result, although children were not targeted (Lubans et al., 2012). However, physical activity was measured as steps per day, so it is not clear what types of activities these fathers and children were doing either. Overall, the evidence suggests that efforts focusing on increasing vigorous physical activity, specifically rough and tumble play, among fathers and children may be an efficacious strategy for preventing child obesity, however, this requires further research.

Limitations

Limitations of the study included the use of a convenience sample of fathers within one geographic region. Therefore, fathers that participated may be more interested in nutrition or involved in feeding their children, only representing a certain subgroup of fathers. Because only one 24 hour recall was performed, we are not able to assess habitual intake of the child. The accuracy of the child’s dietary intake is limited due to only one 24 hour recall collected and its dependence on a father’s report of his child’s dietary intake. Steps were taken to include only data that the father could verify as reliable. Only two fathers in the sample were deemed “unreliable” because they were only able to report the dinner meal for their child, and these children’s diet quality score was omitted from the final sample. Additionally, physical activity was based on parent report but assessed with a previously validated tool. As this is novel study, it provides formative information and additional research questions can be formed to understand paternal influences on child weight-related factors more completely.

Conclusion

To prevent childhood obesity, the prime time to intervene is the period before a child turns 5 years old. Children at this age rely on parents to set the foundation for eating behaviors and physical activity for the rest of their lives (S. Anzman et al., 2010; L. Birch & Ventura, 2009). While obesity prevention is a complex process, novel strategies are needed. Because a father's body weight, diet quality, and vigorous physical activity level may have a strong relationship to his preschool age child's, future interventions should consider the role of a father in addition to a mother in future efforts to prevent childhood obesity.

Table 4.1. Characteristics of fathers and their preschool age children^a

Variable		Mean	SD
Fathers (n=150)			
Age (years)		37.37	(7.52)
BMI (kg/m ²)		29.63	(5.75)
BMI classification		n	(%)
Underweight		3	(2)
Healthy		30	(20)
Overweight		47	(31)
Obese		70	(47)
Race			
White		86	(57)
Black or African American		28	(19)
Asian or Asian American		7	(5)
Other/Multiple Races		29	(19)
Ethnicity			
Hispanic		28	(19)
Non-Hispanic		122	(81)
Income			
Low-income		79	(53)
Mid- to High-income		71	(47)
Education level: n (%)			
Less than high school		4	(3)
High school diploma/GED		23	(15)
Some college/technical school		47	(31)
4 year degree or more		76	(51)
Children			
Child age (months)		49.06	(8.19)
Child BMI z-score (kg/m ²) (n=149)		.44	(1.11)
		n	%
Male gender		83	(55)
BMI Classification			
Underweight		5	(3)
Healthy		108	(72)
Overweight		21	(14)
Obese		15	(10)

^a Not all percentages may round to 100 due to either rounding or fathers choosing multiple categories (i.e. race)

Table 4.2. Summary of diet quality scores and physical and sedentary activity time among fathers and their preschool age child.

Variable	N	Father Mean	SD	N	Child Mean	SD
Overall Diet Quality (points)	149	53.2	(15.5)	148	59.2	(15.1)
Adequacy		28.3	(10.2)		31.6	(9.1)
Total fruit		1.9	(2.0)		3.3	(1.9)
Whole fruit		1.9	(2.2)		3.0	(2.2)
Total vegetables		2.9	(1.8)		1.7	(1.5)
Greens/Beans		1.7	(2.3)		0.8	(1.6)
Whole grains		4.5	(4.4)		5.9	(4.1)
Dairy		5.5	(3.6)		8.2	(2.8)
Total protein		4.1	(1.4)		3.4	(1.6)
Plant/Seafood protein		1.7	(2.2)		1.9	(2.3)
Fatty Acids ratio		4.1	(3.8)		3.6	(3.8)
Moderation		25.1	(7.1)		28.0	(7.6)
Refined grains		6.4	(3.8)		6.9	(3.4)
Sodium		4.2	(3.8)		6.2	(3.4)
Empty calories		14.5	(5.6)		14.8	(4.9)
Weekday Activity (min/day) ^a						
Sedentary	147	165.64	(204.11)	147	218.07	(160.27)
Light intensity		88.38	(160.43)	147	53.33	(66.90)
Moderate intensity		14.44	(67.75)	146	132.71	(221.73)
Vigorous intensity		34.56	(89.10)	147	73.28	(95.77)
Weekend Activity (total min)						
Sedentary		381.22	(383.57)	147	511.13	(373.24)
Light intensity		140.74	(294.02)	147	154.90	(173.19)
Moderate intensity		32.57	(128.90)	146	344.78	(597.84)
Vigorous intensity		57.30	(107.52)	147	181.93	(234.34)

^a Sedentary activity: 1 metabolic equivalent (METs); Light intensity physical activities: 3 METs; Moderate intensity physical activity: 3 to 6 METs; Vigorous physical activity: greater than 6 METs.

Table 4.3. Relationship between paternal-child weight status, diet quality, and physical activity^a

Variable	β	SE ^b	<i>p</i> -value
BMI ^c	.03	(.02)*	0.05
Overall diet quality	.40	(.09)***	<0.0001
Adequacy	.35	(.08)***	<0.0001
Total fruit	.18	(.08)*	0.035
Whole fruit	.20	(.09)*	0.028
Total vegetables	.29	(.06)***	<0.0001
Greens/Beans	.27	(.06)***	<0.0001
Whole Grains	.28	(.08)**	0.001
Dairy	.00	(.07)	0.704
Total protein	.09	(.13)	0.481
Plant/Seafood protein	.23	(.09)**	0.008
Fatty Acids Ratio	.19	(.08)*	0.018
Moderation	.34	(.08)***	<0.0001
Refined Grains	.32	(.07)***	<0.0001
Sodium	.24	(.08)**	0.002
Empty calories	.24	(.07)***	0.001
Weekday Activity (min/day)			
Sedentary	.10	(.07)	0.137
Light intensity	.07	(.08)	0.076
Moderate intensity	.23	(.27)	0.396
Vigorous intensity	.27	(.09)**	0.002
Weekend Activity (total min)			
Sedentary	.08	(.08)	0.332
Light intensity	.08	(.05)	0.102
Moderate intensity	.14	(.39)	0.728
Vigorous intensity	.62	(.18)**	0.001

^a Child-related variables as predicted by paternal-related variables

^b * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

^c BMI used for fathers. BMI *z*-score used for child.

Chapter V: Influence of paternal perception of the role of the father and his view of his partner's perception role of the father on paternal feeding practices and child diet quality and/or body weight

Abstract

It is currently unknown how a father's perception of his role or, how his partner views his role, at mealtimes influences his child's nutritional status. Therefore, the aim of this study was to evaluate the influence of father reported maternal and paternal perceptions of the role of the father on child feeding practices, as well as child diet quality and body weight. This study included a one-time, one-on-one interview with biological fathers (n=150) of preschool age children (ages 3-5 years old) using the Role of the Father Questionnaire to assess a father's perception of his own role and of his partner's perception of his role in mealtimes. Father's feeding practices were assessed using the Child Feeding Questionnaire. Child dietary Healthy Eating Index scores were calculated from an interviewer administered 24 hour recall with the father. Height and weight for each father and child were also measured and child body mass index z-scores were calculated. Linear regression was used to examine the relationship between the role of the father, paternal feeding practices and child nutritional status. Overall, the findings revealed that only the father's perception of his role at mealtimes was associated with higher perceived responsibility for child feeding ($\beta = .033$, $p = 0.020$), and lower use of controlling feeding practices, including pressure to eat ($\beta = -.048$, $p = 0.029$) and restriction ($\beta = -.030$, $p = 0.05$). The father's appraisal of his partner's perception of his role at mealtimes did not moderate any of these relationships. These results suggest that a father's beliefs regarding his role at mealtimes, and not his views of the mother's perception, may influence his own feeding practices.

Introduction

Often, when the discussion of the “family’s” role in childhood obesity prevention is presented, the responsibility is often placed upon the mother (Tanner, Peterson, & Fraser, 2013), however, many researchers are now attempting to unveil the role of the father in the family’s role in childhood obesity prevention (Tanner et al., 2013). Traditionally, fathers have been viewed as the breadwinner or playmate of their children, while mothers have been defined as the caretaker of their children (Cabrera et al., 2000). Yet, only about 25 percent of children live in two-parent families in which the father serves as the sole breadwinner (Hofferth, 1998). This may indicate that the definition of the role of the father within a family has shifted (B. McBride et al., 2005; Pleck, JH. & Masciadrelli, BP., 2004). Increased involvement of a father in caretaking responsibility may have positive effects for families and children (Pleck, JH. & Masciadrelli, BP., 2004). In an Australian study, fathers who perceived their role as a father positively, ate significantly more meals with their child (K. M. Mallan et al., 2013), however it is unknown how a father’s feeding practices would be influenced by his perception of his role as a father, or if a father’s perception of his role at mealtime would be more influential on his feeding practices.

Feeding practices are of great interest to childhood obesity prevention. These feeding practices, including monitoring a child’s intake, pressure to eat, and restriction are rarely measured among fathers. Similar to mothers, paternal use of pressure to eat was inversely associated with child BMI *z*-score (J. Blissett et al., 2006). Paternal use of restriction has been linked to higher child weight status (Johannsen et al., 2006; Musher-Eizenman et al., 2006), and higher concern for a child’s future overall health (Johannsen et al., 2006) while other studies have found no significant relationship between paternal controlling feeding practices and child body mass index [BMI] (J. Blissett et al., 2006).

According to studies in the fathering literature, the impact of fathers on children not only depends on a child's direct interactions with his or her father, but also on the congruence between the father's behavior and their partner's (in male-female relationships) perception of the father's role (M. Lamb, 2008). Because the role of the father is more loosely defined by societal norms than the role of the mother, a father's own perceptions of his role in his child's life may drive his behavior (R. Parke, 2008; Tamis-LeMonda, CS. & Cabrera, N., 1999). For example, if a father believes that it is the mother's job to feed the children, he may not participate in child feeding during meal times. A qualitative study found that mothers of preschool aged children described fathers as peripheral to the food responsibility role. Specifically, fathers were described as neither skilled nor interested in healthy food preparation compared to mothers (Tanner et al., 2013). Thus, a mother's attitudes or beliefs may influence a father's involvement in feeding or providing food for young children.

A mother's perception of a father's role in a family can also influence father identity, and even father involvement (Rane, TR. & McBride, BA., 2000). This can be reflected in a mother's behaviors, often referred to as maternal gatekeeping (B. McBride et al., 2005). Maternal perceptions of a father's role in a family and child care giving is a very powerful predictor of father involvement, regardless of a father's own perception of his role (Grossman, Pollack, & Golding, 1988; McBride, BA. & Rane, TR., 1997; B. McBride et al., 2005). If a mother does not perceive a father to be important, then the mother may adopt behaviors or attitudes that inhibit the father from increasing his involvement (B. McBride et al., 2005). Furthermore, the father's perception of the mother's opinions can also affect a father's involvement (K. Pasley, Gutrin, & Skinner, 2003). Thus, the role of the father in child feeding needs further research. Specifically, it is unclear how a father's perception of how his partner (in this case, the child's mother)

perceives his role in a family may influence his child feeding practices and his child's nutritional status such as diet and body weight. Therefore, the aims of this study are to determine the relationship of: 1) father reported maternal and paternal beliefs of the role of the father (ROF) in the family or at mealtimes on feeding responsibility and monitoring child intake of his preschool age child and 2) father reported maternal and paternal beliefs of the ROF in the family or at mealtimes on his controlling feeding practices, including restriction or pressure to eat. It is hypothesized that paternal perception of the ROF or role of the father at mealtimes [ROFM] will be positively related to paternal feeding responsibility and monitoring of child intake on the Child Feeding Questionnaire [CFQ], only when father-reported maternal perception of the ROF or ROFM scores are high, indicating that dad is able to and should be involved. It is also hypothesized that paternal perceptions of the ROF or ROFM will be positively associated with paternal controlling feeding practices, only when father-reported maternal perceptions of the ROF or ROFM scores are high. This hypothesis is based on previous studies of mostly mothers in which perceived responsibility for child feeding was positively associated with controlling feeding practices (Geng et al., 2009; Kaur et al., 2006; Spruijt-Metz et al., 2002).

Material and Methods

Subject Population & Recruitment

The study was approved by the University of Connecticut-Storrs Institutional review Board for Human Subjects. A convenience sample of fathers was recruited primarily from local preschool centers. Inclusion criteria were: biological father of at least one child between 3 and 5 years old who eats at least 1 meal per week with that child, at least 18 years of age, able to read and understand English. Fathers could be of any race or ethnicity, education level, or income level.

Data Collection and Measures

Written informed consent (Appendix D) was obtained from each father prior to the interview. Fathers also provided consent for their preschool age child and were offered a copy of the consent form once it was signed. Each father completed a one-time, one-on-one interview with a trained researcher that lasted 60 to 90 minutes. Fathers self-reported demographic information, including race, ethnicity, education level, and age (APPENDIX N). To establish income levels (low vs. non-low), each father was asked if he or his child were eligible for government assistance programs, such as Head Start, Supplemental Nutrition Assistance Program, or Women, Infants, and Children. If a father had more than one preschool age child, the interviewer specified that the father should answer the questions regarding his youngest child between the ages of 3 and 5 years old. Father and child height and weight was measured using standard techniques (Centers for Disease Control, January 2009) using a portable digital scale (Seca 869 or 874) and stadiometer (Seca 217) to calculate Body Mass Index (BMI), BMI z-score (for child). BMI z-scores were calculated using The Children's Hospital of Philadelphia online calculator (The Children's Hospital of Philadelphia Research Institute, 2014), which was based on the Centers for Disease Control growth charts (Kuczmarski et al., 2002). Because children over 2 years of age were measured, overweight BMI z-score was defined as ≥ 1 standard deviation and obese BMI z-score was defined as ≥ 2 standard deviations (Kuczmarski et al., 2002). Additionally, fathers answered questions regarding their perception and their appraisal of their partner's perception of the role of the father in the family and at mealtimes, feeding practices, and child diet quality. A \$25 gift card incentive was provided at the end of the interview to each father.

Role of the Father Questionnaire (ROFQ)

Each father completed two Role of the Father Questionnaires (ROFQ) with the interviewer: one to report his perception of his partner's (child's mother) view of his role as a father ($\alpha = .77$) and another ROFQ to report his own perception of his role as a father ($\alpha = .66$) (Palkovitz, 1984). The ROFQ (APPENDIX K) is a 14-item questionnaire using a 5-point scale ranging from "strongly agree" to "strongly disagree." Higher scores indicate that the respondent believes the father is capable of and demonstrates involvement with his child (B. McBride et al., 2005). Maternal scores can be an indication of maternal gatekeeping that may encourage or discourage father involvement (B. McBride et al., 2005). This measure was originally developed for parents of infants, but has been adapted and used with parents with preschool children (B. McBride et al., 2005). Three items (#2, 10, and 13) as shown in Appendix K, were removed from each questionnaire to improve reliability. These questions did not perform well in capturing ROF and reliability was low ($\alpha < 0.60$)

Role of the Father at Mealtimes Questionnaire (ROFMQ)

Each father completed two Role of the Father at Mealtime Questionnaires (APPENDIX L) with the interviewer as well: one to report his perception of his partner's (child's mother) view of his role as a father at mealtimes ($\alpha = .68$) and another to report his own perception of his role at mealtimes ($\alpha = .71$). This questionnaire was developed by the authors by adapting 10 items from the original ROFQ measure to apply only to the mealtime environment. The same 5-point scale was used ranging from "strongly agree" to "strongly disagree."

Paternal feeding practices

Paternal child feeding practices and concern for child's weight was assessed using the Child Feeding Questionnaire (CFQ). The CFQ is a 31-item questionnaire (APPENDIX H) that determines a parent's responsibility for child feeding ($\alpha = .80$), restriction ($\alpha = .75$), pressure to eat ($\alpha = .72$), and monitoring of child's eating ($\alpha = .88$) using a 7-point Likert scale with word anchors. This questionnaire has been validated in a diverse sample of parents with children between the ages of 2 and 11 years old (L. Birch et al., 2001).

Statistical analyses

All statistics were analyzed using the Statistical Package for the Social Sciences (SPSS for Windows version 21, SPSS, Inc, Chicago, IL). Descriptive statistics including means and standard deviations, were conducted for participant demographics as well as ROF and ROFM scores. Significance level at $p < 0.05$ was used for all analyses. Linear regression was used to examine relationships between self and partner perception of ROF, self and partner perception of ROFM on the dependent variables, paternal feeding practices, and child diet quality and/or BMI z-score. In each regression, father's race, ethnicity, and income (low vs. non-low) were entered as covariates. Because there was a small number of Asian ($n=7$) fathers, and no fathers in the Alaskan Native or American Indian group, father race categories were collapsed into three categories: white, black, and other/multiple.

In step 1, all covariates, including race, ethnicity, and income level were entered into the model due to disparities in child obesity prevalence rates among these variables (C. L. Ogden et al., 2014; Fryar et al., 2012). Predictor variables (i.e. ROF, ROFM) were entered into the regression in step 2. In step 3, the interaction term was entered to test for moderation (i.e. ROF father X ROF partner). Multiplication of the centered independent variables was used to

calculate interaction variables to eliminate any collinearity issues. If the interaction term was significant, post hoc analyses were performed. Using a median split, the hypothesized moderating predictor was categorized into high or low levels (i.e. low vs. high ROF) and then relationships between predictor variable and outcome variable were examined under each high or low condition.

Results

A total sample of 150 fathers with preschool age children were measured and interviewed. Demographic characteristics for fathers and children are displayed in Table 5.1. A majority (53%) of the fathers were classified as low-income, but had a college education (51%) and were non-Hispanic (81%) and white (57%). A majority of the fathers in this sample were married (75%) or living with a partner (21%) and the average length of these relationships was over 8 years.

Role of the Father, Role of the Father at Mealtimes, and Paternal Feeding Practices

Using the responsibility items on the CFQ, on average, fathers reported that they were responsible half of the time for feeding their child, deciding what their child's portion sizes are, and deciding if their child has ate the right type of foods (Table 5.2).

The father's own perception of his role as a father was not associated with his perceived responsibility ($\beta = 0.03$, $p = 0.102$) in either feeding his child or monitoring ($\beta = 0.02$, $p = 0.379$) of his child's food intake (Table 5.3). The father's perception of his partner's view of the ROF did not moderate any of these relationships.

The father's own perception of the ROF was not associated with his use of pressure to eat ($\beta = .03$, $p = 0.393$) or use of restrictive feeding practices ($\beta = .00$, $p = 0.907$). The father's perception of his partner's view of the ROF did not moderate either of these relationships.

In contrast, the father's own perception of the ROFM was significantly, positively associated with his perceived responsibility in child feeding ($\beta=.03$, $p=0.020$), but it was not significantly associated with monitoring ($\beta= 0.02$, $p= 0.200$) of child intake (Table 5.3). The father's perception of his partner's views of the ROFM did not modify either of these relationships.

The father's own perception of the ROFM was inversely associated with paternal use of pressure to eat ($\beta=-.048$, $p=0.029$) and restrictive ($\beta=-.030$, $p=0.058$) feeding practices (Table 5.3). The father's perception of his partner's views of the ROFM did not moderate either of these relationships.

Discussion

This is the first study, to the authors' knowledge, to explore how a father's perception and his view of the mother's perception of his role as a father in the family, and at meal times, may influence his child feeding practices. Overall, fathers reported being responsible for child feeding half of the time, suggesting that fathers perceive that they share responsibility in child feeding with a child's mother. This study found that a father's perception of his ROF in the family was not significantly related to his perceived responsibility for child feeding or paternal feeding practices such as monitoring, restriction, or pressure to eat. Although the study by Mallan and others (2013), provided some evidence that a father's perception of his role may have an influence over his perception of responsibility in child feeding or how often a father eats family meals, the authors did not provide any information on paternal feeding practices or child obesity risk.

This study found that if fathers believed they demonstrated more involvement in meal times, it was associated with higher perceived responsibility for child feeding and lower

frequency of controlling feeding practices, including pressure to eat and restriction. High parental pressure to eat and restriction are often deemed counterproductive feeding practices. This is especially interesting considering that studies of mostly mothers, have found positive, significant relationships between perceived responsibility for child feeding and controlling feeding practices (Geng et al., 2009; Kaur et al., 2006; Spruijt-Metz et al., 2002). Pressuring a child to eat may be successful in the short term for a parent's goals but some studies have found that pressure to eat has been associated with increased intake of the target food (Orrell-Valente et al., 2007), and ultimately, calories consumed (Drucker et al., 1999). Constant pressure on a child to eat a certain amount of food or to finish a serving, will undermine a child's internal satiety and fullness cues. Therefore, a child will rely on environmental cues to stop eating, thus leading to the potential for over eating (Carper et al., 2000). Restriction is another controlling feeding practice found to have counterproductive effects that has been implicated in the child obesity literature. Overt restriction, in which a parent restricts a child's access to specific foods, has been associated with excessive weight gain (Clark et al., 2007), and overconsumption of the restricted food when it is made available (J. Fisher & Birch, 1999). The results of this study suggest that high involvement of dads at mealtimes could be beneficial because they may use less controlling feeding practices, thus higher involvement of fathers at mealtimes may be protective against child obesogenic behaviors. Even though higher levels of involvement in meal times predicted lower use of paternal controlling feeding practices in this study, higher paternal involvement may not always be beneficial if dads use counterproductive feeding practices. For example, if higher involvement is associated with higher counterproductive feeding practices in other samples, it may be detrimental to child obesogenic behaviors compared to the influence of

counterproductive feeding practices of fathers who are less involved. Thus, this requires further investigation.

This study also adds to the existing literature because it not only assesses a father's perception of his role in general and at mealtime, but also his view of his partner's perception of his role as a father. In existing literature, it has been found that a mother's beliefs of the ROF moderate the relationship between father's beliefs of the ROF and paternal involvement (B. McBride et al., 2005). A father's appraisal of his partner's perception of ROF has also been found to moderate this relationship (K. Pasley et al., 2002). Although this relationship was not found, the study by Pasley and others used a different measure to assess a father's appraisal of his partner's perception, and children ranged in ages from 1 to 18 years of age. Furthermore, in the present study there was not much variation in the score of father's perception of his partner's view of the ROF or ROFM, indicating that fathers perceived their partner's viewed them as important in the family and during mealtimes (Table 5.2). Thus, this hypothesis requires further testing with larger samples of fathers, including non-custodial fathers as a majority of this sample was either married to or living with the child's mother.

Other variables besides a father's own perception of his role may influence a father's involvement or behaviors (Allen & Hawkins, 1999). It has been suggested that the quality of the marital relationship or partnership between the mom and dad can influence the relationship between paternal perception of the ROF and paternal involvement (Bonney et al., 1999; Fagan, J. & Barnett, M., 2003). Only a small number of fathers in this sample were single or divorced/separated, thus, a majority of the fathers were married to or living with their child's mother. Although marital status and length of relationship were collected, neither marital satisfaction and/or quality were measured in this study, and should be included in future studies

to fully understand the relationship between father and mother perception of the ROF and paternal involvement and feeding practices.

Limitations

Although this study fills a void in the literature by examining how a father perceives his role may influence his feeding practices, it is not without limitations. A convenience sample was used and may not be representative of all fathers. Fathers that participated may be more interested in nutrition or involved in feeding their children, only representing a certain subgroup of fathers. This is evident given the high scores for all measures of the role of the father (Table 5.1), thus, these results may only be generalizable to fathers who have high levels of involvement in their family and at mealtimes.

All questionnaires have been validated in parents of preschoolers, which includes both mothers and fathers. These questionnaires have not, however been validated just for fathers.

If the participating fathers are not actively involved in feeding their children, but are still present at meals, it could impact data quality, because the influence of the mother is missing. Furthermore, because only fathers were interviewed, it is unknown how mothers and fathers in this sample divide feeding responsibility and if fathers report their partner's perception of the ROF accurately. However, this study fills a necessary gap in the feeding literature and provides rationale to include fathers in future studies and child obesity prevention programs.

Conclusion

It has been suggested that fathers should no longer be ignored in childhood obesity prevention efforts (Hall et al., 2011), and this study provides evidence that the way a father perceives his role at mealtimes may influence his behavior or feeding practices. Such beliefs or behaviors that a father has in regards to mealtime may be of utmost importance when trying to

engage fathers in childhood obesity prevention (K. M. Mallan et al., 2013). Of course, high paternal involvement in family mealtimes is not guaranteed to be positive, and in fact, high paternal involvement may not be desirable if a father has maladaptive feeding practices or unhealthy eating habits. Thus, when attempting to change paternal feeding practices, it may be necessary to consider a father's own perception of his role at mealtimes and determine if that role is positive or negative.

Table 5.1. Characteristics of fathers and their preschool age children^a

Variable	Mean	SD
<u>Fathers (n=150)</u>		
Age (years)	37.37	(7.52)
BMI (kg/m ²)	29.625	(5.75)
	n	(%)
BMI classification:		
Underweight	3	(2)
Healthy	30	(20)
Overweight	47	(31)
Obese	70	(47)
Race:		
White	86	(57)
Black or African American	28	(19)
Asian or Asian American	7	(5)
Other/Multiple Races	29	(19)
Ethnicity:		
Hispanic	28	(19)
Non-Hispanic	122	(81)
Income:		
Low-income	79	(53)
Mid- to High-income	71	(47)
Education level:		
Less than high school	4	(3)
High school diploma/GED	23	(15)
Some college/technical school	47	(31)
4 year degree or more	76	(51)
Marital Status:		
Married	113	(75)
Living with partner	31	(21)
Single, never married	5	(3)
Divorced/Separated	9	(6)
<u>Children</u>	Mean	(SD)
Age (months)	49.1	(8.2)
BMI z-score (kg/m ²) (n=149)	.44	(1.11)
	n	(%)
Gender (male)	83	(55)
BMI Classification (n=149):		
Underweight	5	(3)
Healthy	108	(72)
Overweight	21	(14)
Obese	15	(10)

Not all percentages may round to 100 due to either rounding or fathers choosing multiple categories (i.e. race)

Table 5.2 Summary of independent and dependent variables used in statistical analyses

Variable	Mean	SD
<u>Fathers (n=150^a)</u>		
Length of relationship with partner (months)	106.7	(51.6)
Role of the Father Questionnaires		
Role of the father, self (n=149)	56.0	(3.4)
Role of the father, partner (n=146)	55.5	(3.8)
Role of the father at mealtimes, self (n=148)	41.0	(4.8)
Role of the father at mealtimes, partner (n=146)	39.4	(5.0)
Child Feeding Questionnaire		
Perceived responsibility	3.4	(0.8)
Monitoring of child intake	4.0	(1.0)
Restriction	3.6	(0.9)
Pressure to eat	3.2	(1.3)

^a Sample size is n=150, unless otherwise noted

Table 5.3. Relationship between paternal perception of the role of a father in the family and at mealtimes on paternal feeding practices

		Paternal Perception of a Father's Role (Predictor Variables)	
		Role of the Father (n=149)	Role of the Father at Mealtimes (n=148)
Paternal feeding practices (Dependent Variables)		β (SE) ^a	β (SE) ^a
	Responsibility	.03 (.02)	.03 (.02)*
	Monitoring	.02 (.03)	.02 (.02)
	Pressure to Eat	.03 (.03)	-.05 (.02)*
	Restriction	.00 (.02)	-.03 (.02)*

^a* $p < 0.05$

Chapter VI. Conclusions

Major Findings

In conclusion, this study provides evidence that a father's feeding practices and style have an influence on the relationship between child eating behaviors and child weight status. There are relatively few studies examining a father's influence on a child's diet, eating behavior, or weight status, and most studies often define the "parent" as the mother. In this study, paternal feeding practices as moderated by style were not associated with child diet quality or weight status, however, they were associated with child appetitive traits. This indicates that there may be an unknown factor between parent feeding behaviors, child appetitive traits, and child diet quality and/or weight status. While obesity prevention is a complex process, novel strategies are needed. Furthermore, this study has shown evidence that a father may have an influence over his child's weight, diet quality, and vigorous physical activity.

It has been suggested that fathers should no longer be ignored in childhood obesity prevention efforts (Hall et al., 2011), and this study provides evidence that the way a father perceives his role at mealtimes may influence his behavior or feeding practices. Such beliefs or behaviors that a father has in regards to mealtime may be of utmost importance when trying to engage fathers in childhood obesity prevention (K. M. Mallan et al., 2013). Of course, high paternal involvement in family mealtimes is not guaranteed to be positive, and in fact, high paternal involvement may not be desirable if a father has maladaptive feeding practices or unhealthy eating habits. Thus, when attempting to change paternal feeding practices and diet and/or physical activity, it may be necessary to consider a father's own perception of his role at mealtimes and determine if that role is positive or negative.

Strengths

The strength of this study is that it is the first to measure the complex set of relationships between paternal feeding practices, feeding style, and child eating behavior among a group of U.S. fathers. There are relatively few studies that have examined relationships between fathers and preschool age children's diet and physical activity. Studies often only consist of white, middle- to high-income fathers while a majority of fathers in this study were considered low-income. Existing studies have focused solely on food groups consumed, and not the overall quality of diet among children and fathers. One of the strengths of this study is using the HEI-2010 to control for quantity of food calculated from a standardized, multiple pass 24 hour dietary recall. Additionally, this study discriminates between light-, moderate-, and vigorous physical activity to give a more accurate view of the relationship between father and child physical activity. Furthermore, this study measured father and child body weight and height using standard techniques. It is the first study to our knowledge to closely explore what can influence a father's feeding practices including a father's perception of his role in the family and at mealtimes, as well as, his appraisal of his partner's view of a father's role in the family and at mealtimes.

Limitations

Limitations of the study included the use of a convenience sample of fathers within one geographic region. Therefore, fathers that participated may be more interested in nutrition or involved in feeding their children, only representing a certain subgroup of fathers. Because only one 24 hour recall was performed, we are not able to assess habitual intake of the child. The accuracy of the child's dietary intake is limited due to only one 24 hour recall collected and its dependence on a father's report of his child's dietary intake. Steps were taken to include only

data that the father could verify as reliable. Only two fathers in the sample were deemed “unreliable” because they were only able to report the dinner meal for their child, and these children’s diet quality score was omitted from the final sample. Additionally, physical activity was based on parent report, without qualitative information regarding activity time spent together, but assessed with a previously validated tool.

Additionally, if the participating fathers are not actively involved in feeding their children, but are still present at meals, it could impact data quality, because the influence of the mother is missing. Furthermore, because only fathers were interviewed, it is unknown how mothers and fathers in this sample divide feeding responsibility and if fathers report their partner’s perception of the ROF or ROFM accurately. However, this study fills a necessary gap in the childhood obesity prevention literature and provides rationale to include fathers in future studies and child obesity prevention programs.

Future Directions

While obesity prevention is a complex process, novel strategies are needed. Because a father’s body weight, diet quality, and vigorous physical activity level may have a strong relationship to his preschool age child’s, future interventions should consider the role of a father in addition to a mother in future efforts to prevent childhood obesity. More studies need to include fathers, as well as mothers and fathers who cohabitate to gain an understanding of synergistic feeding and its influence on child diet, eating behavior, and weight status. Because these results indicate that there may be an unknown factor between parent feeding behaviors, child appetitive traits, and child diet quality and/or weight status, future studies are needed on this topic, and more specifically, longitudinal studies are especially needed to understand the direction of these relationships.

It is unknown how parents would respond if they were aware of their child's genetic propensity to exhibit specific appetitive traits that could increase their risk for obesity (M. Faith et al., 2013). Some research suggests that people appreciate and respond well to personalized information for weight control (Frosch, Mello, & Lerman, 2005). This may provide a novel avenue for child obesity prevention in which parents receive individualized assessment of his or her child's eating behaviors and counseling in regards to feeding practices, home food availability, or feeding styles that may attenuate or exacerbate the child's risk for obesity (M. Faith et al., 2013), however, it's unknown how parents would respond to this information.

Prior to such prevention efforts, more research is needed to understand the complex relationship between parent feeding behaviors, particularly paternal, and their influence on a child's eating behavior, diet, and/or weight status. As evidenced by this study, there are many factors that can moderate a parent's feeding behaviors on child related outcomes. Because a father's body weight, diet quality, and vigorous physical activity level may have a strong relationship to his preschool age child's, future interventions should consider the role of a father in addition to a mother in future efforts to prevent childhood obesity.

APPENDIX A
Institutional Review Board [IRB] Approval Letter



University of Connecticut
Office of Research Compliance

DATE: February 18, 2013

TO: Amy Mobley, Ph.D., RD
Rachel Vollmer, MS, RD
Nutritional Sciences, Unit 4017

FROM: Deborah Dillon McDonald, RN, Ph.D.
Chair, Institutional Review Board
FWA# 00007125

RE: Protocol #: H13-021, "Understanding Family Influences on a Young Child's Diet and Physical Activity"
Please refer to the Protocol# in all future correspondence with the IRB.
Funding Source: Faculty Start-Up
Approval Period: From: February 18, 2013 Valid Through: February 18, 2014
"Expiration Date"

On February 8, 2013, the Institutional Review Board (IRB) reviewed the above-referenced research study by expedited review and determined that modifications were required to secure approval. Those requirements have been met, and the IRB granted approval of the study on February 18, 2013. The research presents no more than minimal risk to human subjects and qualifies for expedited approval under categories # 4 - Collection of data through noninvasive procedures (not involving general anesthesia or sedation) routinely employed in clinical practice, excluding procedures involving x-rays or microwaves and #7 - Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies..

Enclosed is the validated consent form, which is valid through February 18, 2014. **A copy of the approved, validated consent form (with the IRB's stamp) must be used to consent each subject.**

All investigators at the University of Connecticut are responsible for complying with the attached IRB "Responsibilities of Research Investigators."

Re-approval: It is the investigator's responsibility to apply for re-approval of ongoing research at **least once yearly**, or more often if specified by the IRB. The Re-approval/Completion Form (IRB-

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Facsimile: (860) 486-1044
web: compliance.uconn.edu

2) and other applicable re-approval materials must be submitted **one month** prior to the expiration date noted above.

Modifications: If you wish to change any aspect of this study, such as the procedures, the consent forms, the investigators, or funding source, please submit the changes in writing to the IRB using the Amendment Review Form (IRB-3). All modifications must be reviewed and approved by the IRB prior to initiation.

Audit: All protocols approved by the IRB may be audited by the Research Compliance Monitor.

Please keep this letter with your copy of the approved protocol.

Attachments:

1. Validated Consent Form
2. Validated Recruitment Flyer and Email Messages
3. Validated Appendix A
4. Validated IRB-1
5. "Responsibilities of Research Investigators"



DATE: February 12, 2014

TO: Amy R. Mobley, Ph.D., RD
Rachel Vollmer, MS, RD, Student Investigator
NUSC, Unit 4017

FROM: Jaci L. VanHeest, Ph.D. *JLH*
Chair, Institutional Review Board
FWA# 00007125

RE: Protocol #H13-021: "Understanding Family Influences on a Young Child's Diet and Physical Activity"
Please refer to the Protocol# in all future correspondence with the IRB.
Funding Source: Faculty Start-up
Re-approval Period: From: February 18, 2014 Valid Through: February 18, 2015
"Expiration Date"

The Institutional Review Board (IRB) re-approved this protocol on February 12, 2014. The research presents no more than minimal risk to human subjects and qualifies for expedited approval under category #4: Collection of data through noninvasive procedures (not involving general anesthesia or sedation) routinely employed in clinical practice, excluding procedures involving x-rays or microwaves. Where medical devices are employed, they must be cleared/approved for marketing; and #7: Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies. Because this study is closed to new enrollment, and remains open for data analysis only, the consent form was not re-validated.

All investigators of the University of Connecticut are responsible for complying with the "Responsibilities of Research Investigators" attached to this letter.

Re-approval: It is the investigator's responsibility to apply for re-approval of ongoing research at **least once yearly**, or more often if specified by the IRB. The Re-approval/Termination Form (IRB-2) and other applicable re-approval materials must be submitted **one month** prior to the expiration date noted above.

Modifications: If you wish to change any aspect of this study, such as the procedures, the consent forms, the investigators, or funding source, please submit the changes in writing to the IRB using the Amendment Review Form (IRB-3). All modifications must be reviewed and approved by the IRB prior to initiation.

Audit: All protocols approved by the IRB may be audited by the Post Approval Monitor.

Please keep this letter with your copy of the approved protocol.

Attachments:

1. Validated IRB-2 Re-approval Form
2. "Responsibilities of Research Investigators"

Office of the Vice President for Research
Research Compliance Services
438 WHITNEY ROAD EXTENSION UNIT 1249
STORRS CT 06269-1249
PHONE 860.486.6802
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compliance@uconn.edu

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APPENDIX B

Study Advertisement Materials



University of Connecticut



Fathers of Preschool Children Wanted for a Research Study

“Understanding Family Influences on a Young Child’s Diet and Physical Activity”

We are conducting one-on-one interviews to talk to fathers about their preschool child’s eating and physical activity habits.

The one-time interview will last for 90 minutes at a community site convenient for you.

- Each father will be asked questions in a one-on-one interview related to their child’s eating and physical activity habits

Who is eligible?

- Fathers (18 years and older) who have at least 1 biological child between the ages of 3 and 5 years old and eat at least one meal with the child per week
- Able to speak English

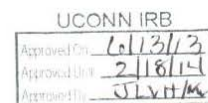
You may not directly benefit from this research. However, we hope that your participation can help us to educate other parents about eating and physical activity behaviors.

Fathers will receive \$25 after the interview.

To learn more about this project, please contact

Rachel Vollmer at rachel.rogers@uconn.edu or 860-486-3681 OR

Dr. Amy Mobley at amy.mobley@uconn.edu or 860-486-3681.



Fathers of Preschool Age Children: Human Subjects Requested

"Understanding Father's Influences on a Young Child's Diet and Physical Activity"

The University of Connecticut's Department of Nutritional Sciences is looking for fathers of children ages 3 to 5 years old to take part in an interview. The purpose of this study is to talk to fathers in a semi private setting about their family's eating and physical activity habits. The one-time interview will last up to 90 minutes at a local community or campus site during a convenient time.

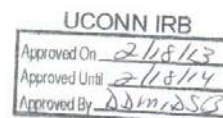
Who is eligible?

- Fathers (18 years and older) who have at least 1 biological child between the ages of 3 and 5 years old and eat at least one meal per week with the child
- Able to speak English

Fathers may not directly benefit from this research. However, participation may help us understand how fathers influence their child's dietary and physical activity behaviors and body weight. In addition, we hope to learn how family habits can help prevent childhood obesity.

Participants will receive a \$25 gift card after the interview.

To learn more about this study, contact Rachel Vollmer at rachel.rogers@uconn.edu or 860-486-3681. This research is conducted under the direction of Dr. Amy Mobley, RD in the Department of Nutritional Sciences. This research study was approved by the UConn IRB, Protocol H13-021.



APPENDIX C

Telephone Script for Interested Participants

IF DAD CALLS:

1. Thank him for calling and describe the study.
 - a. “We are interviewing dads to understand how they feed their children, eating and physical activity habits, and how they interact with their children.”
 - b. The one-on-one interview will last at least 90 minutes and you will receive a \$25 gift card for your time.
2. Confirm that he is eligible for the study.
 - a. “Do you have at least 1 biological child between the ages of 3 and 5?”
 - b. “Do you eat at least one meal with this child each week?”
 - c. If dad answers “no” to either of these questions, thank him for calling, but inform him that he is not eligible for the study at this time.
3. If he is interested in participating, schedule an interview date/time.
 - a. “Where did you find the flyer?” Locate the site’s availability on the Google spreadsheet.
 - b. “These dates are available (list the days that we will be at that site), which one would you like?” Refer to the Google spreadsheet to match a date/time that works for the participant for Rachel or Jaime and the site.
 - c. After finding a time, confirm the date and time. “If possible, please bring your child with you so we can weigh and measure the child. We will have childcare/activities to occupy your child while you complete the interview. If you won’t be able to bring the child, please bring a current height and weight to report.”
 - d. Are you or your child eligible for certain assistance programs such as Women, Infants, and Children (WIC), SNAP (food stamps), Head Start, or Husky A Healthcare
 - e. If you live with the mother of the child, would she be interested in participating as well? She will also receive \$25 for her time.
 - f. “We will remind you the day before the interview. Would you prefer an email, phone call, or a text? Can I have your name and number/email address?”
4. Thank him for taking the time to call.

IF MOM CALLS

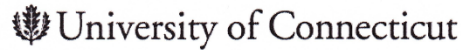
1. Thank her for calling and describe the study
 - a. “We are interviewing pairs of parents to understand how they feed their children, eating and physical activity habits, and how they interact with their children.”
 - b. The one-on-one interview will last at least 90 minutes and you will each receive a \$25 gift card for your time.
2. Confirm that she is eligible for the study.
 - a. “Do you have at least 1 biological child between the ages of 3 and 5?”
 - b. “Do you eat at least one meal with this child each week?”

- c. “Are you cohabitating or married to the father of this child and is he willing to participate?” (Note: we cannot interview mothers who answer “no” to this question.)
 - d. Are you or your child eligible for certain assistance programs such as Women, Infants, and Children (WIC), SNAP (food stamps), Head Start, or Husky A Healthcare? (Note: we cannot interview mothers who answer “no” to this question.)
 - e. If mom answers “no” to any of these questions, thank her for calling, but inform her that she is not eligible for the study at this time.
- 3. If she is interested in participating, schedule an interview date/time for both mom and dad.
 - a. Where did you find the flyer?” Locate the site’s availability on the Google calendar.
 - c. “These dates are available (list the days that we will be at that site), which one would you like?” Refer to the Google spreadsheet to match a date/time that works for the participant for Rachel or Jaime and the site.
 - b. After finding a time, confirm the date and time. “If possible, please bring your child with you so we can weigh and measure the child. We will have childcare/activities to occupy your child while you complete the interview. If you won’t be able to bring the child, please bring a current height and weight to report.”
 - c. “Since we are focused mainly on fathers for this study, we cannot interview you first and then interview dad later. He can be interviewed first or you both will need to come together. If you come without him, we will need to reschedule the interview or we will withhold the \$25 incentive until he is interviewed.”
- 4. “We will remind you the day before the interview. Would you prefer an email, phone call, or a text? Can I have your name and number/email address? Thank her for taking the time to call.

APPENDIX D

Consent Form

Consent Form for Participation in a Research Study



Principal Investigator: Amy R. Mobley, PhD, RD

Study Title: Understanding Family Influences on a Young Child's Diet and Physical Activity

Sponsor: University of Connecticut

Introduction

You are invited to participate in a research study to understand how parents influence their child's dietary and physical activity behaviors and weight. You are being asked to participate because you are a parent of a preschool age child.

Why is this study being done?

We are conducting this research study to learn more about how fathers and mothers interact with their children as it relates to nutrition and physical activity. Because you are a parent, we would like to interview about you and your child's eating, physical activity and other habits. We would also like to measure your preschool child's height and weight.

What are the study procedures? What will I be asked to do?

If you agree to take part in this study, you will be asked questions during an interview that will take no longer than 90 minutes about your child's diet, physical activity, eating habits, and body weight. You will also be asked about yourself (race, education etc.), child feeding habits, food security status, physical activity, and diet. You and your child's height and weight will also be measured. The interview questions will be asked once. These questions will be asked during a time that is convenient for you in a semi private room at your child's preschool or a convenient location in the community. We will not be contacting again you after the study.

What are the risks or inconveniences of the study?

We believe there are no known risks associated with this research study; however, a possible inconvenience may be the time it takes to complete the study. You may also have to arrange for childcare and/or transportation.

What are the benefits of the study?

You or your child may not directly benefit from this research; however, we hope that your participation in the study may help us understand how fathers and mother's influence their child's dietary and physical activity behaviors and body weight. In addition, we hope to learn how family habits can help prevent childhood obesity.

Will I receive payment for participation? Are there costs to participate?

There are no costs to you or your child. For your time, you will receive a \$25 gift card.

How will my personal information be protected?

The following procedures will be used to protect the confidentiality of the data collected from you: You will be assigned a number by the interviewer based on your recruitment site ID,

UConn IRB	
Approved On	2/18/13
Approved Until	2/18/14
Approved By	DM/DS

Page 1 of 2

investigator, month, and day, and parent-child ID (numbered as order entered into the study). No names or other identifiable information will be used or recorded during the study. All documents will be stored in a locked file cabinet in Room 225 of the Jones Building, Storrs, CT. Data will be entered on a University-owned computer in Room 225, Jones Building and stored on a password protected computer within a locked room. Any computer hosting such files will also have password protection to prevent access by unauthorized users. Only the members of the research staff will have access to the passwords.

Data that will be shared with others will be coded as described above. At the conclusion of this study, the researchers may publish their findings. Information will be presented in summary format and individuals will not be identified in any publications or presentations. Upon request, the study results in summary form may be shared with parents or the preschool to inform them of the benefits of the program. You should also know that the UConn Institutional Review Board (IRB) and the Office of Research Compliance may inspect study records as part of its auditing program, but these reviews will only focus on the researchers and your responses or involvement. The IRB is a group of people who review research studies to protect the rights and welfare of research participants. Confidentiality cannot be guaranteed if you or your child report instances of abuse/neglect and these instances will be reported to the proper authorities.

Can I stop being in the study and what are my rights?

You and/or your preschool child do not have to be in this study if you do not want to participate. If you give permission to be in the study, but later change your mind, you may withdraw at any time. There are no penalties or consequences of any kind if you decide that you do not want to participate. You do not have to answer any question that you do not want to answer. If you refuse to answer a question, the question will be skipped and the next question will be asked. If your preschool child refuses to have his/her height or weight measured, you can still continue in the study.

Whom do I contact if I have questions about the study?

Take as long as you like before you make a decision. We will be happy to answer any question you have about this study. If you have further questions about this study or if you have a research-related problem, you may contact the principal investigator, Dr. Amy Mobley at 860-486-5073 or amy.mobley@uconn.edu. If you have any questions concerning your rights as a research participant, you may contact the UConn Institutional Review Board (IRB) at 860-486-8802.

Documentation of Consent:

I have read this form and decided that I will participate in the project described above. Its general purposes, the particulars of involvement and possible risks and inconveniences have been explained to my satisfaction. I understand that I can withdraw at any time. My signature also indicates that I have received a copy of this consent form.

Participant Signature:

Print Name:

Date:

Child's Name (print)

Person Obtaining Consent

Print Name:

Date:

UConn IRB	
Approved On	2/15/13
Approved Until	2/15/14
Approved By	AM/AS

Page 2 of 2

Data Collection Protocol with Interview Script

Note: If dad cannot recall the child's intake, ask specifically about the 1 meal during the week that the dad ate with the child that deemed him eligible for participation or ask about "usual" intake. If these measures are taken, make a note in NDSR.

4. Child Feeding Questionnaire (CFQ). Switch to the excel spreadsheet. "Now I am going to ask you a series of questions. I have printed out a copy for you to follow along. These first 28 questions are how you feel about your child's weight, your weight, and how you feed your child. Please indicate the answer that best fits with your feelings and behaviors."
5. Caregiver Feeding Style Questionnaires. "The next 19 questions ask about your interactions with the child during the dinner meal. "
Note: If the parent reports that he/she does not eat dinner with the child regularly, ask about the times they do eat together. If they eat lunch or breakfast together regularly, ask the parent to report about interactions during those meals.
6. Child Eating Behavior Questionnaire: "The next 35 questions ask about your child's eating behaviors."
7. Pre-PAQ: "These questions ask about exercise and physical activity you and your child do."
8. Role of the Father Questionnaires: "The next questions ask about your perception of the role of a father in a family."
9. Role of the Father Questionnaires (Partner Perception): "These next questions ask about what your partner might think about the role of a father in a family."
10. Role of the Father at Mealtimes Questionnaire: "These questions ask about your perception of the role in a family at mealtimes."
11. Role of the Father at Mealtimes Questionnaire: These next questions ask about what your partner might think about the role of a father at mealtimes."
12. Demographics. "These questions ask about background information about you and your child, for example age and race/ethnicity."
13. Height and Weight for parent AND child. Have parent and child take off shoes and any heavy coats before measuring. "The last thing we need to do is measure your height and weight. Please remove your shoes and stand with your back against the stadiometer. Make sure that your heels are touching the base. Stand up straight and look straight forward, you'll feel me slide down a level to get an accurate measure. To measure your weight, please step up on the scale (do this twice and average the 2 later to get the most accurate measure."
Note: If dad did not bring child, try to set up a follow-up time, have him self-report if able, or leave blank. Dad should have been notified on the phone that he needed to bring the child, and if not, to bring a current height/weight.
14. Close the interview by thanking the parent for their time.
15. Have parent sign the gift card receipt log and allow them to choose their gift card.
16. Save the spreadsheet and return the computer to the office and backup the new files on the USB flash drive.

APPENDIX F

NDSR 24 hour recall protocol with screen shots

1. Create new record (ALT + N)

Complete Header Tab:

Participant ID: site-investigator's initials-month/day-ID#

Site: 100 = Head Start, 200 = MDD, 300 = UConn

ID#: Start 1st dyad at 001, and continue in sequential order as entered into study

Date of Intake

Date of birth

Gender (F= female, M=male)

Lifestage group

Notes: If a father cannot recall an entire day, please indicate here (200 character limit)

NDSR 2012 Nutrition Data System for Research

File Edit Record View Reports Window Help

Project: Tutorial - Dietary Recalls, Participant ID: <New>, Date of intake:

Participant ID	Date of Intake	Date of Entry	Version	QA
<New>	00/00/0000	04/27/2012		

Header

Participant ID: [Text Field]
 Date of intake: (mm/dd/yyyy) [00/00/0000]
 Participant name: [Text Field]
 Date of birth: (mm/dd/yyyy) [00/00/0000]
 Gender: [Dropdown Menu]
 Life Stage Group: [Dropdown Menu]
 Interviewer ID: [Text Field]
 Visit number: [Text Field]
 Site ID: [Text Field]
 Notes: [Text Area]
 Date of entry: (mm/dd/yyyy) [04/27/2012] Day: Friday
 Database Version: 2012
 Quality Assurance Status:
 Record Reviewed: [Checkbox]
 Reviewer ID: [Text Field]
 Date of Review: [00/00/0000]

Food

Trailer

Dietary Supplements

Continue Recall

Select record to display record information

2. Complete Quick List of Foods (**1st Pass**)

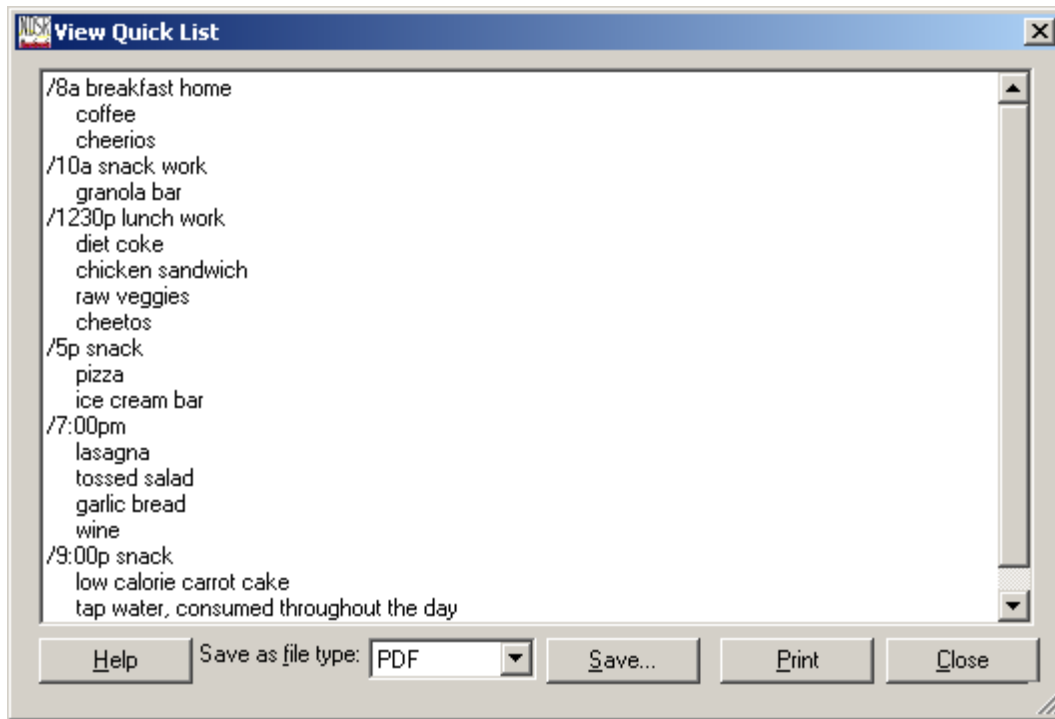
Enter Mealtime/Meal Name/Meal Location

Note: NDSR recognizes 1st 3 letters of a meal name and/or location

Separate a new eating occasion by a “/”

Example: /8a bre hom = at 8:00 am, participant ate breakfast at home

Type each item consumed on a different line



3. Review Quick List of Foods (**2nd Pass**)

After you have entered all meals/food and select **VERIFY** button and review quick list.

Data may be edited and/or added at this point

After verifying, select **CONTINUE (ALT + I)** button

4. Describe Foods (**3rd Pass**)

Review meal time, meal name, and meal location information

Select **CONTINUE** and receive the **ADD FOOD** window

Note: **ADD FOOD** window provides the opportunity to enter food as an **ASSEMBLED FOOD/RECIPE** and to capture any additions to food (i.e. condiments)

The screenshot shows a software window titled "Add Food: coffee, 8:00a BREAKFAST HOME". The window is divided into three main sections. The top section, "Food/Recipe", contains a checkbox labeled "Assembled Food or Recipe" which is currently unchecked, and a text field labeled "Name:" containing the word "coffee". The middle section, "Additions", has a label "Did you add anything to the coffee?" and a text area containing the words "cream" and "sugar" on separate lines. The bottom section, "Components/Ingredients", is currently empty. At the bottom of the window are four buttons: "Help", "Finish Later", "Continue >", and "Cancel".

If the participant is able to provide information about amounts and ingredients of assembled food (i.e. salad, sandwich) select **ASSEMBLED FOOD/RECIPE** box and enter components in **COMPONENTS/INGREDIENTS** pane.

Add Food: chicken sandwich, 12:30p LUNCH WORK

Food/Recipe

☒ Assembled Food or Recipe

Name: chicken sandwich

Additions

Did you add anything to the chicken sandwich?

Components/Ingredients

What were the items in the chicken sandwich?

- whole wheat bread
- chicken
- mayo
- lettuce
- tomato
- pickles

Help Finish Later Continue > Cancel

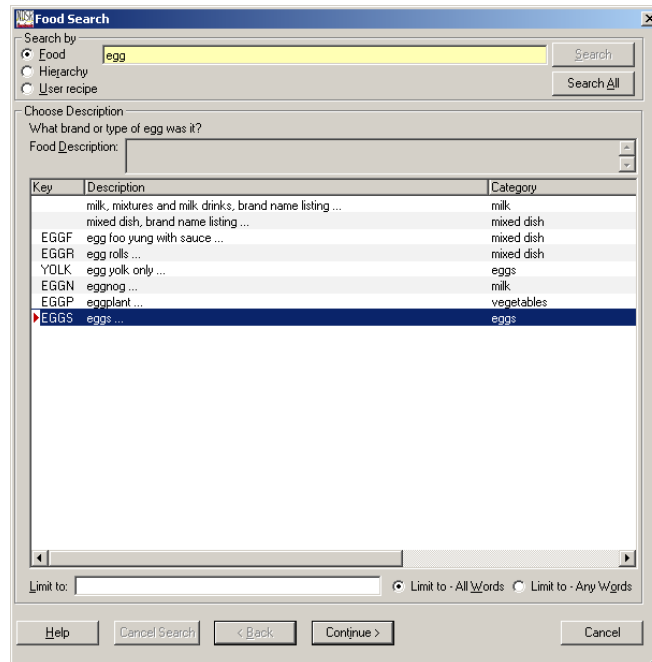
Complete all required fields in **ADD FOOD** window and select **CONTINUE (ALT+ I)** to begin food search.

5. Food Search Window

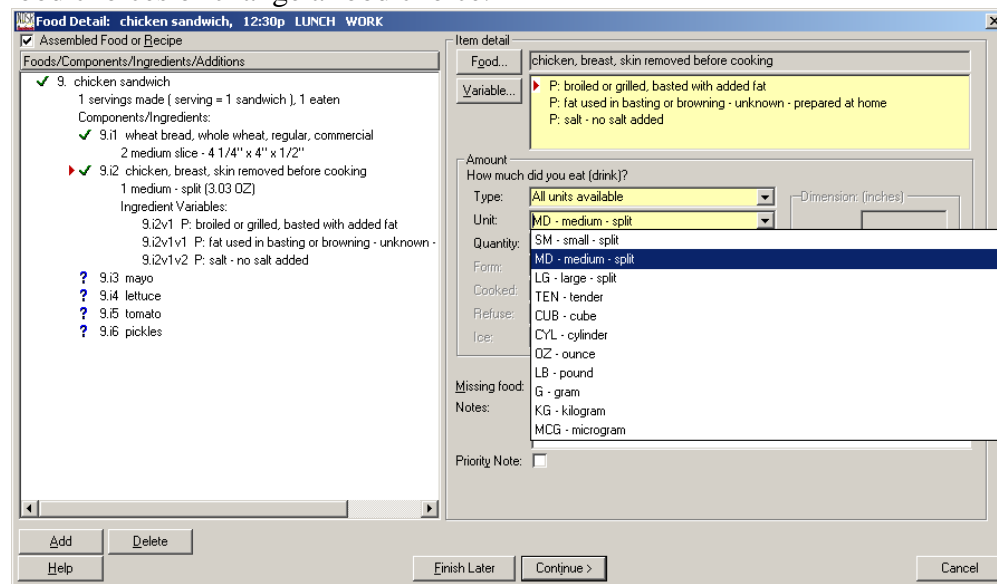
Highlight appropriate item depending on participant's description and select **CONTINUE (ALT + I)** to complete food description.

Note: If results do not include the item you are searching for research by:

1. Correct spelling or shorten food name
2. Select **SEARCH ALL** button to expand search
3. Select **HIERARCHY** radio button to view list of 50 NDSR hierarchies that categorize all foods



FOOD DETAIL window will open to specify and quantify food to edit variable food choices or change a food choice.



Note: NDSR inserts a check mark to the left of all completed items

To add an addition/ingredient, highlight food and select **ADD** or **INSERT**

To change food, highlight food and select **FOOD** button

To change a variable selected for a food, highlight food/variable, select **VARIABLE**

Note: If you cannot find a food in the database, cancel the food search and select **MISSING FOOD** box in **ITEM DETAIL** pane. This allows you to enter details about the missing food.

6. Review Record & Make Necessary Edits (4th pass)

Review record with participant for completeness and accuracy in **FOOD DETAIL** window

Make sure check mark is to the left of all foods

Record Information Project: Tutorial - Dietary Recalls, Participant ID: 47058, Date of intake: 04/25/2012

Participant ID	Date of Intake	Date of Entry	Version	QA
12345678abc	04/25/2012	04/27/2012	2012	
47058	04/25/2012	04/27/2012	2012	

Food Detail

At (time) you had (amount) of (food). Is this correct?
 At the end of each meal ask: "Did you have anything else at that time?"

A las (hora) usted (comió/bebió) (cantidad) de (alimento). ¿Correcto?
 Al finalizar cada comida pregunte: "¿Tuvo algo más a esa hora?"

- ✓ 8:00a BREAKFAST HOME
 - ✓ 1. coffee, regular (caffeinated), made from ground 10 FO
 - ✓ 2. cereal, ready-to-eat, Frosted Cheerios (General Mills) 1 1/4 CP
 - Additions:
 - ✓ 2.a1 milk, skim, nonfat or fat free 6 FO (0.75 CP)
- ✓ 10:00a SNACK WORK
 - ✓ 3. granola bars, Kudos - Peanut Butter 1 bar - each 1 OZ
- ✓ 12:30p LUNCH WORK
 - ✓ 4. soda pop or soft drink, Coke - diet, fountain 16 FO, with ice (crushed or cubed) (12.00 FO)
 - ✓ 5. chicken sandwich 1 servings made (serving = 1 sandwich), 1/2 eaten
 Note: Saving 1/2 for tomorrow's lunch
 Components/Ingredients:
 - ✓ 5.i1 chicken, breast, skin removed before cooking 1 medium - split (3.03 OZ)
 - Ingredient Variables:
 - 5.i1v1 P: broiled or grilled, basted with added fat
 - 5.i1v1v1 P: fat used in basting or browning - unknown - prepared at home

Insert Food Insert Meal Delete Continue Recall

Select record to display record information

Note: To edit food, double click on food and edit in **FOOD DETAIL** window.
 To insert food, highlight preceding food and select **INSERT FOOD** button and press **INSERT** key.
 To insert addition/ingredient: double click on food and insert in **FOOD DETAIL** window and select **ADD** button
 To move food, highlight and drag to line you want food to follow
 To delete, highlight the line containing item and select **DELETE** button

When you have finished editing, select **CONTINUE (ALT + I)**

7. Complete **TRAILER TAB**

Fill in all information and select **CONTINUE (ALT + I)**

The screenshot displays the NDSR 2012 Nutrition Data System for Research interface. The window title is "NDSR 2012 Nutrition Data System for Research". The menu bar includes File, Edit, Record, View, Reports, Window, and Help. The main area is titled "Record Information" and shows "Project: Tutorial - Dietary Recall, Participant ID: 123456789abc, Date of intake: 04/26/2012".

On the left, there is a table with the following data:

Participant ID	Date of Intake	Date of Entry	Version	QA
123456789abc	04/26/2012	04/27/2012	2012	

The right side of the interface has three tabs: "Header", "Food", and "Trailer". The "Trailer" tab is selected. It contains the following sections:

- In terms of the amount of food you ate, would you say this was:**
 - ☒ Close to the amount that you usually eat?
 - ☐ A lot more than you usually eat?
 - ☐ A lot less than you usually eat?
- Information was:**
 - ☒ Reliable.
 - ☐ Unreliable because the participant was unable to recall one or more meals.
 - ☐ Unreliable for other reasons.
- Notes:** A large text area for entering notes.

At the bottom right of the "Trailer" tab is a button labeled "Continue Recall". The status bar at the bottom of the window says "Continue interview".

APPENDIX G
Intro/Screen Questions

Introduction

Enter ID Number below

1 How many meals do you eat with your child during a typical week?

Meals

2 How many biological children ages 18 and younger do you have?

APPENDIX H
Child Feeding Questionnaire [CFQ]

Child Feeding Questionnaire (CFQ)

Questions 1-3 ask about your responsibility for your child's feeding.

When your child is at home, how often are you responsible for feeding him/her?

☐ Never ☐ Seldom ☐ Half of the time ☐ Most of the time ☐ Always

How often are you responsible for deciding what your child's portion sizes are?

☐ Never ☐ Seldom ☐ Half of the time ☐ Most of the time ☐ Always

How often are you responsible for deciding if your child has eaten the right kind of foods?

☐ Never ☐ Seldom ☐ Half of the time ☐ Most of the time ☐ Always

Questions 4-7 ask about how you feel about your past and current body weight

During your childhood (5-10 years old)

☐ Markedly Underweight ☐ Underweight ☐ Normal ☐ Overweight ☐ Markedly Overweight

During adolescence

☐ Markedly Underweight ☐ Underweight ☐ Normal ☐ Overweight ☐ Markedly Overweight

During your 20s

☐ Markedly Underweight ☐ Underweight ☐ Normal ☐ Overweight ☐ Markedly Overweight

At present

☐ Markedly Underweight ☐ Underweight ☐ Normal ☐ Overweight ☐ Markedly Overweight

Questions 8-10 ask about how you feel about your child's past and current weight

Your child during the first year of life.

☐ Markedly Underweight ☐ Underweight ☐ Normal ☐ Overweight ☐ Markedly Overweight

Your child as a toddler.

☐ Markedly Underweight ☐ Underweight ☐ Normal ☐ Overweight ☐ Markedly Overweight

Your child as a pre-schooler.

☐ Markedly Underweight ☐ Underweight ☐ Normal ☐ Overweight ☐ Markedly Overweight

Questions 11-13 ask about your concern for your child's present and future weight

How concerned are you about your child eating too much when you are not around him/her?

- ☐ Unconcerned ☐ A little concerned ☐ Concerned ☐ Fairly concerned ☐ Very concerned

How concerned are you about your child having to diet to maintain a desirable weight?

- ☐ Unconcerned ☐ A little concerned ☐ Concerned ☐ Fairly concerned ☐ Very concerned

How concerned are you about your child becoming overweight?

- ☐ Unconcerned ☐ A little concerned ☐ Concerned ☐ Fairly concerned ☐ Very concerned

Questions 14-25 ask about how you feed your child

I have to be sure that my child does not eat too many sweets (candy, ice cream, cake, or pastries.)

- ☐ Disagree ☐ Slightly Disagree ☐ Neutral ☐ Slightly Agree ☐ Agree

I have to be sure that my child does not eat too many high-fat foods.

- ☐ Disagree ☐ Slightly Disagree ☐ Neutral ☐ Slightly Agree ☐ Agree

I have to be sure that my child does not eat too much of her/his favorite foods.

- ☐ Disagree ☐ Slightly Disagree ☐ Neutral ☐ Slightly Agree ☐ Agree

I intentionally keep some foods out of my child's reach.

- ☐ Disagree ☐ Slightly Disagree ☐ Neutral ☐ Slightly Agree ☐ Agree

I offer sweets (candy, ice cream, cake, pastries) to my child as a reward for good behavior.

- ☐ Disagree ☐ Slightly Disagree ☐ Neutral ☐ Slightly Agree ☐ Agree

I offer my child his/her favorite foods in exchange for good behavior.

- ☐ Disagree ☐ Slightly Disagree ☐ Neutral ☐ Slightly Agree ☐ Agree

If I did not guide or regulate my child's eating, he/she would eat too many junk foods.

- ☐ Disagree ☐ Slightly Disagree ☐ Neutral ☐ Slightly Agree ☐ Agree

If I did not guide or regulate my child's eating, he/she would eat too much of his/her favorite foods.

- ☐ Disagree ☐ Slightly Disagree ☐ Neutral ☐ Slightly Agree ☐ Agree

My child should always eat all of the food on his/her plate.

☐ Disagree ☐ Slightly Disagree ☐ Neutral ☐ Slightly Agree ☐ Agree

I have to be especially careful to make sure my child eats enough.

☐ Disagree ☐ Slightly Disagree ☐ Neutral ☐ Slightly Agree ☐ Agree

If my child says, "I'm not hungry", I try to get him/her to eat anyway.

☐ Disagree ☐ Slightly Disagree ☐ Neutral ☐ Slightly Agree ☐ Agree

If I did not guide or regulate my child's eating he/she would eat much less than he/she should.

☐ Disagree ☐ Slightly Disagree ☐ Neutral ☐ Slightly Agree ☐ Agree

Questions 26-29 ask how you monitor the food your child eats

How much do you keep track of the sweets (candy, ice cream, cake, pies, pastries) that your child eats?

☐ Never ☐ Rarely ☐ Sometimes ☐ Mostly ☐ Always

How much do you keep track of the snack food (potato chips, Doritos, cheese puffs) that your child eats?

☐ Never ☐ Rarely ☐ Sometimes ☐ Mostly ☐ Always

How much do you keep track of the high-fat foods that your child eats?

☐ Never ☐ Rarely ☐ Sometimes ☐ Mostly ☐ Always

APPENDIX I

Caregiver Feeding Style Questionnaire [CFSQ]

<p>These questions deal with your interactions with your child during the dinner meal. Circle the best answer that describes how often these things happen. If you are not certain, make your best guess.</p> <p>How often during the dinner meal do YOU....</p>						
1)	Physically struggle with the child to get him or her to eat (for example, physically putting the child in the chair so he or she will eat)	Never	Rarely	Sometimes	Most of the Time	Always
2)	Promise the child something other than food if he or she eats (for example, "If you eat your beans, we can play ball after dinner").	Never	Rarely	Sometimes	Most of the Time	Always
3)	Encourage the child to eat by arranging the food to make it more interesting (for example, decorating pancakes).	Never	Rarely	Sometimes	Most of the Time	Always
4)	Ask the child questions about the food during dinner.	Never	Rarely	Sometimes	Most of the Time	Always
5)	Tell the child to eat at least a little bit of food on his or her plate.	Never	Rarely	Sometimes	Most of the Time	Always
6)	Reason with the child to get him or her to eat (for example, "Milk is good for your health because it will make you strong").	Never	Rarely	Sometimes	Most of the Time	Always

7)	Say something to show your disapproval of the child for not eating dinner.	Never	Rarely	Sometimes	Most of the Time	Always
8)	Allow the child to choose the foods he or she wants to eat for dinner from foods already prepared.	Never	Rarely	Sometimes	Most of the Time	Always
9)	Compliment the child for eating food (for example, "That's great --you're eating your beans").	Never	Rarely	Sometimes	Most of the Time	Always
10)	Suggest to the child that he or she eats dinner, for example by saying, "Your dinner is getting cold".	Never	Rarely	Sometimes	Most of the Time	Always
11)	Say to the child "Hurry up and eat your food".	Never	Rarely	Sometimes	Most of the Time	Always
12)	Warn the child that you will take away something other than food if he or she doesn't eat (for example, "If you don't finish your meal, there will be no play time after dinner").	Never	Rarely	Sometimes	Most of the Time	Always
13)	Tell the child to eat something on the plate (for example, "Eat your beans").	Never	Rarely	Sometimes	Most of the Time	Always

14)	Warn the child that you will take a food away if the child doesn't eat (for example, "If you don't finish your vegetables, you won't get dessert").	Never	Rarely	Sometimes	Most of the Time	Always
15)	Say something positive about the food the child is eating during dinner.	Never	Rarely	Sometimes	Most of the Time	Always
16)	Spoon-feed the child to get him or her to eat dinner.	Never	Rarely	Sometimes	Most of the Time	Always
17)	Help the child to eat dinner (for example, cutting the food into smaller pieces).	Never	Rarely	Sometimes	Most of the Time	Always
18)	Encourage the child to eat something by using food as a reward (for example, "If you finish your vegetables, you will get some dessert").	Never	Rarely	Sometimes	Most of the Time	Always
19)	Beg your child to eat dinner.	Never	Rarely	Sometimes	Most of the Time	Always

APPENDIX J
Child Eating Behavior Questionnaire [CEBQ]

	Never	Rarely	Some - times	Often	Always
My child loves food	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My child eats more when worried	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My child has a big appetite	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My child finishes his/her meal quickly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My child is interested in food	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My child is always asking for a drink	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My child refuses new foods at first	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My child eats slowly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My child eats less when angry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My child enjoys tasting new foods	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My child eats less when s/he is tired	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My child is always asking for food	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My child eats more when annoyed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If allowed to, my child would eat too much	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My child eats more when anxious	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My child enjoys a wide variety of foods	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My child leaves food on his/her plate at the end of a meal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My child takes more than 30 minutes to finish a meal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Nev er	Rarel y	Some - times	Ofte n	Alwa ys
Given the choice, my child would eat most of the time	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My child looks forward to mealtimes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My child gets full before his/her meal is finished	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My child enjoys eating	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My child eats more when she is happy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My child is difficult to please with meals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My child eats less when upset	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My child gets full up easily	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My child eats more when s/he has nothing else to do	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Even if my child is full up s/he finds room to eat his/her favourite food	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If given the chance, my child would drink continuously throughout the day	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My child cannot eat a meal if s/he has had a snack just before	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If given the chance, my child would always be having a drink	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My child is interested in tasting food s/he hasn't tasted before	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My child decides that s/he doesn't like a food, even without tasting it	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If given the chance, my child would always have food in his/her mouth	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My child eats more and more slowly during the course of a meal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

APPENDIX K
Role of the Father Questionnaire [ROFQ]

	Agree Strongly	Agree Moderately	Neither Agree or Disagree	Disagree Moderately	Disagree Strongly
It essential for the child's well being that fathers spend time interacting and play with their children.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It is difficult for men to express tender and affectionate feelings toward young children.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fathers play a central role in the child's personality development.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The responsibilities of fatherhood never overshadow the joys.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fathers are able to enjoy children more when the children are older and don't require so much care.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Young children are generally able to sense an adult's moods and feelings. For example, a young child can tell when you are angry.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Young children are affected by adults' moods and feelings. For example, if you are angry with a young child he/she may feel hurt.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The most important thing a man can invest is time and energy into his family.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A father should be as heavily involved in the care of a young child as the mother is.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Mothers are naturally more sensitive caregivers than fathers are	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Agree Strongly	Agree Moderately	Neither Agree or Disagree	Disagree Moderately	Disagree Strongly
.Even when a child is very young, it is important for a father to set a good example for his young child.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It is as important for a father to meet a young child's psychological needs as it is for the mother to do so.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It is important to respond quickly to a young child each time he/she cries.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The way a father treats his baby in the first six months has important life-long effects on the child.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
All things considered, fatherhood is a highly rewarding experience.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

APPENDIX L
Role of the Father at Mealtimes Questionnaire [ROFMQ]

	Agree Strongly	Agree Moderately	Neither Agree or Disagree	Disagree Moderately	Disagree Strongly
It essential for children's well being that fathers eat meals together with their children.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fathers play a central role in the development of children's food preferences.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fathers are able to enjoy mealtimes with children more when the children are older and can eat more independently.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It is important for a father to invest his time and energy into family mealtimes.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A father should be as heavily involved in preparing meals for a young child as the mother is.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A father should be as heavily involved in feeding a young child as the mother is.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mothers are naturally better at feeding children than fathers are	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mothers are naturally better at preparing meals for children than fathers are.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Even when a child is very young, it is important for a father to set a good example for his child at mealtimes.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It is as important for a father to make sure a young child's dietary needs are met as it is for the mother to do so.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

APPENDIX M

Pre-Physical Activity Questionnaire [Pre-PAQ]

Section 2: Parent physical activity & parenting habits

The next questions are about any physical activities that you may have done in the last week:

	Weekdays (Monday – Friday)	Weekends (Saturday & Sunday)
Q10a. In the last week, <u>how many times</u> have you walked continuously, for at least 10 minutes (without stopping), for recreation, exercise or to get to or from places?	<input type="text"/> <input type="text"/> times	<input type="text"/> <input type="text"/> times
Q10b What do you estimate was the <u>total time</u> that you spent walking in this way in the last week? Record "0" if no time spent in this activity	<input type="text"/> hrs <input type="text"/> <input type="text"/> mins	<input type="text"/> hrs <input type="text"/> <input type="text"/> mins
Q11a In the last week, how many times did you do any other more moderate physical activities that you have not already mentioned? (e.g. gentle swimming, social tennis, golf etc.)	<input type="text"/> <input type="text"/> times	<input type="text"/> <input type="text"/> times
Q11b What do you estimate was the <u>total time</u> that you spent doing these more moderate activities in the last week? Record "0" if no time spent in this activity	<input type="text"/> hrs <input type="text"/> <input type="text"/> mins	<input type="text"/> hrs <input type="text"/> <input type="text"/> mins
Q12a In the last week, <u>how many times</u> did you do any vigorous physical activity which made you breathe harder or puff and pant? (e.g. jogging, cycling, aerobics, competitive tennis, gardening or heavy work around the yard etc.)	<input type="text"/> <input type="text"/> times	<input type="text"/> <input type="text"/> times
Q12b What do you estimate was the total time that you spent doing this vigorous physical activity in the last week? Record "0" if no time spent in this activity	<input type="text"/> hrs <input type="text"/> <input type="text"/> mins	<input type="text"/> hrs <input type="text"/> <input type="text"/> mins

These questions relate to what you did in your *FREE TIME* in THE LAST WEEK. These questions are about the time when you were SITTING and NOT DOING CHORES

Q13 What do you estimate is the total time that <u>you</u> spent watching TV, videos, or DVDs as your main activity IN THE LAST WEEK? Please do not include time when the TV was switched on and you were doing something else such as preparing a meal	<input type="text"/> hrs <input type="text"/> <input type="text"/> mins	<input type="text"/> hrs <input type="text"/> <input type="text"/> mins
Q14 What do you estimate is the total time that <u>you</u> spent playing electronic games IN THE LAST WEEK? Please circle which electronic games were used PlayStation, Nintendo, XBOX, Wii II	<input type="text"/> hrs <input type="text"/> <input type="text"/> mins	<input type="text"/> hrs <input type="text"/> <input type="text"/> mins
Q15 What do you estimate is the total time that <u>you</u> spent using the computer at home <u>in your free time</u> IN THE LAST WEEK? (NOT including use for work)	<input type="text"/> hrs <input type="text"/> <input type="text"/> mins	<input type="text"/> hrs <input type="text"/> <input type="text"/> mins

Think about where your child spent his/her time **YESTERDAY**.

Note: If yesterday was a **Saturday or Sunday**, or a day when your child was in formal care then this question refers to the **most recent WEEK DAY** (i.e. Monday-Friday) **when your child was at home with you**

Q32 What was the weather like **YESTERDAY**? (please tick one response)

- Fine to play outdoors ☐
- Too wet to play outdoors ☐
- Too hot or humid to play outdoors ☐
- Too cold to play outdoors ☐

Q33 How much time did your child spend outdoors in active play **YESTERDAY**?
(record "0" if your child did not spend time playing outside)

hours mins

Q34 Which of the following activities did your child do **YESTERDAY**?
(record "0" for any activities that your child did not do)

	Did your child do this activity?		Total time spent in activity
	Yes	No	Hours/Minutes
Sat or lay still watching TV	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> hrs <input type="text"/> <input type="text"/> mins
Sat or lay still watching a DVD or a video	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> hrs <input type="text"/> <input type="text"/> mins
Sat or lay still (e.g. looking at books or listening to stories)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> hrs <input type="text"/> <input type="text"/> mins
Played computer or electronic games Please circle which electronic games were used: PlayStation, Nintendo, Gameboy, XBOX i-Pad, Wii II, i-toy, Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> hrs <input type="text"/> <input type="text"/> mins
Was stationary but moving a part of the body such as swinging or swaying trunk (e.g. standing and swaying to a song) or moving arm or leg (e.g. sitting doing puzzles or craft, digging in a sandpit or standing and kicking or throwing a ball, doing movements to a song)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> hrs <input type="text"/> <input type="text"/> mins
Walked at a leisurely or moderate pace (for any reason – not just when going on a walk)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> hrs <input type="text"/> <input type="text"/> mins

	Did your child do this activity?		Total time spent in activity
	Yes	No	Hours/Minutes
Walked at a fast pace	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> hrs <input type="text"/> <input type="text"/> mins
Walked up steep slopes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> hrs <input type="text"/> <input type="text"/> mins
Ran or jogged slowly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> hrs <input type="text"/> <input type="text"/> mins
Ran or jogged quickly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> hrs <input type="text"/> <input type="text"/> mins
Rough & tumble play with moderate effort	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> hrs <input type="text"/> <input type="text"/> mins
Rough & tumble play with hard effort	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> hrs <input type="text"/> <input type="text"/> mins
Hopped, jumped, skipped or marched at an easy pace	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> hrs <input type="text"/> <input type="text"/> mins
Hopped, jumped, skipped or marched with moderate speed or effort	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> hrs <input type="text"/> <input type="text"/> mins
Hopped, jumped, skipped or marched with fast speed or hard effort	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> hrs <input type="text"/> <input type="text"/> mins
Danced or did movement and music activities (moving around)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> hrs <input type="text"/> <input type="text"/> mins
Climbed (e.g. on play equipment, in a tree etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> hrs <input type="text"/> <input type="text"/> mins
Used swing (moving self. <i>Not</i> being pushed by another person)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> hrs <input type="text"/> <input type="text"/> mins
Rode a tricycle, bike or scooter etc. at an easy pace or slow speed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> hrs <input type="text"/> <input type="text"/> mins
Rode a tricycle, bike or scooter etc.at an moderate pace or medium speed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> hrs <input type="text"/> <input type="text"/> mins
Rode a tricycle, bike or scooter etc.at a hard pace or fast speed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> hrs <input type="text"/> <input type="text"/> mins
Swam by self (\pm floatation devices)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> hrs <input type="text"/> <input type="text"/> mins
Swam with support of an adult	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> hrs <input type="text"/> <input type="text"/> mins
Other (please state)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> hrs <input type="text"/> <input type="text"/> mins
Other (please state)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> hrs <input type="text"/> <input type="text"/> mins

**Think about where your child spent his/her time LAST WEEKEND
(Saturday-Sunday)**

Q35 What was the weather like LAST WEEKEND?
(please tick *one* response)

	SATURDAY	SUNDAY
Fine to play outdoors	<input type="checkbox"/>	<input type="checkbox"/>
Too wet to play outdoors	<input type="checkbox"/>	<input type="checkbox"/>
Too hot or humid to play outdoors	<input type="checkbox"/>	<input type="checkbox"/>
Too cold to play outdoors	<input type="checkbox"/>	<input type="checkbox"/>

Q36 How much time did your child spend outdoors in active play LAST WEEKEND?
(record "0" if your child did not spend time playing outside)

SATURDAY	SUNDAY
<input style="width: 30px; height: 20px; border: 1px solid black;" type="text"/> hours <input style="width: 30px; height: 20px; border: 1px solid black;" type="text"/> <input style="width: 30px; height: 20px; border: 1px solid black;" type="text"/> mins	<input style="width: 30px; height: 20px; border: 1px solid black;" type="text"/> hours <input style="width: 30px; height: 20px; border: 1px solid black;" type="text"/> <input style="width: 30px; height: 20px; border: 1px solid black;" type="text"/> mins

Q37 Which of the following activities did your child do LAST WEEKEND?
(record "0" for any activities that your child did not do)

			Saturday				Sunday	
	Did your child do this activity?		Total time spent in activity		Did your child do this activity?		Total time spent in activity	
	Yes	No	Hours/Minutes		Yes	No	Hours/Minutes	
Sat or lay still watching TV	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> hrs <input type="checkbox"/> <input type="checkbox"/> mins		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> hrs <input type="checkbox"/> <input type="checkbox"/> mins	
Sat or lay still watching a DVD or a video	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> hrs <input type="checkbox"/> <input type="checkbox"/> mins		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> hrs <input type="checkbox"/> <input type="checkbox"/> mins	
Sat or lay still (e.g. looking at books or listening to stories)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> hrs <input type="checkbox"/> <input type="checkbox"/> mins		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> hrs <input type="checkbox"/> <input type="checkbox"/> mins	
Played computer or electronic games Please circle which electronic games were used: PlayStation, Nintendo, Gameboy, XBOX, i-PAD Wii II, i-toy, Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> hrs <input type="checkbox"/> <input type="checkbox"/> mins		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> hrs <input type="checkbox"/> <input type="checkbox"/> mins	
Was stationary but moving a part of the body such as swinging or swaying trunk (e.g. standing and swaying to a song) or moving arm or leg (e.g. sitting doing puzzles or craft, digging in a sandpit or standing and kicking or throwing a ball, doing movements to a song)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> hrs <input type="checkbox"/> <input type="checkbox"/> mins		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> hrs <input type="checkbox"/> <input type="checkbox"/> mins	
Walked at a leisurely or moderate pace . (for any reason – not just when going on a walk)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> hrs <input type="checkbox"/> <input type="checkbox"/> mins		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> hrs <input type="checkbox"/> <input type="checkbox"/> mins	

			Saturday			Sunday
	Did your child do this activity?		Total time spent in activity	Did your child do this activity?		Total time spent in activity
	Yes	No	Hours/Minutes	Yes	No	Hours/Minutes
Walked at a fast pace	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> hrs <input type="checkbox"/> <input type="checkbox"/> mins	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> hrs <input type="checkbox"/> <input type="checkbox"/> mins
Walked up steep slopes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> hrs <input type="checkbox"/> <input type="checkbox"/> mins	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> hrs <input type="checkbox"/> <input type="checkbox"/> mins
Ran or jogged slowly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> hrs <input type="checkbox"/> <input type="checkbox"/> mins	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> hrs <input type="checkbox"/> <input type="checkbox"/> mins
Ran or jogged quickly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> hrs <input type="checkbox"/> <input type="checkbox"/> mins	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> hrs <input type="checkbox"/> <input type="checkbox"/> mins
Rough & tumble play with moderate effort	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> hrs <input type="checkbox"/> <input type="checkbox"/> mins	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> hrs <input type="checkbox"/> <input type="checkbox"/> mins
Rough & tumble play with hard effort	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> hrs <input type="checkbox"/> <input type="checkbox"/> mins	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> hrs <input type="checkbox"/> <input type="checkbox"/> mins
Hopped, jumped, skipped or marched at an easy pace	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> hrs <input type="checkbox"/> <input type="checkbox"/> mins	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> hrs <input type="checkbox"/> <input type="checkbox"/> mins
Hopped, jumped, skipped or marched with moderate speed or effort	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> hrs <input type="checkbox"/> <input type="checkbox"/> mins	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> hrs <input type="checkbox"/> <input type="checkbox"/> mins
Hopped, jumped, skipped or marched with fast speed or hard effort	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> hrs <input type="checkbox"/> <input type="checkbox"/> mins	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> hrs <input type="checkbox"/> <input type="checkbox"/> mins
Danced or did movement and music activities (moving around)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> hrs <input type="checkbox"/> <input type="checkbox"/> mins	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> hrs <input type="checkbox"/> <input type="checkbox"/> mins
Climbed (e.g. on play equipment, in a tree etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> hrs <input type="checkbox"/> <input type="checkbox"/> mins	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> hrs <input type="checkbox"/> <input type="checkbox"/> mins
Used swing (moving self. <i>Not</i> being pushed by another person)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> hrs <input type="checkbox"/> <input type="checkbox"/> mins	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> hrs <input type="checkbox"/> <input type="checkbox"/> mins

			Saturday				Sunday	
	Did your child do this activity?		Total time spent in activity		Did your child do this activity?		Total time spent in activity	
	Yes	No	Hours/Minutes		Yes	No	Hours/Minutes	
Rode a tricycle, bike or scooter etc. at an easy pace or slow speed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> hrs <input type="text"/> <input type="text"/> mins		<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> hrs <input type="text"/> <input type="text"/> mins	
Rode a tricycle, bike or scooter etc. at an moderate pace or medium speed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> hrs <input type="text"/> <input type="text"/> mins		<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> hrs <input type="text"/> <input type="text"/> mins	
Rode a tricycle, bike or scooter etc. at a hard pace or fast speed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> hrs <input type="text"/> <input type="text"/> mins		<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> hrs <input type="text"/> <input type="text"/> mins	
Swam by self (+ floatation devices)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> hrs <input type="text"/> <input type="text"/> mins		<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> hrs <input type="text"/> <input type="text"/> mins	
Swam with support of an adult	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> hrs <input type="text"/> <input type="text"/> mins		<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> hrs <input type="text"/> <input type="text"/> mins	
Other (please state)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> hrs <input type="text"/> <input type="text"/> mins		<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> hrs <input type="text"/> <input type="text"/> mins	
Other (please state)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> hrs <input type="text"/> <input type="text"/> mins		<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> hrs <input type="text"/> <input type="text"/> mins	

APPENDIX N
Demographics Questionnaire

1.) Zip Code _____

2.) Child information (for the target child between 3 and 5 years old)

Birth month _____ **Birth year** _____ **Gender** Boy ____ Girl ____

Weight _____ Circle one: Reported Measured

Height _____ Circle one: Reported Measured

Who measured the child? _____ When measured (month/year) _____

Child BMI _____

Child BMI Code _____

Child BMI z-score _____

Does your child take any dietary supplements/vitamins? Yes / No

If yes, what does your child take? _____

And how often does your child take this? _____

3.) Parent information

Father _____ **Mother** _____

Birth month _____ **Birth year** _____

Weight _____ Circle one: Reported Measured **BMI** _____

Height _____ Circle one: Reported Measured **BMI Code** _____

Who measured the parent? _____ When measured (month/year) _____

Do you take any dietary supplements/vitamins? Yes / No

If yes, what do you take? _____

And how often do you take this? _____

4.) Parent information

Race (choose all that apply)

American Indian or Alaska Native _____ White or Caucasian _____

Asian or Asian American _____ Other _____

Black or African American _____

Country of origin _____

Ethnicity

Hispanic or Latino Yes _____ No _____

Education level

Have not completed high school _____

Received high school diploma or GED _____

Some college or technical school _____

4-year degree or more _____

Employment status

Stay-at-home Parent _____ Not employed _____

Employed part time _____ Employed full time _____

Marital status (may check more than one)

Married _____ Single, never married _____

Living with a partner _____ Other _____

Separated/divorced _____

If in a relationship, please indicate the length of the relationship: _____(months/years)

5.) How many days do you spend time with your children during a typical week?

☐ 0 – 1 days (1)

☐ 2 – 3 days (2)

☐ 4 – 5 days (3)

☐ 6 – 7 days (4)

6.) Are you the person who does most of the shopping for food in your family? (If you split this task 50/50 with another person, please check “yes”).

☐ Yes (1)

☐ No (2)

☐ I don't know (3)

7.) During the past 7 days, how many times did you prepare food for dinner or supper at home?

☐ ____ Days

☐ Never (2)

☐ I don't know (3)

8a. In the last 12 months did you or any member of your household receive financial assistance (such as money or vouchers) to purchase food?

Yes.....1—go to 2b and then 3a

No.....2—skip to 2c

Refused.....3

Don't Know.....4

2b. If yes, which of the following did you or someone in your household receive?

401-WIC.....Y/N

201-SNAP/food stamps.....Y/N

202-Farmer's market vouchers.....Y/N

203-TANFY/N

204-funds from faith based organizations....Y/N

205-OtherY/N

if other please list:

8b. In the last 12 months did you or any member of your household receive reduced cost or free food/meals?

Yes.....1—go to 3b

No.....2—skip to 3c

Refused.....3

Don't Know.....4

3b. If yes, which of the following did you or someone in your household receive?

301-school breakfast (including Head Start)Y/N

302-school lunch (including Head Start).....Y/N

303-summer food service program (such as summer camps).....Y/N

304-after school program.....Y/N

305-food pantry.....Y/N

306-food share mobile.....Y/N

307-food bank.....Y/N

308-soup kitchen.....Y/N

309-summer food service program.....Y/N

402- cooking matters.....Y/N

310-other.....Y/N

if other please list:

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