Utilizing Family Systems Theory to Understand Adolescent Disordered Eating Behaviors: Exploring the Implications of Triadic Family Discord

A Dissertation
SUBMITTED TO THE FACULTY OF
UNIVERSITY OF MINNESOTA
BY

Katharine Wickel, ABD, LAMFT

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY

Steven M. Harris, PhD, LMFT

May 2014

Acknowledgements

There are many different people who have supported me throughout my educational work at the University of Minnesota, and it would be impossible to mention them all by name. However there are a select few that have contributed great amounts of support and encouragement, without whom, my progress and learning would not have been the same.

First, to my dissertation committee, thank you so much for your guidance and critiques throughout this process. Steve, from the time that I was deciding if I should come to UMN, you were encouraging, supportive, and ready to help me in any way that I needed. As my adviser and boss, that has continued to be true. I felt like I could always count on you to be my mentor, advocate, and support. Thank you for everything. Jerica, in the past few years, you have been my supervisor and boss, as a therapist and researcher. Thank you for taking me into your research groups and providing me with opportunities to work within my clinical and research passions. I have learned so much about research from your mentorship. Shonda, you were particularly influential early in my doctoral work. Thank you teaching me to think in new ways. Sara, as I started out, you were very gracious with your time to help me stay on track with my Critical. Thank you so much for your kind-hearted generosity and helping me find many opportunities within the community related to my research interests.

Throughout my doctoral education, I have developed many different friendships with colleagues that have also been influential and helpful. Bill, Tai, Cathy, and Liz, I worked with each of you in different capacities. Whether it be in class or in working on research projects, thank you so much for sharing your wisdom and helping me be a better person and scholar. To my UMN cohort, thank you so much for your love and support. We got thrown into this experience, and early on, we were challenged in ways that we didn't anticipate. I think it uniquely bonded us together. I have learned so much from each of you, and I will miss you dearly as we each move on to different endeavors over the next few years. Thank you for your friendship and perspective. To friends and colleagues at other universities, thank you so much for being my support from afar. Many of you helped me get through my Master's, and it was no different with my doctoral degree.

Mom and Dad , you have always believed in me and have given me so much. Since I was a little girl, you have made an effort to be present for my successes and for that I thank you. I know that I can count on you to be there as a support. To additional family and friends, thank you so much for being there. It's not always easy to be a good friend or family member as I have gone through my education. Thank you for continuing to support and be there for me.

Finally, Brock thank you for all of your love and support. While you came into my life towards the end of this experience, you have been amazing. You encourage me to go after my dreams and help me believe in myself. I love you.

Dedication

This dissertation is dedicated to everyone who believed in and encouraged me during my entire educational experience, particularly when I wasn't quite sure if I could succeed.

Abstract

Disordered eating behaviors—both unhealthy weight control behaviors and binge eating—are prevalent among adolescents within the United States. Previous literature has relied on single report methodologies to measure adolescents' perspectives of factors associated with disordered eating behaviors, overlooking perspectives of key family members who may add a more complete picture of factors contributing to adolescent disordered eating behaviors. The current study utilizes data from Projects EAT and F-EAT, enabling analysis of adolescent, mother, and father reporting about aspects of the home environment (i.e., family functioning, encouragement of dieting, food insecurity, and support for physical activity) in relation to adolescent disordered eating behaviors. The main objective of this study is to examine the prevalence of concordance and discordance among adolescents, mothers and fathers on home environment factors, and to examine the relationship between concordance/discordance on home environment factors and adolescent disordered eating behaviors. Results, limitations, and directions for future research are discussed.

Table of Contents

List of Tables

Utilizing Family Systems Theory to Understand Adolescent Disordered Eating Behaviors: Exploring the Implications of Triadic Family Discord

Katharine Wickel

University of Minnesota

Abstract

Disordered eating behaviors—both unhealthy weight control behaviors and binge eating—are prevalent among adolescents within the United States. Previous literature has relied on single report methodologies to measure adolescents' perspectives of factors associated with disordered eating behaviors, overlooking perspectives of key family members who may add a more complete picture of factors contributing to adolescent disordered eating behaviors. The current study utilizes data from Projects EAT and F-EAT, enabling analysis of adolescent, mother, and father reporting about aspects of the home environment (i.e., family functioning, encouragement of dieting, food insecurity, and support for physical activity) in relation to adolescent disordered eating behaviors. The main objective of this study is to examine the prevalence of concordance and discordance among adolescents, mothers and fathers on home environment factors, and to examine the relationship between concordance/discordance on home environment factors and adolescent disordered eating behaviors. Results, limitations, and directions for future research are discussed.

Utilizing Family Systems Theory to Understand Adolescent Disordered Eating Behaviors: Exploring the Implications of Triadic Family Discord

Disordered eating behaviors can become extreme and include such practices as restricting food intake in an effort to lose weight or eating large quantities of food (often referred to as binge eating). In their most extreme forms, both of these eating practices are clinically diagnosable behaviors (American Psychological Association, 2013) and can lead to illness or even death. Additionally, both manifestations of poor eating behaviors can be related to mental health illnesses such as anxiety, depression, and substance abuse (APA, 2013; Shapira & Courbasson, 2011).

At one end of the disordered eating spectrum is unhealthy weight control behavior that may consist of severe food restricting and/or additional practices to inhibit weight gain. In its most extreme, these behaviors are often associated with anorexia nervosa, and while official diagnoses are relatively low in the U.S. population (0.4% of all females and unknown for males; APA, 2013) a far more pressing concern is the high prevalence of these types of weight-control behaviors, particularly among adolescents (Serdula et al., 1993; Neumark-Sztainer & Hannan, 2000). For example, 45% of adolescent girls and 26% of adolescent boys are reported to be engaged in weight loss activities (Neumark-Sztainer et al., 2002a; Neumark-Sztainer, Story, Hannan, Perry, Irving, 2002b). To accomplish the goal of either losing weight or maintaining weight, 57% of girls and 33% of boys reported engaging in unhealthy weigh-controlling behaviors such as fasting, skipping meals, smoking more cigarettes, or using food substitutes. Some even resort to extremely unhealthy weight-controlling behaviors such as the non-supervised use of diet

pills, laxatives, diuretics, or vomiting (Neumark-Sztainer et al., 2002a; Neumark-Sztainer et al., 2002b). These and other dieting behaviors are associated with long-term weight gain, dissatisfaction with body image, weight-related teasing, and familial encouragement to diet (Field et al., 2003; Haines, Neumark-Sztainer, Wall, & Story, 2007).

At the other end of the disordered eating spectrum are binge eating behaviors, which are also associated with high costs to individuals. For example, Bedrosian, Striegel, Want, & Schwartz, (2012) found that higher reporting of binge eating habits is associated with lower work productivity, increased use of health service utilization, and higher rates of obesity. Additionally, those diagnosed with binge-eating disorder have a lifetime rate of obesity of 87% (Villarejo et al., 2012). Obesity has become increasingly problematic in the U.S. and has even been labeled as an epidemic (Flegal, Carroll, Ogden, & Curtin, 2010). Among children, rates of obesity have doubled over the past two decades, meaning that a third of children and adolescents in the U.S. are now obese (Ogden, Carroll, Curtin, Lamb, & Flegal, 2010). Similar to binge eating, obesity also has high costs as it impacts the quality of life, life expectancy, earning potential, disability, and chronic illness (Henke et al., 2010; Rodbard, Fox & Grandy, 2009). Obesity also impacts individuals, both adolescents and adults, from low-income families who also belong to racial/ethnic minorities at disproportionately higher rates (Fontaine, Redden, Want, Westfall, & Allison, 2003; Singh, Kogan, Van Dyck, & Siahpush, 2008).

A common barrier to really understanding this phenomenon in adolescents is the fact that so much of the literature and research in this area is based on individual self-report data (Maurizi, Gershoff, & Aber, 2012). Having multiple viewpoints of the

behavior under examination can potentially increase the richness of findings. However, at the same time, when multiple reporters are available, finding reliable assessments can be difficult due to complications of concordance and/or discordance among reporters. De Los Reyes and Kazdin (2005), along with others, suggest that one of the key factors in discrepant reporting is related to crucial elements of parent, child, and family functioning (Chi & Hinshaw, 2002; Ferdinand, van der Ende, & Verhulst, 2004), meaning that discordant reporting may indicate information about the quality of family relationships. Specifically, discordance in the parent-child dyad may be an important indicator of the quality of the relationship in that it suggests less trust, poorer communication, and possible feelings of alienation for adolescents (Maurizi, Gershoff, & Aber, 2012). The quality of the relationship between adolescents and parents has been found to predict internalizing and externalizing behaviors for adolescents (Allen, Porter, McFarland, McElhaney, & Marsh, 2007); this has been found to apply to both adolescent and parental reporting (Brumariu & Kerns, 2010). Due to this potential of internalizing and externalizing behaviors, concordance and discordance among adolescents and their parents should be examined when parents and adolescents are reporting on home environment variables.

Specifically, this study examines the relationship between concordance and discordance of home environment variables (family functioning, parental encouragement of dieting, food security, and parental support of adolescent physical activity) and adolescent eating behaviors (both unhealthy weight control behaviors and binge eating behaviors).

The main objective of this study is to examine the prevalence of concordance and discordance among adolescents, mothers and fathers on home environment factors and to examine the relationship between concordance/discordance on home environment factors and adolescent disordered eating behaviors. For the purposes of the current project, both concordance and discordance will be examined; however, for brevity, the term discordance will be used throughout the study. The current study is a secondary data analysis from two linked studies, Projects EAT 2010 (Eating and Activity in Teens 2010) and F-EAT (Families and Eating and Activity in Teens), funded by the National Institutes of Health. Using data from both of these data sets will enable the use of multiple reporters to study the effects of discordance. An initial description of theory is first needed to build a framework for the current study, and then each home environment variable will be described in its relation to adolescent eating behaviors. Then a description of the current study's methodology, analysis and results will be explained.

Theory

Bertalanffy (1968) and Bateson (1972), both developed research and theory on systemic interactions, which led to the postulation of General Systems Theory (GST; Bertalanffy, 1968). General Systems Theory focuses on interactions between objects and systems arguing that parts of a whole are interrelated, with the whole being most important. When applied to families, systems theory focuses on the individuals as parts and the family as a whole, thus the interactions between individuals makes up the whole. Family systems theory enables a focus on the relational connection between family

members and the potential connectedness or disengagement that can result (Doherty & McDaniel, 2010).

Family systems theory can serve as scaffolding when considering relationships and interactions within a family because it places so much emphasis on the whole, rather than the individuals. Therapeutically this may manifest as concentrating on how the relationships between family members sustain the problematic behavior, rather than the individual acting out the behavior. The current study focuses on disordered eating behaviors of adolescents (i.e., binge eating and unhealthy weight control behaviors), and how it may be connected to relational interactions between parents and the adolescent with the disordered eating behaviors. Thus the current study utilizes multiple reporters (i.e., data from the parent-child triad) to understand the relationship of home environment factors (family functioning, parental encouragement of dieting, food security, and parental support of adolescent physical activity) with adolescent eating behaviors.

Review of Literature

Family Functioning

Studies indicate a growing body of literature connecting positive family functioning with healthy eating habits. Family functioning and anorexia were initially explored in the family therapy field by Minuchin, Rosman, and Baker (1978). Kluck (2008) found that family dysfunction, when co-occurring with negative food related-experiences within a family, were associated with increased disordered eating (i.e. anorexia and bulimia). Additionally, college athletes who perceived their family of origin to have lower levels of psychological health also reported higher levels of disturbed

eating attitudes and higher levels of body dissatisfaction (Blackmer, Searight, & Ratwik, 2011). Other research indicates that positive family functioning is associated with lower BMI for adolescents and higher vegetable intake (Berge, Jin, Hannan, & Neumark-Sztainer, 2013).

Little is known, however, about how these findings might be different if family functioning were to be assessed and determined by multiple reporters. Discordance between reporters may indicate poorer family functioning between parents and children (Chi & Hinshaw, 2002; De Los Reyes and Kazdin, 2005; Ferdinand, van der Ende, & Verhulst, 2004). Additionally, discordant reporting among parent-child dyads may indicate lower levels of trust, poorer communication, and potentially increased feelings of alienation among adolescents (Maurizi, Gershoff, & Aber, 2012). The quality of parent-child relationships—regardless who reports—has been shown to be predictive of internalizing and externalizing behaviors among adolescents (Allen, Porter, McFarland, McElhaney, & Marsh, 2007; Brumariu & Kerns, 2010). The previous literature sheds some understanding on possible implications of discordant reporting in general, however little is known about discordance between parents and it is unclear what this may mean for adolescent eating behavior.

Parental Encouragement of Dieting

Dieting behaviors are common among adolescents (Armstrong & Janicke, 2012; French, Perry, Leon, & Fulkerson, 1995; Fulkerson et al., 2002), and they have been shown to predict body dissatisfaction and disordered eating (Meesters, Muris, Hoefnagels, & van Gemert, 2007). Dieting behaviors can be discussed as weight control

behaviors, some of which are healthy (i.e., exercising, eating more fruits and vegetables, eating less high-fat food and sweets, and drinking less soda, etc.), while others are unhealthy, (i.e., fasting, skipping meals, using laxatives, self-induced vomiting, laxatives, smoking cigarettes, etc.).

Understandably, parents have a vast influence on their adolescent's health-related behaviors. Sometimes this is positive, in that parents can teach and support healthy habits such as increasing fruit and vegetable intake (Neumark-Sztainer, Wall, Perry, & Story, 2003), decreasing fast food intake (Bauer, Larson, Nelson, Story, & Neumark-Sztainer (2009), and increasing physical activity (Savage, Dinallo & Downs, 2009). However, when a parent encourages his/her adolescent to diet (i.e., direct encouragement or instruction to the adolescent to alter eating habits for the principle purpose of weight loss) it can lead to unhealthy weight control behaviors, preoccupation with food (Armstrong & Janicke, 2012), disordered eating (Meesters, Muris, Hoefnagels, & van Gemert, 2007), and psychosocial outcomes such as low self-esteem and depression (Bauer, Laska, Fulkerson, & Neumark-Sztainer, 2011). While it is clear that parental encouragement of dieting can have negative effects on adolescents, there is much that is still unknown about the potential added value of multiple-report data on parental encouragement to diet.

Household Food Security

Food insecurity is defined as a household not having enough food at all times for household members to have active and healthy lives, and it is estimated that 14.5% of American households are food insecure (Coleman-Jensen, Nord, & Singh, 2013). Coleman-Jensen et al., (2013), also found that of those households that were found to be

food insecure, 39.3% (5.7% of all American households) are considered to have very low food security, indicating at least one family member of the household had to alter their eating behaviors due to a lack of food. Children in households experiencing food insecurity are more likely to have lower levels of psychosocial functioning (Casey et al., 2005), be overweight (Alaimo, Olson, & Frongillo, 2002a), and have higher risks of suicide (Alaimo, Olson, & Frongillo, 2002b). When examining the influences of food insecurity on children's weight status, there have been many mixed results. For example some have found that household food insecurity is associated with higher rates of obesity for children (Casey et al., 2006; Dubois, Framer, Girard, & Porcherie, 2006; Jyoti, Frongillo, & Jones, 2005), young adults (Gooding, Walls, & Richmond, 2012; Widome, Neumark-Sztainer, Hannan, Haines, & Story, 2009), and adults (Adams, Grummer-Strawn, & Chavez, 2003; Martin & Ferris, 2007; Wilde, &Peterman, 2006). Other studies have had more neutral findings (Alaimo, Olson, & Frongillo, 2001; Laraia, Siega-Riz, & Evenson, 2004; Whitaker & Orzol; 2006), and still others have found that household food insecurity is associated with lower weight status for children (Matheson, Varady, Varady, & Killen, 2002; Rose & Bodor, 2006). These mixed results may be due to differing coping strategies that the family employs (Meyers, Karp, & Kral, 2006) and the variety of needs a family may have depending on what level of food insecurity each experiences.

While understanding contributing factors to weight status, it is also important to understand how food insecurity may influence the behaviors of an adolescent. For example, in children, food insecurity has been found to be associated with lower vegetable and fruit intake (Branum, 2012), and higher household fruit and vegetable

availability is associated with higher intake among adolescent girls (Hanson, Neumark-Sztainer, Eisenberg, Story, & Wall, 2005). Youth experiencing food insecurity are more likely to perceive healthy eating as inconvenient and healthy food as not tasting good, and they are also more likely to eat more fast food and fewer breakfasts than their food secure peers (Widome et al., 2009). Speirs and Fiese (2013) found that in food insecure environments, parents might use food to regulate their children's emotions by utilizing food as rewards for good behavior, which may lead to poor self-regulation for the child, a habit that may continue into adolescence and adulthood. While food insecurity is typically assessed through individual adult reports (Coleman-Jensen, Nord, Andrews, & Carlson, 2010), very little is known about multiple reporters of food insecurity, including adolescents, in the literature. For this reason, it may be important to obtain adolescent reports of household food insecurity in addition to reports from the adults in the household.

Parental Support of Physical Activity

The final consideration in the proposed research project is the parental support of physical activity for the adolescent. Physical activity is an essential element of a healthy lifestyle and is considered to be a healthy weight controlling behavior. Parental support of physical activity for adolescents is associated with healthy habits regarding physical activity, in that adolescents are more likely to participate when they feel supported (Heitzler, Martin, Duke, & Human, 2006; Hendri, Coveney, & Cox, 2011; Kuo, Young, Voorhees, & Haythornthwaite, 2007). Similar results have been shown indicating that

parental views of child activity are important, with some emphasizing joint-activities, and others not (Dowda, et al., 2011; Hamilton, Cox, & White, 2012; Loprinzi & Trost, 2010).

Cleland et al. (2011) reported that child physical activity had some weak longitudinal relationships with paternal reinforcement and support and maternal role modeling. This suggests that, for children, mothers and fathers may play a different role in terms of support. Lee et al. (2010) reported family meals, which have been associated with healthy eating habits (Berge, Arikian, Doherty, and Neumark-Sztainer, 2012), are positively associated with parent-child co-physical activity. It is important to note, that for the purposes of the proposed study, the key part of this variable is the support of the adolescent's participation in physical activity. This provides a general picture of the household environment around physical activity rather than the behavior itself. This is yet another area in the literature where the use of multiple reporters is lacking and little is known about how concordance and discordance in reporting on a supportive or non-supportive environment of physical activity may affect adolescent eating behaviors. Due to an additional lack of literature on physical activity and eating behaviors, this portion of the study is more exploratory in nature.

Methodology

Research Questions

The overarching research question of the current study is that there will be differences (i.e., discordance) in reporting family closeness, encouragement of dieting, food insecurity in the home, and parental support of adolescent physical activity, among adolescents and their parents (i.e., family triad) and that the discordance will be

associated with more adolescent disordered eating behaviors (i.e., reports of binge eating or unhealthy weight controlling behaviors). The purpose of the proposed research is to understand home environment factors that influence disordered eating behaviors in adolescents. Understanding how discordance influences disordered eating behaviors is helpful for two reasons. First, it can inform methodological decisions in research to know how multiple-report data can be useful, and second understanding contributing factors to disordered eating behaviors can be informative to create family-level interventions that are more effective in the future.

The two questions that will be addressed in the current study are (1) Does discordance exist within the family triads (i.e. mother, father, adolescent) when reporting on home environmental variables (i.e. family functioning, parental encouragement of adolescent dieting, household food insecurity, and parental support of adolescent physical activity), and (2) Is the discordance that exists among the family triads on family environmental variables associated with disordered eating behaviors (i.e. unhealthy weight control and binge eating behaviors).

Survey Development and Data Collection

EAT 2010. Development of the survey was guided by previous Project EAT surveys and by a multidisciplinary team (Neumark-Sztainer et al. 2002a, b; Neumark-Sztainer, Story, Perry, & Casey, 1999). An initial testing of the EAT 2010 draft was pretested (in a multi-step process) by adolescents from diverse backgrounds for understandability and relevance. This draft was also reviewed by a multi-disciplinary team of experts in the professional fields of nutrition, physical activity, adolescent

development, body image, family social science, and urban design. During required health, physical education, and science classes, trained staff administered the surveys and measured adolescent participants' height and weight. Measurements took place in a private area, and surveys were completed over two class periods (typically 45-50 minutes each). Participants were compensated with a $10 gift card. For further information about methodology and survey development see Berge, Wall, Larson, Loth, & Neumark-Sztainer (2013).

F-EAT. Parent or caregiver participants reported on their own physical activity and eating behaviors, parenting practices that were food-specific, home food and physical activity environment, and the emotional atmosphere of the home. The same research team as Project EAT developed a parent survey using multiple resources, including previous Project EAT surveys (Neumark-Szainer et al., 2008), measures corresponding with EAT 2010, and surveys utilized in previous literature. Berge et al. (2012a) describes a multi-step process to ensure cultural and language appropriateness for the major cultural groups participating in the project (i.e., Hmong, Latino, Native American, Somali, and African-American groups). Parents who completed either survey were compensated with a $25 gift card. Further information about methodology and survey development has been provided in the literature (Berge et al., 2013).

Sampling

The current study utilizes data from Projects EAT 2010 and F-EAT to address the specific aims of the project. EAT 2010 was designed to assess adolescent dietary intake, physical activity, weight control behaviors, and weight status and F-EAT was designed

for parents or caregivers of adolescents who participated in EAT 2010. Data collection was in the form of both surveys and anthropometric measures. The larger EAT study included 2793 adolescents from 20 public middle and high schools in the Minneapolis/St. Paul metropolitan area during the 2009-10 school-year. The survey process included asking the adolescents to provide contact information for two parents or caregivers (e.g. grandparents, foster parents, aunts, uncles, etc.). The majority of adolescent participants (70%) provided contact information for two parents or caregivers; the parent/caregiving participants (N = 3709) also filled out a survey (Berge et al. 2012b).

For the purposes of the current study, it was necessary that the group of parent/caregivers reported on the same household and co-parents were paired together using an item that asked "Where does your child who participated in Project EAT live?" Parents who both selected the answer, *My child lives only in my home*, were included in the study. Additionally, due to the wording of the item assessing encouragement of dieting (adolescents were specifically asked to report on their mother and father), the parents were selected for the study only if they self-identified as either a *Mother* or *Father* when asked, "What is your relationship with the child who participated in Project EAT? The subsample used for the current study was smaller for both adolescents (n = 883) and parents (n = 1766), but the subsample was racially/ethnically and socio-economically diverse (see Tables 1 & 2) and provided adequate power for the statistical analyses (Cohen, 1992).

The adolescents in the subsample for the current study (N = 883) were evenly representative of both gender and grade with roughly half of the sample being male (n =

409, or 46.30%) and in middle school (n = 414, 46.90%). The adolescents also identified as being from several different racial groups with 27.90% of the sample reporting being White/Caucasian, 13.90% Black/African American, 21.50% Hispanic/Latino(a) American, 27.60% Asian American, and 8.60% Other (i.e. Native Hawaiian, Pacific Islander, American Indian/Native American). The parents of the subsample were similarly diverse across race with 34.57% identifying as White/Caucasian, 16.09% as Black/African American, 21.97% as Hispanic/Latino(a) American, 28.69% as Asian American, and 2.82% as Other. All parents either identified as a mother or a father in relation to their child participating in Project EAT, with the mothers ranging in age from 24-65 (M = 42.50, SD = 7.08) and fathers ranging in age from 20-89 (M = 45.29, SD = 7.65). Families represented wide range in household income and the highest level of education achieved by one of the parents (see table 2). Most parents identified as being married (93.10%).

Measures

Due to the focus of the study being on discordance, an explanation of how this was determined is also imperative. An explanation of how each variable was measured and then how discordance was determined is given. After concordance and discordance was determined, unique groups of triads were organized to enable statistical analysis (see tables 3-6). For each of the variables, this was determined by uniqueness from other groups and was done due to small numbers in some of the original groups. There were two concordance groups, one with all participants endorsing the behavior and one with all participants not endorsing the behavior (see the footnotes at the end of tables 3-6 for

clarification of the meaning of "endorsement"). There were also four discordant groups, (1) only one parent and the adolescent endorse the behavior one parent does not, (2) only the adolescent endorses the behavior and both parents do not endorse the behavior, (3) Both parents endorse the behavior and the adolescent does not endorse the behavior, and (4) One parent endorses the behavior and one adolescent and one parent does not endorse the behavior (see the foot notes at the end of tables 3-6 for clarification of the meaning of "endorsement").

Family Functioning. Family functioning was measured with six items taken from the general functioning subscale of the Family Assessment Device (Epstein, Baldwin, & Bishop, 1983; Miller, Epstein, Bishop, & Keitner, 1985) to measure overall family functioning. Literature has shown good validity and test-retest reliability for the subscale with racially and socioeconomically diverse populations (Epstein, Baldwin, & Bishop, 1983). It also correlates highly with more extensive measures of family functioning such as the Family Environment Scale (Roosa & Beals, 1990) and the Family Adaptability and Cohesion Evaluation Scale IV (Olson, 2011). Both adolescents and parents answered the same six items reporting on how strongly they agreed with the following statements: (1) Family members are accepted for who they are; (2) Making decisions is a problem for the family, (3) We don't get along well together, (4) We can express feelings to each other, (5) Planning family activities is difficult because we misunderstand each other, and (6) We confide in each other (By 'confide' we mean to trust your family member enough to tell them something that is important to you). Participants were given the options of *strongly disagree, disagree, agree,* and *strongly agree*; each were assigned a value 1 to 4,

respectively. Items 2, 3, and 5, were reverse coded to reflect positive family functioning with higher scores. Responses for this scale ranged from 6 to 24, with higher scores reflecting positive family functioning.

To assess concordance and discordance within the scale, the median value for the adolescents was determined and was utilized as a point of reference to dichotomize the variable; values between 6 and 17 (inclusively) were assigned to one group (low family functioning) and values between 18 and 24 (inclusively) were assigned to the second group (high family functioning). This same point of reference was used for the parents. Concordance and Discordance was assessed across triads. Concordance of all family members endorsing positive family functioning was the most prevalent response (see table 3).

Parental Encouragement of Dieting. Encouragement of dieting was measured with a single item for each of the participants. Adolescents were asked to specifically report on each of their parents individually, with "My mother encourages me to diet to control my weight" and "My father encourages me to diet to control my weight." Response options ranged from *not at all, a little bit, somewhat,* and *very much.* Parents were asked, "To what extent do you encourage your child to diet to control his/her weight?" Response options were the same as the adolescents.

For purposes of concordance and discordance, both items were recoded to reflect if encouragement of dieting never or ever happened. Thus the following responses: *a little bit, somewhat,* and *very much*, were all collapsed into the "ever" category for both parents and adolescents. *Not at all* was coded into the "never" category.

Household Food Security. Food security was measured different for adolescents and parents. For parents, food security was assessed using the *US Household Food Security Survey Module* (Blumberg, Bialostosky, Hamilton, & Briefel, 1999; US Department of Agriculture, 2008), which was previously modified (for self-administration) and validated. This survey included the following: "Is this statement true? 'The food that we bought just didn't last, and we didn't have money to get more'"; "In the past 12 months, did you or other adults in your household ever cut the size of your meals or skip meals because there wasn't enough money for food?"; "In the past 12 months, did you ever eat less than you felt you should because there wasn't enough money for food?"; and "In the past 12 months, were you ever hungry but didn't eat because there was not enough money for food?" If parents responded *often true, sometimes,* or *yes* to more than two questions, then the parents were categorized as food insecure; the alternative classification was food secure.

Adolescents answered slightly different items, "How often during the last 12 months have you been hungry because of your family couldn't afford more food? Response options were *almost every month, some months but not every month, only one or two months, or I have not been hungry for this reason.* The second item adolescents answered was, "Which of these statements best describes the food eaten in your home in the last 12 months:" and responses were, *often we don't' have enough to eat, sometimes we don't' have enough to eat, we have enough to eat but not always the kinds of food we want,* or *we always have enough to eat and the kinds of food we want.* Similar to other variables, these answers were coded in an "ever" or "never" manner. For the both of the

adolescent food security items, the first three responses were combined into "ever" and the final was labeled "never." Both items were combined into an aggregate variable, and any response of ever having experienced food insecurity was labeled as "ever" (food insecure) otherwise it was coded as "never" (food secure).

Parental Support of Physical Activity. Support of physical activity was assessed differently for adolescents and parents. Adolescents were asked how strongly they agreed with each of the following statements, "My family and I do active things together (for example, going on bike rides or walks)" and "My family supports me in being physically active (for example, enrolling me in sports, watching me perform, providing transportation to places to be active)." Responses for both were *strongly disagree, somewhat disagree, somewhat agree, strongly agree.* Responses were first dichotomized into "disagree" and "agree" for each item individually. Next, similar to the previous variable a new, aggregate variable was coded. If the adolescent agreed with either or both statements, they were coded as endorsing the behavior; otherwise they were coded as not endorsing the behavior.

For parents, the items measuring the support around physical activity were slightly different. Each parent was asked to state how many hours a week he/she spent doing to following: "Being physically active with your child?" and "Helping your child to be physically active?" Responses were *none, less than ½ an hour, ½ - 2 hours, 2½ - 4 hours, 4½ - 6 hours,* or *6+ hours.* In keeping with previous coding decisions, responses were dichotomized into "ever" or "never" responses. *None* was coded as "never" and

every other item response was combined and coded into "ever." Additionally, each of these items was then aggregated in a similar way to that of the items for the adolescents.

Outcome Variables. The current study assesses eating disordered behavior both in terms of unhealthy weight control behaviors and binge eating behaviors. Unhealthy weight control behaviors were assessed with the question, "Have you done any of the following things in order to lose weight or keep from gaining weight during the past year?" Response options were: *fasted, ate very little food, took diet pills, made myself vomit (throw up), used laxatives, used diuretics (water pills), used food substitute (powder/special drink), skipped meals, smoked more cigarettes,* or *followed a high protein diet/low carbohydrate diet (e.g., Atkins or other).* Due to small frequency of each of these behaviors individually, the behaviors were recoded into if the adolescent ever did any of these behaviors or never did any of these behaviors (in the past year).

Binge eating was measured with the question, "In the past year, have you ever eaten so much food in a short period of time that you would be embarrassed if others saw you (binge-eating)? Responses were either *yes* or *no.*

Control Variables. Race was assessed with the item, "Do you think of yourself as…" with response option: *White, Black/African American, Hispanic or Latino, Asian American, Native Hawaiian or other Pacific Islander, American Indian or Native American, or Other (Please Specify).* Due to small numbers the final three options were combined into one group named *Other*. For adolescents, gender was assessed with the question, "Are you…" with response options: *Male* or *Female.* Grade was assessed with, "What grade are you in?" The combining of 6th to 8th graders into "Middle School" and

9th to 12th graders into "High School," created responses groups. This categorization was determined by how the public schools divide their schools in the Minneapolis/St. Paul area.

Determining the role of the parent was explained prior (see Sampling). Parents' age was determined (in years) with the question, "What is your birth date?" Income was measured by the primary parent (all of whom were mothers) answering the following question, "What was the total income of your household before taxes in the past year?" To determine socioeconomic status, primary parent was asked to identify the highest level of education that she completed and the highest level of education her spouse/partner completed. The highest level of education received by either the parent or the spouse/partner determined socioeconomic status.

Data Analysis

First, frequencies were used to determine the prevalence of concordance and discordance for each of the home environment factors. Second, step-wise logistic regressions were used to explore the odds of the main independent variable increasing or decreasing based on the dependent variable. This choice of analysis fits the parameters of the study, given the dichotomous dependent variable and categorical independent variables (Field, 2013). For each analysis characteristics of the adolescent such as gender, grade, race, and BMI, were implemented in the first step of the analysis. Household socioeconomic status was also entered into the first step of the analysis. Then, the home environment variable (family functioning, parental encouragement of dieting, household food security, and parental encouragement of physical activity) was put into the analysis

in the second step to examine predictive odds above and beyond that of the variables in the first step. Results of the logistic regressions are given in terms of odds ratios—defined as the probability of the behavior divided by the probability of non-behavior (Field, 2013; Reifman, Barnes, Dintcheff, Farrell, & Uhteg, 1998).

Results

Prevalence of Triadic Concordance and Discordance

The first aim of the current study was to assess the prevalence of concordance and discordance across family triads (i.e. mother, father, and adolescent) when reporting on home environmental variables (i.e. family functioning, parental encouragement of adolescent dieting, household food insecurity, and parental support of adolescent physical activity). To accomplish this aim, simple frequencies were run (see tables 3-6). For family functioning, the most frequent response was triad concordance for positive family functioning (*n*= 347, 39.30%) followed by the discordance of the adolescent endorsing negative family functioning and both parents endorsing positive family (*n* = 202, 22.90%). The least frequent was the adolescent endorsing positive family functioning and both parents endorsing negative family functioning (*n* = 36, 4.10%).

When the triad responded about parental encouragement of dieting both concordant options (i.e. all three family member endorsing that encouragement of dieting does not happen and all three family members do endorse this behavior, meaning both parents participate in encouragement of dieting) were similar at *n* = 236, 26.70%, and *n* = 235, 26.60%, respectively. All four discordant responses were similar in frequency ranging from 85 to103. For food insecurity, the most frequent response was triad

concordance endorsing that the household was food secure (*n* = 311, 35.20%) and the least frequent response was the discordant response of the adolescent not endorsing food security with one parent endorsing food security and the other parent not endorsing food security (*n* = 59, 6.70%). In support of physical activity, the most frequent response was concordance in endorsing that the household environment is supportive of physical activity (*n* = 524, 59.30%). The least frequent responses were concordance that the household environment was not supportive of physical activity (*n* = 24, 2.70%), and the discordant response of the adolescent not endorsing a supportive environment with one parent endorsing and the other parent not endorsing an environment supportive of physical activity (*n* = 33, 3.7%).

Associations between Triad Concordance or Discordance on Home Environment Factors and Adolescent Disordered Eating Behaviors

The second aim of the current study addressed how triadic concordance or discordance on four home environmental variables (i.e. family functioning, parental encouragement of adolescent dieting, household food security, and parental support of adolescent physical activity) was associated with adolescent disordered eating behaviors (i.e. unhealthy weight control and binge eating behaviors). To explore this question, several step-wise logistic regressions were run. First, in each analysis, several control variables were added to the model. Most of the control variables were characteristics of the adolescent (i.e. gender, grade, race, BMI), and one was a characteristic of the household (i.e. socioeconomic status). Due to the number of analyses run, and the

complexity of the results, patterns in the results will be given, rather than a full report; for full results see tables 7-14.

Family functioning. The first two analyses addressed the association of discordance of family functioning and eating disordered behaviors. When examining both types of eating disordered behaviors, the first-step variables of gender, race and BMI were all found to be significant (see tables 7 & 8). Additionally, in the second step of both logistic regression analyses, the same types of triads were found to have significant results for both types of eating disordered behaviors, however the interpretation between the two types is different. For example, when looking at unhealthy weight control behaviors, the over-all model was significant ($p < .001$), and the following categories were also significant: (1) the adolescent endorsing high family functioning with one parent also endorsing high family functioning and one parent not endorsing high family functioning ($p = .012$), and (2) adolescent endorsing high family functioning and neither parent endorsing high family functioning ($p = .004$) were all significant. Both discordant groups had odds ratios below 1.0 (.48 and .35, respectively), indicating that these two groups had significantly lower odds of predicting unhealthy weight control behaviors in adolescents as compared to the reference group (concordance of high family functioning; see table 7).

When looking at binge eating behaviors, the over-all model was significant ($p < .001$), and following categories were also significant: (1) the adolescent endorsing high family functioning with one parent also endorsing high family functioning and one parent not endorsing high family functioning ($p < .001$), (2) and adolescent endorsing high

family functioning and neither parent endorsing high family functioning ($p < .001$). However, with binge eating behaviors, both of the discordant triads had odds ratios above 1.0 (3.45 & 6.78, respectively), indicating that both of these triads had greater odds of predicting adolescent binge eating behaviors (see table 8).

Parental Encouragement of dieting. The next sets of analyses run were to address the association of encouragement of dieting and eating disordered behaviors. When looking at unhealthy weight control behaviors, the first step of the analysis found gender, race, and BMI to be significant variables (see table 9) and for binge eating behaviors only gender was significant in the first step (see table 10). When looking at unhealthy weight control behaviors, the over-all model was significant ($p < .001$), the following categories were also significant: (1) concordant triads where encouragement of dieting was happening ($p < .001$), (2) discordant triads when the adolescent did endorse the occurrence of the encouragement but both parents did not endorse encouragement of dieting ($p < .001$), and (3) discordant triads when the adolescent did endorse the occurrence of the encouragement but one parent did endorse encouragement of dieting ($p < .001$), with odds ratios—for the last three triads—of .34, .31, and .21, respectively. With odds ratios below 1.0 indicating that in each of these cases, these triads were less likely to predict unhealthy weight control behavior by the adolescent (see table 9). When looking at binge eating behavior, the findings were different. The over-all model was significant ($p = .025$) and all triads indicated an increased likelihood of predicting adolescent binge eating behaviors due to having odds ratios above 1.0. This was true of all triads when compared to the reference group (concordant triads when encouragement

of dieting did not happen), and all were significant except the discordant triad where the adolescent did not endorse the parents behavior of encouraging dieting, with one parent endorsing that encouragement of dieting happened and one not endorsing the behavior (see table 10).

Household food security. The next set of analyses was to test how food insecurity was related to disordered eating behaviors. In the first step for both food security analyses, both gender and BMI were significant, and for the analysis looking at unhealthy weight control behaviors race was also significant (see tables 11 & 12). When looking at unhealthy weight control behaviors, the over-all model was significant ($p <$ .001), and two additional categories were significant: (1) the adolescent endorsing food security with one parent endorsing food security while one parent does not ($p <$ .001), and (2) the adolescent not endorsing food security, but both parents endorsing food security ($p =$ .002). Both discordant triads had odds ratios below 1.0 (.36 and .34 respectively), indicating that both had lower odds of predicting unhealthy weight control behaviors when compared to the concordant triads reporting food security (see table 11). Additionally, the over-all model regarding binge eating behavior was not significant ($p =$ .146), but one category was significant. The triad where the adolescent did not endorse food security while the parents both did were 3.38 times more likely to predict the adolescent binge eating behavior than the reference group (concordant triad reporting household food security; see table 12).

Parental encouragement of physical activity. The final set of step-wise logistic regressions in the current study were to explore parental encouragement of physical

activity with eating disordered behaviors. In these analyses, only first-step variables were found to be significant. Both analyses showed gender and BMI as significant first-step variables, and in the analysis for unhealthy weight control behaviors, race and household socioeconomic status were also significant (see tables 13 & 14). Neither model for unhealthy weight control behavior (p = .129) or binge eating behavior (p = .468) was significant.

Discussion

Given the overall lack of literature on triadic data analysis, including reports of concordance and discordance, findings in the current study contribute greatly to the current understanding of how multiple reporters of home environment variables can be used to predict maladaptive behaviors. Two main patterns arose in the current study across most of the analyses. First, the significant triadic findings for in the unhealthy weight control analyses generally had lower odds of predicting the behavior than the reference group. Second, significant triads in the binge eating analyses generally had higher odds of predicting the behavior than the reference group. Each home environment variable will be explored separately.

Family Functioning

The first finding related to family functioning, was that, triadic concordance on positive family functioning was significantly associated with adolescent unhealthy weight control behaviors and binge eating. This was finding was unexpected, given that previous literature indicated low family functioning was associated with disturbed eating attitudes and higher levels of body dissatisfaction (Blackmer, Searight, & Ratwik, 2011; Kluck,

2008). Within the unhealthy weight control analysis, results showed that the odds of adolescents engaging in unhealthy weight control behaviors were lower among discordant triads, if the adolescent reported high family functioning. This may be a surprising finding, given that some previous literature indicates that any discordant reporting may be indicative of poorer family functioning (Chi & Hinshaw, 2002; De Los Reyes and Kazdin, 2005; Ferdinand, van der Ende, & Verhulst, 2004; Maurizi, Gershoff, & Aber, 2012). However, understanding that the outcome variable is a behavior reported by the adolescent, it seems that even if the triad reporting is discordant, if the adolescent reports high family functioning, this may be an influential factor in reducing the odds of predicting unhealthy weight control behaviors. The findings for binge eating behavior however are very different. The same discordant triads in the previous analysis were significant again, but this time to increase the odds of predicting binge eating behaviors. The results regarding binge eating behaviors are in keeping with literature cited previously (e.g. Blackmer, Searight, & Ratwik, 2011; Kluck, 2008). Additional research is needed to be able to make sense of this particular finding of why some discordant triads have increased odds to predict adolescent binge eating behaviors and others do not.

Parental Encouragement of Dieting

Examining parental encouragement of dieting was similar to that of family functioning in that both concordant and discordant categories were significant for both analyses of unhealthy weight control and binge eating behaviors. When looking at unhealthy weight control behavior, the reference group—concordance among the triad that encouragement of dieting did not happen—was significant, as was the other

concordance group—encouragement of dieting does happen—and two discordant groups. Previous literature indicates that parental encouragement of dieting increases preoccupation with food (Armstrong & Janicke, 2012) and higher eating disordered behaviors (Meesters, Muris, Hoefnagels, & van Gemert, 2007) in adolescents. The current study does not support these findings, in that in triads that include an adolescent who reported no encouragement of dieting had lower odds of predicting the adolescent participating in unhealthy weight control behaviors than the triads with concordance that encouragement of dieting was happening. In the binge eating analysis, all triads were significant except one (adolescent does not endorse, with one parent endorsing and one parent not endorsing the encouragement of dieting). Each of these was in the direction that increased the odds of predicting binge eating behaviors which did support the findings of previous literature (Armstrong & Janicke, 2012; Meesters, Muris, Hoefnagels, & van Gemert, 2007). This indicates that in the triads when the adolescent does endorse the encouragement of dieting, he or she is more likely to engage in binge eating behaviors, regardless of what messages the parents are giving (i.e. whether they endorse the behavior or not). For the some discordant triads, there may be mixed messages about dieting being presented by the parents, and to date, there is no information on the influences of potentially mixed-messages of encouragement of dieting on adolescent eating behaviors. This is an area for further research.

Household Food Security

Household food security was significantly related to the reference group and two discordant triads (i.e. the adolescent endorses food security, with one parent endorsing

and one parent not endorsing food security and the adolescent not endorsing food security with both parents endorsing food security). Unhealthy weight control behavior is less likely to happen in either of these triads, and this may have something to do with 2 of the three family members perceiving the household to be food secure. According to systems theory, the sum is greater than the parts (Bertalanffy, 1968), and this could contribute to the interpretation of the results, in that those who have at least two members of the triad who perceive the household to be food secure the lower the odds of predicting unhealthy weight control behavior. Previous research states that adolescents who are food insecure don't see healthy food as tasting good and as inconvenient (Widome et al., 2009). This may mean that they are not eating as healthily and are less likely to utilize unhealthy weight control behaviors.

When it comes to binge eating, the only triad that was significant in predicting odds of the behavior was the discordant triad where the adolescent did not endorse food security but the parents both did endorse it. This means that within this triad, the adolescent is experiencing food insecurity—even though the parents disagree—and have higher odds of participating in binge eating. This may suggest a preoccupation of food for the adolescent due to his/her concerns of the household not being food secure, and this preoccupation may influence binge eating behavior. This may partially explain Alaimo, Olson, & Frongillo's (2002a) finding that of food insecurity is associated with being overweight. While several studies have shown mixed results on weight status and food security (Matheson et al., 2006; Whitaker & Orzol; 2006; Widome et al., 2009), it is important to remember that binge eating behaviors are separate from weight status. The

behaviors may contribute to increased weight status, but the results are just as mixed in the current study due to so many categories (concordant and discordant) not being significantly related to binge eating behaviors.

Parental Encouragement of Physical Activity

When looking at parental encouragement of physical activity, no significant results were found for concordance or discordance. As stated previously, these analyses were more exploratory in nature, given the limited literature associating physical activity with eating disordered behaviors. Most of the literature that does exist on support of physical activity focuses on physical activity outcomes (Cleland et al., 2011; Dowda et al., 2011; Hamilton, Cox, & White, 2012). Even though there is some precedence for healthy eating habits and co-physical activity (Berge et al., 2012), this study was done without a focus on disordered eating.

Clinical Implications

With such mixed results between the types of eating disordered behaviors, clinical implications are complex and challenging to innumerate. The findings for binge eating are more straightforward than those for unhealthy weight control behaviors, thus these will be discussed first, and then potential implications for unhealthy weight control behaviors will be discussed second.

In three of the four home environment variables of interest (i.e. family functioning, parental encouragement of dieting, and household food security), multiple categories were found to have increased odds of predicting binge eating behaviors. This indicates a few clinical implications to potentially lessen the likelihood of adolescents

engaging in binge eating behaviors. First, with family functioning, the two categories where adolescents perceived higher family functioning, but one or more parents reported lower family functioning. As a clinician, this indicates facilitating positive family functioning among all three family members is an important step in decreasing the likelihood of the adolescent engaging in binge eating behaviors.

Second, regarding encouragement of dieting and binge eating, every category except one was found to have an increased likelihood of predicting binge eating behavior. It is challenging to decipher clinical implications from the category of concordance when no one in the triad endorses encouragement of dieting. However, it is clear that when discordance about encouragement of dieting occurs, adolescents are more likely to engage in binge eating behaviors. This indicates that clinicians should work with families (both parents and adolescents) to lessen encouragement of dieting. Open conversations between the clinician and parents about the negative effects of encouraging their adolescents to diet (Armstrong & Janicke, 2012; Bauer, Laska, Fulkerson, & Neumark-Sztainer, 2011; Meesters, Muris, Hoefnagels, & van Gemert, 2007), may be a start, further research in this area is needed to fully understand what interventions are most effective preventing binge eating behaviors.

The third finding regarding binge eating behavior is with household food security. The sole category that was significant was the triad where the parents both endorsed household food security and the adolescent did not. Clinicians can open conversations within families to (1) help the adolescent understand what food is available within the household, and (2) enable parents to convey more confidence to their adolescent in terms

of food security. These discussions may entail conversations about times when the family was not as food secure, which may enable the adolescent to voice why s/he does not view the household as food secure and how often s/he has held this perspective. There have been mixed results in the past about how a lack of food security affects families (Alaimo, Olson, & Frongillo, 2001; Gooding, Walls, & Richmond, 2012; Laraia, Siega-Riz, & Evenson, 2004; Matheson, Varady, Varady, & Killen, 2002; Whitaker & Orzol, 2006; Widome, Neumark-Sztainer, Hannan, Haines, & Story, 2009). One study attributes this to differing coping strategies (Meyers, Karp, & Kral, 2006). If the household has not always been food secure, a clinician should understand previous coping strategies that have been utilized by a particular family and recognize how those coping strategies may still be influencing the adolescent's behaviors.

When thinking about unhealthy weight control behaviors, the clinical implications are more difficult to decipher across all three home environment factors that had significant results (i.e. family functioning, encouragement of dieting, and household food insecurity). Considering, that many of these findings were different than what was expected and contradictory to previous literature, clinical implications seem premature. Further research and insight in the area of unhealthy weight control behaviors is needed, before such recommendations are given.

Limitations

As with any study there are limitations to the findings of this study that should be considered when interpreting the results. First, all of the home environment factors were measured by self-report, and many (i.e. encouragement of physical activity and

household food insecurity as reported by the adolescent) utilized a small number of items, and in the case of encouragement of dieting a singular item. This means it is possible that some reporting on behaviors may have changed if there had been multiple questions to measure these variables. More complex measures may have resulted in additional aspects of the home environment being measured, which could have enhanced the results. Additionally, the interpretation of the findings is limited by a lack of literature addressing triadic data analyses. While it is a strength to be able to utilize multiple reports within the same family, little has been done and little is known about analyzing an interpreting triadic data. This means that findings should be interpreted conservatively, and additional research is needed, not only on the topics relevant to the current study (i.e. the home environment variables and disordered eating behaviors) but the methodology and statistical analyses also.

Another limitation is that adolescents' responses for eating disordered behaviors were coded as ever or never having enacted the behavior within the last year. For example, in the case of unhealthy weight control behaviors, a person who endorsed one behavior is coded in the same manner as a person who enacted in all ten behaviors. This means that the study does not address severity of eating disordered behaviors or if the behavior is diagnosable. This is true of both unhealthy weight control behaviors and binge eating behaviors. This is certainly an area for further research to determine how concordance of any of these home environment variables are related to being able to predict severity of eating disordered behaviors.

The family type included in the triad for the current study also limits the external validity. Only duel parent households that self-identified a mother and a father as parents to the adolescent were kept in the study. This was necessary due to the item used to measure the adolescents' report of parental encouragement of dieting (it specifically asked about encouragement of dieting for each the mother and father separately), the same inclusion criteria was utilized across all home environment variables to provide consistency within the entire study. Additional limits to external validity also existed. Although there are several strengths to the methodological approach of the current study such as sampling from a general population, diverse racial and socioeconomic representation, even representation of males and females, and utilizing multiple viewpoint of family members. Generalizing should be used cautiously due to the previous concerns mentioned of some variables being measured with relatively few items and the sample being limited to only duel parent households with only a mother and father. With each of these limitations in mind, several recommendations for future research can be made from the current study.

Future Research

There are several potential areas for future research. As mentioned previously, the current literature on disordered eating is generally limited to single report data (Maurizi, Gershoff, & Aber, 2012). While multi-report data can be useful, it can also increase the complexity of the analysis and be difficult to interpret (Kenny, Kashy, & Cook, 2006). Is this the first area for future research, not just in the area of home environment and disordered eating, but also the methodology and statistical approaches that utilize triadic

data. Researchers that operate from a systemic theoretical lens are often inclined to want multiple report data, however the interpretation and understanding may sometimes be lacking in how to best utilize this type of data.

Additionally, the limitations of the current study should be the guide for future research. First, because this study does not address the severity of the disordered eating behavior, little is known about how concordance may have different influences on eating behaviors that are more or less severe. Second, only dual-parent households were included, and thus nothing is know about single-parent households, blended-family households, and same-sex parent households. These are important family types to consider when understanding the predictability of eating disordered behaviors. Concordance in these households may be different in many ways (i.e. how many people are included in the concordance, the relationship of the parent to the adolescent, etc.). It is important to include different types of families in future research.

Adolescent disordered eating behaviors are prevalent within the US and can manifest as either unhealthy weight control or binge eating behaviors. The previous literature has relied heavily on individual reporting of either an adolescent or a parent. However the current study has shown some promising next steps for future research. First, regarding unhealthy weight control behaviors, several types of triads were found to have lower odds in predicting the eating behavior. This was true for family functioning, parental encouragement of dieting, and household food security. Second, when predicting the odds of binge eating behavior, several triads were show to have higher odds. This was also true among all home environmental factors except physical activity. While there are

still several questions to be answered, it is important to note the contribution of multiple reporters in finding variables that are associated with disordered eating behaviors. The current study shows that concordance and discordance among adolescent, mother, and father, triads is related to these behaviors for adolescents.

Table 1. Demographics of adolescents in current study (*N* = 883).

		N (%)
Race		
	White	246 (27.86)
	Black or African American	123 (13.93)
	Hispanic or Latino American	190 (21.52)
	Asian American	244 (27.63)
	Other	76 (8.61)
Grade		
	Middle school (6^{th} – 8^{th} grade)	414 (46.89)
	High school (9^{th} – 12^{th} grade)	469 (53.11)
Gender		
	Male	409 (46.32)
	Female	474 (53.68)
Unhealthy weight control behaviors		
	Never	521 (59.00)
	Ever	360 (40.77)
Binge eating behaviors		
	Never	754 (85.39)
	Ever	123 (13.93)

Table 2. Demographics of parents in current study (*N* = 1766).

	Parent 1 (N = 883)	Parent 2 (N = 883)
		N (%)
Race		
White	301 (34.10)	275 (31.14)
Black or African American	129 (14.61)	139 (15.74)
Hispanic or Latino American	181 (20.50)	185 (20.95)
Asian American	241 (27.29)	237 (26.84)
Other	19 (2.15)	28 (3.17)
Missing	12 (1.40)	19 (2.15)
Parental Role		
Father	0 (0.00)	883 (100.00)
Mother	883 (100.00)	0 (0.00)
Age in Years (*M* (*SD*))	42.50 (7.08)	45.29 (7.65)
		Parent 1 & 2
Household-level Demographics		(N = 1766)
Income		
Less than $20,000		209 (23.70)
$20,000 - $34,999		175 (19.82)
$35,000 - $49,999		145 (16.42)
$50,000 - $74,999		136 (15.40)
$75,000 - $99,999		87 (9.85)
$100,000 or more		85 (9.63)
Missing		46 (5.21)
Highest education level		
Did not finish high school		242 (27.41)
Finished high school/GED		181 (20.50)
Some college or training after high school		216 (24.46)
Finished college		147 (16.65)
Advanced degree		86 (9.74)
Missing		11 (1.25)
Marital status		
Married or in a committed relationship		822 (93.09)
Divorced/separated		16 (1.81)
Single		30 (3.40)
Widowed		1 (0.11)
Other		5 (0.60)
Missing		9 (1.01)

Table 3. Family Functioning frequencies (*N* = 826)

Concordance Discordance		*N* (%)
Concordance	All high	347 (39.30)
	All low	73 (8.30)
Discordance	Adolescent high, one parent high and one parent low	90 (10.20)
	Adolescent high, both parents low	36 (4.10)
	Adolescent low, both parents high	202 (22.90)
	Adolescent low, one parent high and one parent low	78 (8.80)
Total		826 (93.5)

Table 4. Parental encouragement of dieting frequencies. (*N* = 859)

Concordance Discordance		*N* (%)
Concordance	All do not endorse[§]	236 (26.70)
	All endorse	235 (26.60)
Discordance	Adolescent does endorse, both parents do not endorse	103 (11.70)
	Adolescent does not endorse, one parent does endorse and one parent does not endorse	103 (11.70)
	Adolescent does endorse, one parent does endorse and one parent does not endorse	85 (9.60)
	Adolescent does not endorse, both parents endorse	97 (11.00)
Total		859 (97.30)

[§]Endorse means that the individual endorses that encouragement of dieting does happen.

Table 5. Household food security frequencies. (*N* = 807)

Concordance Discordance		*N* (%)
Concordance	All endorse[§]	311 (35.20)
	All do not endorse	121 (13.70)
Discordance	Adolescent does endorse, one parent does endorse and one parent does not endorse	70 (7.90)
	Adolescent does endorse, both parents do not endorse	65 (7.40)
	Adolescent does not endorse, both parents do endorse	181 (20.50)
	Adolescent does not endorse, one parent does endorse and one parent does not endorse	59 (6.70)
Total		807 (91.40)

[§]Endorse means that the individual endorses that the household is food secure.

Table 6. Encouragement of physical activity frequencies. (*N* = 850)

Concordance Discordance		*N* (%)
Concordance	All endorse[§]	524 (59.30)
	All do not endorse	24 (2.70)
Discordance	Adolescent does endorse, one parent does endorse and one parent does not endorse	132 (14.90)
	Adolescent does endorse, both parents do not endorse	72 (8.2)
	Adolescent does not endorse, both parents do endorse	65 (7.4)
	Adolescent does not endorse, one parent does endorse and one parent does not endorse	33 (3.7)
Total		850 (96.30)

[§]Endorse means that the individual endorses that the home environment is supportive of physical activity.

Table 7. Discordance of family functioning and any unhealthy weight control behaviors

Variable	B	*SE*	Wald	DF	Sig.	OR
Block 1						
Gender (adolescent)	.54	.16	11.13	1	.000***	1.71
Grade (adolescent)	.05	.16	0.08	1	.780	1.05
Socioeconomic Status (household)	-.14	.07	4.29	1	.038*	0.87
Race (adolescent)	.26	.07	15.11	1	.000***	1.30
BMI (adolescent)	2.34	.32	54.59	1	.000***	10.35
Block 2:						
Concordance			26.88	5	.000***	
All high (reference)						
All low	-.07	.36	.04	1	.847	.93
Discordance						
Adolescent high, one parent high and one parent low	-.73	.29	6.24	1	.012*	.48
Adolescent high, both parents low	-1.05	.36	8.27	1	.004**	.35
Adolescent low, both parents high	.21	.46	.22	1	.641	1.24
Adolescent low, one parent high and one parent low	-.00	.31	.00	1	.998	1.00

Note: *<.05, **<.01, ***<.001

Table 8. Discordance of family functioning and any binge eating behaviors

Variable	B	*SE*	Wald	DF	Sig.	OR
Block 1						
Gender (adolescent)	-.48	2.18	4.96	1	.026*	.62
Grade (adolescent)	-.41	.22	3.64	1	.057	.66
Socioeconomic Status (household)	.05	.09	.26	1	.611	1.05
Race (adolescent)	-.06	.09	.45	1	.501	.94
BMI (adolescent)	-.91	.41	4.86	1	.027*	.40
Block 2:						
Concordance			21.49	5	.001***	
All high (reference)						
All low	.71	.411	3.01	1	.083	2.04
Discordance						
Adolescent high, one parent high and one parent low	1.24	.33	13.74	1	.000***	3.45
Adolescent high, both parents low	1.91	.54	12.70	1	.000***	6.78
Adolescent low, both parents high	.83	.53	2.43	1	.119	2.29
Adolescent low, one parent high and one parent low	.56	.33	2.86	1	.091	1.76

Note: *<.05, **<.01, ***<.001

Table 9. Discordance of parental encouragement of dieting and any unhealthy weight control behaviors

Variable	B	*SE*	Wald	DF	Sig.	OR
Block 1						
Gender (adolescent)	.58	.16	13.32	1	.000***	1.79
Grade (adolescent)	.07	.16	.18	1	.674	1.07
Socioeconomic Status (household)	-.12	.06	3.62	1	.057	.89
Race (adolescent)	.19	.07	8.38	1	.004**	1.21
BMI (adolescent)	1.70	.33	26.91	1	.000***	5.50
Block 2:						
Concordance			47.00	5	.000***	
All do not endorse[§] (reference)						
All endorse	-1.09	.27	16.46	1	.004**	.34
Discordance						
Adolescent does endorse, both parents do not endorse	-1.17	.24	24.18	1	.000***	.31
Adolescent does not endorse, one parent does endorse and one parent does not endorse	-.21	.27	.63	1	.428	.81
Adolescent does endorse, one parent does endorse and one parent does not endorse	-1.56	.31	25.95	1	.000***	.21
Adolescent does not endorse, both parents endorse	-.40	.28	2.12	1	.145	.67

Note: *<.05, **<.01, ***<.001

[§]Endorse means that the individual endorses that encouragement of dieting does happen.

Table 10. Discordance of parental encouragement of dieting and any binge eating behaviors

Variable	B	*SE*	Wald	DF	Sig.	OR
Block 1						
Gender (adolescent)	-.66	.21	9.85	1	.002**	.51
Grade (adolescent)	-.33	.21	2.43	1	.119	.72
Socioeconomic Status (household)	.07	.09	.66	1	.417	1.07
Race (adolescent)	-.07	.09	.59	1	.442	.93
BMI (adolescent)	-.79	.46	2.96	1	.085	.46
Block 2:						
Concordance			12.81	5	.025*	
All do not endorse[§] (reference)						
All endorse	.75	.37	4.19	1	.041*	2.12
Discordance						
Adolescent does endorse, both parents do not endorse	.75	.32	5.41	1	.020*	2.11
Adolescent does not endorse, one parent does endorse and one parent does not endorse	.71	.38	3.65	1	.056	2.04
Adolescent does endorse, one parent does endorse and one parent does not endorse	1.33	.47	8.02	1	.005**	3.78
Adolescent does not endorse, both parents endorse	.22	.33	.43	1	.041*	1.24

Note: *<.05, **<.01, ***<.001

[§]Endorse means that the individual endorses that encouragement of dieting does happen.

Table 11. Discordance of household food security and any unhealthy weight control behaviors.

Variable	B	*SE*	Wald	DF	Sig.	OR
Block 1						
Gender (adolescent)	.53	.16	10.78	1	.001***	1.70
Grade (adolescent)	.12	.16	.51	1	.476	1.12
Socioeconomic Status (household)	-.11	.07	2.68	1	.102	.90
Race (adolescent)	.22	.07	10.68	1	.001***	1.25
BMI (adolescent)	2.48	.32	60.27	1	.000***	11.96
Block 2:						
Concordance			25.22	5	.000***	
All endorse[§] (reference)						
All do not endorse	-.05	.35	.02	1	.899	.96
Discordance						
Adolescent does endorse, one parent does endorse and one parent does not endorse	-1.02	.25	16.41	1	.000**	.36
Adolescent does endorse, both parents do not endorse	-.45	.33	1.89	1	.169	.64
Adolescent does not endorse, both parents do endorse	-1.09	.35	9.71	1	.002**	.34
Adolescent does not endorse, one parent does endorse and one parent does not endorse	-.47	.26	3.18	1	.074	.62

Note: *<.05, **<.01, ***<.001,

[§]Endorse means that the individual endorses that the household is food secure.

Table 12. Discordance of household food security and any binge eating behaviors

Variable	B	*SE*	Wald	DF	Sig.	OR
Block 1						
Gender (adolescent)	-.60	.22	7.34	1	.007**	.55
Grade (adolescent)	-.23	.22	1.14	1	.286	.80
Socioeconomic Status (household)	.13	.09	2.18	1	.140	1.14
Race (adolescent)	-.04	.09	.19	1	.663	.96
BMI (adolescent)	-.93	.42	5.06	1	.025*	.39
Block 2:						
Concordance			8.20	1	.146	
All endorse (food secure)						
All do not endorse (food insecure)	.21	.43	.25	1	.621	1.24
Discordance						
Adolescent does endorse, one parent does endorse and one parent does not endorse	.54	.32	2.89	1	.089	1.71
Adolescent does endorse, both parents do not endorse	.36	.43	.68	1	.409	1.43
Adolescent does not endorse, both parents do endorse	1.22	.57	4.55	1	.033*	3.38
Adolescent does not endorse, one parent does endorse and one parent does not endorse	.01	3.2	.00	1	.970	1.01

Note: *<.05, **<.01, ***<.001

[§]Endorse means that the individual endorses that the household is food secure.

Table 13. Discordance of support for physical activity and any unhealthy weight control behaviors

Variable	B	*SE*	Wald	DF	Sig.	OR
Block 1						
Gender (adolescent)	.48	.16	9.45	1	.002**	1.62
Grade (adolescent)	-.03	.16	.04	1	.846	.97
Socioeconomic Status (household)	-.14	.06	5.05	1	.025*	.87
Race (adolescent)	.24	.07	13.58	1	.000***	1.27
BMI (adolescent)	2.44	.31	64.04	1	.000***	11.45
Block 2:						
Concordance			8.54	5	.129	
All endorse[§] (reference)						
All do not endorse	.39	.59	.44	1	.505	1.48
Discordance						
Adolescent does endorse, one parent does endorse and one parent does not endorse	-.10	.47	.04	1	.837	.91
Adolescent does endorse, both parents do not endorse	.03	.50	.00	1	.957	1.03
Adolescent does not endorse, both parents do endorse	.52	.53	.97	1	.326	1.68
Adolescent does not endorse, one parent does endorse and one parent does not endorse	.49	.54	.82	1	.366	1.62

Note: *<.05, **<.01, ***<.001

[§]Endorse means that the individual endorses that the home environment is supportive of physical activity.

Table 14. Discordance of support for physical activity and any binge eating behaviors

Variable	B	*SE*	Wald	DF	Sig.	OR
Block 1						
Gender (adolescent)	-.63	.21	8.64	1	.003**	.54
Grade (adolescent)	-.22	.21	1.12	1	.290	.80
Socioeconomic Status (household)	.07	.08	.60	1	.441	1.07
Race (adolescent)	.09	.09	.89	1	.347	.92
BMI (adolescent)	-.96	.40	5.85	1	.016*	.38
Block 2:						
Concordance			4.59	5	.468	
All endorse[§] (reference)						
All do not endorse	.07	.69	.01	1	.920	1.07
Discordance						
Adolescent does endorse, one parent does endorse and one parent does not endorse	.52	.53	.94	1	.331	1.68
Adolescent does endorse, both parents do not endorse	.29	.57	.26	1	.611	1.34
Adolescent does not endorse, both parents do endorse	-.07	.59	.02	1	.901	.93
Adolescent does not endorse, one parent does endorse and one parent does not endorse	.18	.62	.09	1	.768	1.20

Note: *<.05, **<.01, ***<.001

[§]Endorse means that the individual endorses that the home environment is supportive of physical activity.

References

Adams, E.J., Grummer-Strawn, L., &Chavez, G. (2003) Food insecurity is associated with increased risk of obesity in California women. *Journal of Nutrition*, *133*, 1070–1074.

Alaimo, K., Olson, C. M., & Frongillo, E.A. Jr. (2002a). Low family income and food insufficiency in relation to overweight in US children: is there a paradox? *Archives of Pediatrics and Adolescent Medicine, 155*, 1161–1167.

Alaimo, K., Olson, C.M., & Frongillo, E.A. Jr. (2002b). Family food insufficiency, but not low family income, is positively associated with dysthymia and suicide symptoms in adolescents. *Journal of Nutrition, 132*, 719–725.

Allen, J. P., Porter, M., McFarland, C., McElhaney, K. B., & Marsh, P. (2007). The relation of attachment security to adolescents' paternal and peer relationships, depression, and externalizing behavior. *Child Development, 78,* 1222-1239.

American Psychological Association. (2013). *Diagnostic and statistical manual of mental disorders (5th ed.)*. Washington D.C.: Author.

Armstrong, B. & Janicke, D. M. (2012). Differentiating the effects of maternal and peer encouragement to diet on child weight control attitudes and behaviors. *Appetite, 59*, 723-729. doi: http://dx.doi.org/10.1016/j.appet.2012.06.022

Bateson, G. (1972). *Steps to an ecology of mind: A revolutionary approach to man's understanding of himself.* San Francisco, CA: Chandler Publishing Company.

Bauer, K. W., Larson, N. I., Nelson, M. C., Story, M., & Neumark-Sztainer, D. (2009). Fast food intake among adolescents: Secular and longitudinal trends from 1999 to

2004. *Preventive Medicine, 48,* 284-287.

Bauer, K. W., Laska, M. N., Fulkerson, J. A., & Neumark-Sztainer, D. (2011). Longitudinal and secular trends in parental encouragement for healthful eating, physical activity, and dieting throughout the adolescent years. *Journal of Adolescent Health, 23,* 720-723.

Bedrosian, R. C., Striegel, R. H., Wang, C., & Schwartz, S. (2012). Associations of binge eating with work productivity impairment, adjusted for other health risk factors. *Journal of Occupational and Environmental Medicine, 54,* 385-393. doi: 10.1097/JOM.0b013e3182479f40

Berge, J. M., Arikian, A., Doherty, W. J., & Neumark-Sztainer, D., (2012a). Healthful eating and physical activity in the home environment: Results from multifamily focus groups. *Journal of Nutrition Education and Behavior, 44,* 123-131. doi:10.1016/j.jneb.2011.06.011

Berge, J. M., Jin, S., Hannan, P. J., & Neumark-Sztainer, D. (2013). Structural and interpersonal characteristics of family meals: Associations with adolescent BMI and dietary patterns. *Journal of the Academy of Nutrition and Dietetics*, *113,* 816-822.

Berge, J. M., MacLehose, R., Loth, K. A., Eisenberg, M. E., Fulkerson, J. A., & Neumark-Sztainer, D. (2012b). Family meals. Associations with weight and eating behaviors among mothers and fathers. *Appetite, 58,* 1128-1135.

Berge, J. M., Wall, M., Larson, N., Loth, K. A., & Neumark-Sztainer, D. (2013). Family functioning: Associations with weight status, eating behaviors, and physical activity in adolescents. *Journal of Adolescent Health. 52,* 351-357.

Bertalanffy, L. von. (1968). *General System Theory.* New York: George Braziller.

Blackmer, V. Searight, H. R. & Ratwik, S. H. (2011). The relationship between eating attitudes, body image and perceived family-of-origin climate among college athletes. *North American Journal of Psychology, 13,* 435-446.

Blumberg, S. J., Bialostosky, K., Hamilton, W. L., & Briefel, R. R. (1999). The effectiveness of a short form of the household food security scale. *American Journal of Public Health, 89,* 1231-1234. doi: 10.2105/AJPH.89.8.1231

Branum, A. M. (2012). Fruit and vegetable intake in US children and adolescents: Measurement error and determinants. (Unpublished doctoral dissertation). The Johns Hopkins University, Baltimore, Maryland.

Brumariu, L. E. & Kerns, K. A. (2010). Parent-child attachment and internalizing symptoms in childhood and adolescence: A review of empirical findings and future directions. *Development and Psychopathology, 22,* 177-203. doi: 10.1017/S0954579409990344

Casey, P. H., Simposon, P. M., Gossett, J. M., Bogle, M. L., Champagne, C. M., Connell, C., Harsha, D., McCabe-Sellers, B., Robbins, J. M., Stuff, J. E., & Weber, J. (2006) The association of child and household food insecurity with childhood overweight status. *Pediatrics, 118*, e1406-e1413.

Casey, P. H., Szeto, K. L., Robbins, J. M., Stuff, J. E., Connell, C., Gossett, J. M., &

Simpson, P. M. (2005). Child health-related quality of life and household food security. *Archives of Pediatric Adolescent Medicine, 159,* 51-56. doi: 10.1001/archpedi.159.1.51

Chi, T. C. & Hinshaw, S. P. (2002). Mother-child relationships of children with ADHD: The role of maternal depressive symptoms and depression-related distortions. *Journal of Abnormal Child Psychology, 30*, 387-400.

Cleland, V., Timperio, A., Salmon, J., Hume, C., Telford, & Crawford, D. (2011). A longitudinal study of the family physical activity environment and physical activity among youth, *American Journal of Health Promotion, 25*(3), 159-167. doi:10.4278/ajhp.090303-QUAN-93

Cohen, J. (1992). A power primer. *Psychological Bulletin, 112*(1), 155-159.

Coleman-Jensen, A., Nord, M., & Singh, A. (2013). Household food security in the United States in 2012. November 22, 2013 from, http://www.ers.usda.gov/publications/err-economic-research-report/err155.aspx#.UuQ4uhDnbcs

De Los Reyes, A. & Kazdin, A. E. (2005). Informant discrepancies in the assessment of childhood psychopathology: A critical review, theoretical framework, and recommendations for further study. *Psychological Bulletin, 131,* 483-509. doi: 10.1037/0033-2909.131.4.483

Doherty, W. J., & McDaniel, S. J. (2010). *Family therapy*. Washington, DC: American Psychological Association.

Dowda, M., Dishman, R. K., Pfeiffer, K. A., & Pate, R. R. (2007). Family support for

physical activity in girls from 8th to 12th grade in South Carolina. *Preventive Medicine, 44,* 153-159.doi: http://dx.doi.org/10.1016/j.ypmed.2006.10.001

Dowda, M., Pfeiffer, K. A., Brown, W. H., Mitchell, J. A., Byun, W., & Pate, R. R. (2011). Parental and environmental correlates of physical activity of children attending preschool. *Archives of Pediatric Adolescent Medicine, 165*, 939-944. doi:10.1001/archpediatrics.2011.84

Dubois, L., Farmer, A., Girard, M., & Porcherie, M. (2006). Family food insufficiency is related to overweight among pre-schoolers. *Social Science and Medicine, 63,* 1503–1516.

Epstein, N. B., Baldwin, L. M., & Bishop, D. S. (1983). The McMaster family assessment device. *Journal of Marital & Family Therapy, 9*, 171-180. doi:10.1111/j.1752-0606.1983.tb01497.x

Field, A. (2013). *Discovering statistics using IBM SPSS statistics.* Los Angeles: SAGE.

Ferdinand, R. F., van der Ende, J., & Verhulst, F. C. (2004). Parent-adolescent disagreement regarding psychopathology in adolescents from the general population as a risk factor for adverse outcome. *Journal of Abnormal Psychology, 113,* 198-206. doi: 10.1037/0021-843X.113.2.198

Field, A. E., Austin, S. B., Taylor, C. B., Malspeis, S., Rosner, B., Rockett, H. R., Gillman, M. W., & Colditz, G. A. (2003). Relation between dieting and weight change among preadolescents and adolescents. *Pediatrics, 112,* 900-906. doi: 10.1542/peds.112.4.900

Flegal, K. M., Carroll, M. D., Ogden, C. L., & Curtin, L. R. (2010). Prevalence and trends in obesity among U.S. adults, 1999-2008. *The Journal of the American Medical Association, 303*, 235-241. doi:10.1001/jama.2009.2014

Fontaine, K. R., Redden, D. T., Wang, C., Westfall, A. O. & Allison, D. B. (2003). Years of life lost due to obesity. *The Journal of the American Medical Association, 289*, 187-193. doi: 10.1001/jama.289.2.187.

French, S. A., Perry, C. L., Leon, G. R., & Fulkerson, J. A. (1995). Dieting behaviors and weight change history in female adolescents. *Health Psychology, 14,* 548-555. doi: 10.1037/0278-6133.14.6.548

Fulkerson, J. A., McGuire, M. T., Neumark-Sztainer, D., Story, M., French, S. A., & Perry, C. L. (2002). Weight-related attitudes and behaviors of adolescent boys and girls who are encouraged to diet by their mothers. *International Journal of Obesity. 26,* 1579-1587.

Gooding, H. C., Walls, C. E., & Richmond, T. K. (2012) Food insecurity and increased BMI in young adult women. *Obesity, 20*, 1896-1901. doi:10.1038/oby.2011.233

Haines, J., Neumark-Sztainer, D., Wall, M., & Story, M. (2007). Personal, behavioral, and socio-environmental risk and protective factors for adolescent overweight. *Obesity Research*, *15,* 2748-2760.

Hamilton, K., Cox, S., & White, K. M., (2012). Testing ta model of physical activity among mothers and fathers of young children: integrating self-determined motivation, planning, and the theory of planned behavior. *Journal of Sport & Exercise Psychology, 34*, 124-145.

Hanson, N.I., Neumark-Sztainer, D., Eisenberg, M.E., Story, M., &Wall, M. (2005). Associations between parental report of the home food environment and adolescent intakes of fruits, vegetables, and dairy foods. *Public Health Nutrition, 8,* 77-85.

Heitzler CD, Martin SL, Duke J, Huhman M. (2006). Correlates of physical activity in a national sample of children aged 9–13 years. *Preventative Medicine, 42,* 254–60.

Hendri, G. A., Coveney, J., & Cox, D. N. (2011). Factor analysis shows association between family activity environment and children's health behavior. *Health Behavior, 35*, 524-529.

Henke, R. M., Carls, G. S., Short, M. E., Pei, X., Wang, S., Moley, S., Sullivan, M., & Goetzel, R. Z. (2010). The relationship between health risks and health and productivity costs among employees at Pepsi Bottling Group. *Journal of Occupational & Environmental Medicine, 52,* 519-527. doi: 10.1097/JOM.0b013e3181dce655

Jyoti, D.F., Frongillo, E.A., & Jones, S. J. (2005). Food insecurity affects school children's academic performance, weight gain, and social skills. *Journal Nutrition, 135,* 2831–2839.

Kenny, D. A., Kashy, D. A., & Cook, W. L. (2006). *Dyadic Data Analysis.* New York, The Guilford Press.

Kluck, A. S. (2008). Family factors in the development of disordered eating: Integrating dynamic and behavior explanations. *Eating Behavior, 9,* 471-483. doi:10.1016/j.eatbeh.2008.07.2006.

Kuo, J., Voorhees, C.C., Haythornthwaite, J.A., & Young, D.R. (2007). Associations between family support, family intimacy, and neighborhood violence and physical activity in urban adolescent girls. *American Journal of Public Health, 97,* 101–3.

Laraia, B.A., Siega-Riz, A.M., & Evenson, K.R. (2004). Self-reported overweight and obesity are not associated with concern about enough food among adults in New York and Louisiana. *Preventative Medicine, 38*, 175–181.

Lee, S. M., Nihiser, A., Strouse, D., Das, B., Michael, S., & Huhman, M. (2010). Correlates of children and parents being physically active together. *Journal of Physical Activity and Health, 7*, 776-783.

Loprinzi, P. D. & Trost, S. G. (2010). Parental influences on physical activity behavior in preschool children. *Preventative Medicine, 50,* 129-133. doi:10.1016/j.ypmed.2009.11.010

Martin, K.S., & Ferris, A.M. (2007). Food insecurity and gender are risk factors for obesity. *Journal of Nutrition Education and Behavior, 39,* 31–36.

Matheson, D.M., Varady, J., Varady, A., & Killen, J. (2002). Household food security and nutritional status of His-panic children in the fifth grade. *American Journal of Clinical Nutrition, 76,* 210-217.

Maurizi, L. K., Gershoff, E. T., & Aber, J. L. (2012) Item-level discordance in parent and adolescent reports of parenting behavior and its implications for adolescents' mental health and relationships with their parents. *Journal of Youth and Adolescence, 41*, 1035-1052. doi: 10.1007/s10964-011-9741-8

Meesters, C., Muris, P., Hoefnagels, C., & van Gemert, M. (2007). Social and family correlates of eating problems and muscle preoccupation in young adolescents. *Eating Behaviors, 8,* 83-90.

Meyers, A.F., Karp, R.J., & Kral, J.G. (2006). Poverty, food insecurity, and obesity in children. *Pediatrics, 118,* 2265a–2266.

Miller, I. W., Epstein, N. B., Bishop, D. S., & Keitner, G. I. (1985). The McMaster family assessment device: Reliability and validity. *Journal of Marital & Family Therapy, 11,* 345-356. doi:10.1111/j.1752-0606.1985.tb00028.x

Minuchin, S., Rosman, B. L., & Baker, L. (1978). *Psychosomatic families: Anorexia nervosa in context*. United States of America: Harvard University Press.

Neumark-Sztainer, D., Croll, J., Story, M., Hannan, P. J., French, S. A., & Perry, C. (2002a). Ethnic/racial differences in weight related concerns and behaviors among adolescent girls and boys: Findings from Project EAT. *Journal of Psychosomatic Research, 53*, 963–974.

Neumark-Sztainer, D., Eisenberg, M. E., Fulkerson, J. A., Story, M., & Larson, N. I. (2008). Family meals and disordered eating in adolescents. Longitudinal findings from Project EAT. *Archives of Pediatrics and Adolescent Medicine, 162*, 17–22.

Neumark-Sztainer, D., & Hannan, P. J. (2000). Weight-related behaviors among adolescent girls and boys. *Journal of the American Medical Association Pediatrics, 6,* 569-577. doi:10.1001/archpedi.154.6.569

Neumark-Sztainer, D., Story, M., Hannan, P. J., Perry, C. L., & Irving, L. M. (2002b). Weight-related concerns and behaviors among overweight and non-overweight

adolescents: Implications for preventing weight-related disorders. *Archives of Pediatrics and Adolescent Medicine, 156*, 171–178.

Neumark-Sztainer, D., Story, M., Perry, C., & Casey, M. (1999). Factors influencing food choices of adolescents: Findings from focus-group discussions with adolescents. *Journal of the American Dietetic Association, 99*, 929–937.

Neumark-Sztainer D., Wall M., Perry C., & Story M. (2003). Correlates of fruit and vegetable intake among adolescents: Findings from Project EAT. *Preventive Medicine*, *37,*198-208.

Ogden, C., Carroll, M., Curtin, L., Lamb, M., & Flegal, K. (2010). Prevalence of high body mass index in US children and adolescents, 2007-2008. *Journal of the American Medical Association, 303*, 242-249.

Olson, D. H. (2011). FACES IV and the circumplex model: validation study. *Journal of Marital & Family Therapy, 37*, 64-80. doi: 10.1111/j.1752-0606.2009.00175.x

Reifman, A., Barnes, G. M., Dintcheff, B. A., Farrell, M. P., & Uhteg, L. (1998). Parental and peer influences on the onset of heavier drinking among adolescents. Journal of Studies on Alcohol, 59, 311–317.

Rodbard, H. W., Fox, K. M., & Grandy, S. (2009). Impact of obesity on work productivity and role disability in individuals with the at risk for diabetes mellitus. *American Journal of Health Promotion, 23*, 353-360. doi: http://dx.doi.org/10.4278/ajhp.081010-QUAN-243

Roosa, M. W. & Beals, J. (1990). Measurement issues in family assessment: The case of the Family Environment Scale. *Family Process, 29*, 191-198. doi: 10.1111/j.1545-5300.1990.00191.x

Rose, D., & Bodor, J.N. (2006). Household food insecurity and overweight status in young school children: results from the Early Childhood Longitudinal Study. *Pediatrics, 117*, 464–473.

Savage, J. S., Dinallo, J. M., & Downs, D. S. (2009). Adolescent body satisfaction: the role of perceived parental encouragement for physical activity. *The International Journal Behavioral Nutrition and Physical Activity, 6,* 90.

Serdula, M. K., Ivery, D., Coates, R. J., Freedman, D. S., Williamson, D. F., & Byers, T. (1993). Do obese children become obese adults? A review of the literature. *Preventive Medicine, 22*, 167-177. doi: http://dx.doi.org/10.1006/pmed.1993.1014

Shapira, L. B., & Courbasson, C. M. (2011). Depression and anxiety: Predictors of eating disorder symptoms and substance addiction severity. *Mental health and Substance Use, 40*, 222-238.

Singh, G. K., Kogan, M. D., Van Dyck, P. C., Siahpush, M. (2008). Racial/ethnic, socioeconomic, and behavioral determinants of childhood and adolescent obesity in the United States: Analyzing independent and joint associations. *Annals of Epidemiology, 18,* 682-695. doi: http://dx.doi.org/10.1016/j.annepidem.2008.05.001

Speirs, K. & Fiese, B. (2013, November). Food security and parental feeding practices that impact self-regulation. In J. Wilgen (Facilitator), *Families, Food and Health*

Outcomes. Paper Presentation presented at the National Council on Family Relations 75th Annual Conference, San Antonio, TX.

Villarejo, C., Fernández-Aranda, F., Jiménez-Murcia, S., Peñas-Lledó, E., Granero, R., Penelo, E., Tinahones, F. J., Sancho, C., Vilarras, N., Bernabé, M. M., Casanueva, F. F., Fernández-Real, J. M., Frühbeck, G., De la Torre, R., Treasure, J., Botella, C., Menchón, J. M. (2012). Lifetime obesity in patients with eating disorders: Increasing prevalence, clinical and personality correlates. *European Eating Disorders Review, 20,* 250-254. doi: 10.1002/erv.2166

Whitaker, R.C., & Orzol, S. M. (2006). Obesity among US urban preschool children: relationships to race, ethnicity, and socioeconomic status. *Archives of Pediatrics and Adolescent Medicine*, *160*, 578–584.

Widome, R., Neumark-Sztainer, D., Hannan, P. J., Haines, J., & Story, M. (2009). Eating when there is not enough to eat: Eating behaviors and perceptions of food among food-insecure youths. *American Journal of Public Health, 99,* 822-828.

Wilde, P.E. & Peterman, J. N. (2006). Individual weight change is associated with household food security status. *Journal of Nutrition, 136,* 1395–1400.

Appendix A: Dissertation Proposal

Utilizing Family Systems Theory to Understand Adolescent Disordered Eating Behaviors:

Exploring the Implications of Triadic Family Discord

Katharine Wickel

University of Minnesota

PROJECT SUMMARY

Adolescent disordered eating behaviors are prevalent within the US and can manifest as either binge eating or unhealthy weight controlling behaviors. The current literature relies heavily on individual reporting of either the adolescent or one parent, and this may results in a significant methodological barrier. With single report data, the study can only address an individual's responses. This can be particularly limiting if the variables of interest are influenced by multiple people, and such is true of most family research. The proposed study utilizes data from Projects EAT and F-EAT, enabling analysis of adolescent, mother, and father reporting about aspects of the home environment (i.e., family functioning, encouragement of dieting, food insecurity, and support for physical activity) in relation to adolescent disordered eating behaviors. First the proposed study will use chi-squared analyses to identify the concordance and discordance among mother, father, adolescent, triads regarding factors in the home environment. Next, the association between concordance and discordance among the triads regarding the home environment factors and adolescent disordered eating behaviors (i.e., binge eating and unhealthy weight control behavior) will be examined. This project is innovative and significant. Specifically, it will provide information about the use of multiple reporters in adolescent research when studying the home environment and eating disordered behaviors, which may inform the methodology of future studies. It may also be helpful for interventionists and clinicians in understanding what aspects of the home environment are especially important when treating eating disordered behaviors among adolescents.

PROJECT NARRATIVE

The proposed study is *relevant to public health* because it seeks to extend current knowledge regarding adolescent disordered eating behaviors by utilizing more complex methodological strategies (i.e., triadic concordance and discordance) to capture a more comprehensive picture of the home environment such as family functioning, encouragement of dieting, household food insecurity, and support of physical activity.

SPECIFIC AIMS

Disordered eating behaviors can become extreme and include such practices as restricting food intake in an effort to lose weight or eating large quantities of food (often referred to as binge eating). Both restricting and binge eating behaviors are manifestations of poor eating habits that can be related to anxiety and depression (American Psychological Association, 2013). Often when these types of behaviors become extreme and result in problematic and uncontrolled behaviors, they are termed as eating disorders. Likewise, the behaviors themselves (e.g. restricting, binging, or other unhealthy weight control behaviors) can be labeled as eating disordered behaviors.

Extreme weight control behaviors are prevalent among adolescents, with 25% of females and 11% of males reporting symptoms of eating and weight control behaviors that were severe enough to justify clinical evaluation (Austin et al., 2008). This same study also concluded that early intervention could prevent disordered eating in the long-term (Austin et al., 2008). Binge eating, specifically, can result in obesity, which is a term used to describe an excess of body fat and has been described as an epidemic in the US (Flegal, Caroll, Ogden, & Curtin, 2010). Eating disorders, both binge eating and anorexia are associated with co-occurring mental health problems (e.g. depression, anxiety, and substance abuse disorders) and low self-esteem (Shapira & Courbasson, 2011).

One barrier in the adolescent disordered eating literature is the use of individual self-report data (Maurizi, Gershoff, & Aber, 2012). Having multiple viewpoints of the behavior under study can potentially increase the richness of findings. However, at the same time, when multiple reporters are available, finding reliable assessments can be difficult due to complications of concordance and/or discordance among reporters. When discordance occurs, understanding the reported information becomes particularly challenging because researchers are left with questions of whose reports in the family are most accurate or helpful in predicting variables of interest. For the purposes of the current project, both concordance and discordance will be examined; however, for brevity, the term discordance will be used throughout the proposal. The proposed study is a secondary data analysis from Projects EAT 2010 (Eating and Activity in Teens 2010) and F-EAT (Families and Eating and Activity in Teens). Using data from both of these data sets will enable the use of multiple reporters to study the effects of discordance. The project was developed by a multidisciplinary team that collected data on eating behaviors, attitudes, and associated practices from adolescents and their parents.

The *central hypothesis* is that there will be differences (i.e., discordance) in reporting family closeness, encouragement of dieting, food insecurity in the home, and parental support of adolescent physical activity, among adolescents and their parents and (i.e., family triad) the discordance will be associated with more adolescent disordered eating behaviors (i.e., reports of binge eating or unhealthy weight controlling behaviors). The *rationale* of the proposed research is to understand home environment factors that influence disordered eating behaviors in adolescents. Understanding how discordance influences on disordered eating behaviors is helpful for two reasons. First, it can inform methodological decisions in research to know how multiple report data can be useful, and second understanding contributing factors to disordered eating behaviors can be informative to create interventions that are more effective in the future.

The *central hypotheses* will be tested objectively according to the following *specific aims*:

Aim 1: Examine whether discordance exists within family triads (i.e., mother, father, adolescent) when reporting on family functioning, parent encouragement of dieting, food insecurity in the home, and parental support of adolescent physical activity.

> **Hypothesis 1:** There will be discordance on self-report measures of family environment variables (i.e., family functioning, encouragement of dieting, food insecurity, and support for physical activity) among mother, father, adolescent triads.

Aim 2: Examine whether concordance and discordance among family triads on family environment variables (i.e., family functioning, encouragement of dieting, food insecurity, and support for physical activity) are associated with disordered eating behaviors (i.e., binge eating and unhealthy weight control behavior) among adolescents.

- **Hypothesis 1:** Concordance among family triads on healthy family functioning will be associated with the lowest reporting of adolescent disordered eating behaviors.
- **Hypothesis 2:** Concordance among family triads on low encouragement of adolescent dieting will be associated with the lowest reporting of adolescent disordered eating behaviors.
- **Hypothesis 3:** Concordance among family triads on low household food insecurity will be associated with the lowest reporting of adolescent disordered eating behaviors.
- **Hypothesis 4:** Concordance among family triads on high support of adolescent physical activity will be associated with the lowest reporting of adolescent disordered eating behaviors.

The *expected outcomes* of this study include increasing understanding of how discordance among family members on family environment factors is associated with adolescent disordered eating behaviors and using these findings to inform research interventions and clinical recommendations for providers and interventionists who work with adolescents and their families. Additionally, results from this study will inform methodological questions regarding the usefulness of multiple reporters in the home environment. For example, if discordant reporting is associated with disordered eating behaviors, researchers may want to design further studies with multiple reporters in order to ensure they do not miss important family viewpoints. Furthermore, results of this study could aid in developing measures and study designs to improve researchers' ability to tease out the relationship between complex family environment variables and adolescent health behaviors.

RESEARCH STRATEGY

SIGNIFICANCE

Eating disorders: Review of Relevant Literature. Both binge and restrictive eating, in their most extreme forms are clinically diagnosable behaviors, can lead to death and for adolescents, they may be related to the family and home environment. Several studies have focused on discordance as it relates to mental health diagnoses (i.e., depression, anxiety, attention deficit/hyperactivity disorder, and trichotillomania), stating that among multiple reporters there is often discordance in reporting symptomatology (Breland-Noble & Weller, 2012; Keuthen et al., 2008; Klassen, Miller, Y Fine, 2006). However most researchers have focused on the discordance in reporting of the specific diagnostic symptoms, and there has been a lack of examination of discordance in variables that may predict or be related to mental health outcomes. With the knowledge that discordance can be related to internalizing and externalizing behaviors for adolescents (Allen, Porter, McFarland, McElhaney, & Marsh, 2007; Brumariu & Kerns, 2010), looking at the predictive value of discordance among independent variables as they relate to mental health behaviors is important.

De Los Reyes and Kazdin (2005), along with others, suggest that one of the key factors in discrepant reporting is related to crucial elements of parent, child, and family functioning (Chi & Hinshaw, 2002; Ferdinand, van der Ende, & Verhulst, 2004), meaning that discordant reporting may indicate information about the quality of family relationships. Specifically, discordance in the parent-child dyad, may be an important indicator of the quality of the relationship in that it suggests less trust, poorer communication, and possible feelings of alienation for adolescents (Maurizi, Gershoff, & Aber, 2012). The quality of the relationship between adolescents and parents has been found to predict internalizing and externalizing behaviors for adolescents (Allen, Porter, McFarland, McElhaney, & Marsh, 2007); this has been found to apply to both adolescent and parental reporting (Brumariu & Kerns, 2010).

Both types of weight controlling behaviors are prevalent in adolescent populations. Binge eating is not being seen as an eating disorder in its own right and is now called binge-eating disorder in some circumstances (APA, 2013). A binge eating episode is defined as during a distinct amount of time, eating a larger amount of food than what most people would eat in similar time-frame and circumstances and experiencing a sense of lacking control during the timeframe. The episode may be characterized with eating more quickly, feeling uncomfortably full, eating large quantities of food when not hungry, eating alone due to feelings of embarrassment, and/or feeling a sense of disgust or guilt afterward (APA, 2013). For diagnosis, the episodes must be present at least once a week for three months; however, for the purposes of the proposed study, binge eating will be measured by self-reported embarrassment of binge eating (i.e., could each adolescent identify a time in the past year when s/he would be embarrassed if others saw you eat so much food in a short period of time). Binge eating behaviors are associated with high costs to individuals. For example, Bedrosian, Striegel, Want, & Schwartz, (2012) found that higher reporting of being eating habits is associated with lower work productivity, increased use of health service utilization, and higher rates of obesity. Additionally those diagnosed with Binge-eating disorder have a lifetime rate of obesity of 87% (Villarejo et al., 2012).

Obesity has become increasingly problematic in the United States, with rates of adults being overweight or obese currently at 72.3% for men and 64.1% for women (Flegal, Carroll, Ogden, & Curtin, 2010). Additionally, among children, rates of obesity have doubled over the past two decades, meaning that a third of children and adolescents in the US are now obese (Ogden, Carroll, Curtin, Lamb, & Flegal, 2010). Similar to binge eating, obesity also has high

costs as it impacts the quality of life, life expectancy, earning potential, disability, and chronic illness (Henke et al., 2010; Rodbard, Fox & Grandy, 2009). On average, individuals who are obese spend an additional $1,429 in medical expenses every year. It also impacts individuals, both adolescents and adults, from low-income families who also belong to racial/ethnic minorities at disproportionately higher rates (Fontaine, Redden, Want, Westfall, & Allison, 2003; Singh, Kogan, Van Dyck, & Siahpush, 2008). On a global level, obesity also has high monetary costs. Medical spending in the US was $78.5 billion per year, and increased in 2008 to $147 billion; after accounting for inflation it was estimated as an increase by 10%, much of which was attributed to the increasing cost of obesity (Finkelstein, Trogdon, Cohen, & Dietz, 2009).

At the other end of the disordered eating spectrum is unhealthy weight control behavior consisting of severe restricting of food and additional practices to inhibit weight gain. Food restriction, in its most extreme, is often associated with anorexia nervosa, an eating disorder when an individual restricts food to the point of lowering their Body Mass Index to 17 or below, meaning they are underweight (Center for Disease Control, 2011). Anorexia has prevalence in 0.4% of females and unknown for males in the US, though in clinical populations the ratios of females to males in treatment is 10:1 (APA, 2013). Far more pressing though, is the high prevalence of weight-control behaviors for adolescents (Serdula et al., 1993; Neumark-Sztainer & Hannan, 2000). Additionally, previous studies have shown that a large portion of adolescents are trying to lose weight with rates at 45% of girls and 26% of boys, and 26% of girls and 23% of boys reporting they wanted to maintain their weight. To accomplish these goals, 57% of girls and 33% of boys reported engaging in unhealthy weigh-controlling behaviors such as fasting, skipping meals, smoking more cigarettes, or using food substitutes. Some (12% of girls and 5% of boys), were even resorting to extremely unhealthy weight-controlling behaviors (e. g. use of diet pills, laxatives, diuretics, or vomiting) (Neumark-Sztainer et al., 2002a; Neumark-Sztainer, Story, Hannan, Perry, Irving, 2002). These and other dieting behaviors are associated with long-term weight gain, dissatisfaction with body image, weight-related teasing, and familial encouragement to diet (Field et al., 2003; Haines, Neumark-Sztainer, Wall, & Story, 2007).

Family Functioning and Discordance: Review of the Relevant Literature. Family functioning and eating behaviors was initially explored by the family therapy field by Minuchin, Rosman, & Baker (1978). These authors connected different typologies of families to individuals with anorexia. Kluck (2008) found that family dysfunction, when co-occurring with negative food related-experiences within a family, were associated with increased disordered eating (i.e. anorexia and bulimia). In a sample of college athletes, researchers found that participants who perceived their family of origin to have lower levels of psychological health also reported higher levels of disturbed eating attitudes and higher levels of body dissatisfaction (Blackmer, Searight, & Ratwik, 2011). Additionally, in a study about family meals, positive family functioning was associated with lower BMI for adolescents and higher vegetable intake (Berge, Jin, Hannan, & Neumark-Sztainer, 2013). Each of these studies indicates the growing body of literature connecting positive family functioning with healthy eating habits, however, little is known about how family functioning as determined by multiple reporters may enhance understanding of eating behaviors.

An additional element of having multiple reports on family functioning is that discrepant reporting may itself also indicate information about family functioning. For example, discordance in reporting of family functioning may provide information about the functioning relationship between parents and children (Chi & Hinshaw, 2002; De Los Reyes and Kazdin, 2005; Ferdinand, van der Ende, & Verhulst, 2004). This indicates that discordant reporting may be related to the quality of family relationships. This is particularly true of parent-child discordance, and may indicate the quality of the relationship suggesting lower levels of trust, poorer communication, and potentially increased feelings of alienation among adolescents (Maurizi,

Gershoff, & Aber, 2012). Additionally, the quality of relationships—regardless of parental or adolescent reporting—has been shown to be predictive of internalizing and externalizing behaviors among adolescents (Allen, Porter, McFarland, McElhaney, & Marsh, 2007; Brumariu & Kerns, 2010). The previous literature sheds some understanding on possible implications of discordant reporting in general, however it is unclear what this may mean for adolescent eating behavior. This is one area that the proposed study will examine.

Parental Encouragement of Dieting: Review of Relevant Literature. Dieting behaviors are common among adolescents (Armstrong & Janicke, 2012; French, Perry, Leon, & Fulkerson, 1995; Fulkerson et al., 2002), yet it has been shown to predict body dissatisfaction and disordered eating (Meesters, Muris, Hoefnagels, & van Gemert, 2007). Dieting behaviors can also be discussed as weight control behaviors, some of which are healthy (i.e., exercising, eating more fruits and vegetables, eating less high-fat food and sweets, and drinking less soda, etc.), while others are unhealthy, (i.e., fasting, skipping meals, using laxatives, self-induced vomiting, laxatives, smoking cigarettes, etc.). Understandably, parents have a vast influence on their adolescent's health-related behaviors. Sometimes this is positive, in that parents can teach and support healthy habits such as increasing fruit and vegetable intake (Neumark-Sztainer, Wall, Perry, & Story, 2003), decreasing fast food intake (Bauer, Larson, Nelson, Story, & Neumark-Sztainer (2009), and increasing physical activity (Savage, Dinallo & Downs, 2009). However, when a parent encourages his/her adolescent to diet (i.e., direct encouragement or instruction to the adolescent to alter eating habits for the principle purpose of weight loss) it can lead to unhealthy weight control behaviors, preoccupation with food (Armstrong & Janicke, 2012), disordered eating (Meesters, Muris, Hoefnagels, & van Gemert, 2007), and psychosocial outcomes such as low self-esteem and depression (Bauer, Laska, Fulkerson, & Neumark-Sztainer, 2011). Further, children may perceive comments directly encouraging the restriction of food to lose weight, teasing related to weight, and negative comments regarding the child's weight or shape, as encouragement to diet (Fulkerson et al., 2002). They may also receive indirect messages from their parents when parents model dieting behaviors (Fulkerson et al., 2002). Reasons for encouragement of dieting may vary depending on the family. One example, Armstrong, Carmondy, & Janicke (2013) found that higher child BMI was associated with increased maternal weight concern which was associated with an increase in diet encouragement. Another study found that adolescent boys and girls with higher BMIs were more affected by parental encouragement of dieting than their normal weight peers (Helfert & Warschburger, 2013).

The effects of parental encouragement of dieting on an adolescent's eating behaviors can be substantial. Armstrong and Janicke (2012) found that maternal encouragement of dieting mediated the relationship between BMIz scores (as standardized way of measuring and interpreting body mass index scores for adolescents) and unhealthy weight control behaviors. Additionally, maternal encouragement of dieting is associated with weight-related concerns and behaviors for adolescent girls, a relationship that did become non-significant when adjusting for BMI. However with adolescent boys, this behavior by mothers was associated with binge eating and weight control behaviors such as dieting; this relationship continued to be significant even after controlling for BMI (Fulkerson et al., 2002). While it is clear that maternal encouragement of dieting can have negative effects on adolescents, much is still unknown about the paternal influence of encouragement of dieting, and even less about the potential influence from measuring the effects of multiple reporters on the encouragement of dieting. This study utilizes the reporting from the adolescent and father, as well as the mother, to further understand potential influences on adolescent eating behaviors (both binge eating and unhealthy weight controlling behaviors).

Household Food Insecurity: Review of Relevant Literature. Food insecurity is defined as a household not having enough food at all times for household members to have active and

healthy lives, and it is estimated that 14.5% of American households are food insecure (Coleman-Jensen, Nord, & Singh, 2013). Coleman-Jensen et al., (2013), also found that 39.3%of these households (5.7% of the total) are considered to have very low food security, indicating at least one family member of the household had to alter their eating behaviors due to a lack of food. Children in households experiencing food insecurity are more likely to have lower levels of psychosocial functioning (Casey et al., 2005), be overweight (Alaimo, Olson, & Frongillo, 2002a), and have higher risks of suicide (Alaimo, Olson, & Frongillo, 2002b). When examining the influences of food insecurity on children's weight status, there have been many mixed results. For example some have found that household food insecurity is associated with higher rates of obesity for children (Casey et al., 2006; Dubois, Framer, Girard, & Porcherie, 2006; Jyoti, Frongillo, & Jones, 2005), young adults (Gooding, Walls, & Richmond, 2012; Widome, Neumark-Sztainer, Hannan, Haines, & Story, 2009), and adults (Adams, Grummer-Strawn, & Chavez, 2003; Martin & Ferris, 2007; Wilde, &Peterman, 2006). Other studies have had more neutral findings (Alaimo, Olson, & Frongillo, 2001; Laraia, Siega-Riz, & Evenson, 2004; Whitaker & Orzol; 2006), and still others have found that household food insecurity is associated with lower weight status for children (Matheson, Varady, Varady, & Killen, 2002; Rose & Bodor, 2006). These mixed results may be due to differing coping strategies that the family employs (Meyers, Karp, & Kral, 2006) and the variety of needs the a family may have depending on what level of food insufficiency each experiences.

While understanding contributing factors to the weight status of an adolescent, it is also important to understand how food insecurity may influence the behaviors of an adolescent. For example, in children food insecurity has been found to be associated with lower vegetable and fruit intake (Branum, 2012), and higher household fruit and vegetable availability is associated with higher fruit and vegetable intake among adolescent girls (Hanson, Neumark-Sztainer, Eisenberg, Story, & Wall, 2005). Youth experiencing food insecurity are more likely to perceive healthy eating as inconvenient and healthy food as not tasting good, and they are also more likely to eat more fast food and fewer breakfasts than their food secure peers (Widome et al., 2009). Eating practices by adolescents may also be learned from their childhood eating environment. For example, Speirs & Fiese (2013) found that in food insecure environments, parents might use food to regulate their children's emotions by utilizing food as rewards for good behavior. This may lead to poor self-regulation for the child, a habit that may continue into adolescents and adulthood. While food insecurity is often reported by adults in the family (Coleman-Jensen, Nord, Andrews, & Carlson, 2010), very little is known about multiple reporters in the literature. Nord & Carlson (2006) found that often children are protected from food insecurity, but adolescents may not be as protected. For this reason, it may be important to obtain adolescent reports of household food insecurity in addition to the adults in the household.

Parental Support of Physical Activity: Review of Relevant Literature. The final consideration in the proposed research project is the parental support of physical activity for the adolescent. Physical activity is an essential piece of health and has been labeled as a healthy weight controlling behavior. Parental support of phsyical activity for adolescents is assocated with healthy habits regarding phsyical activity, in that they are more likely to participate in it (Heitzler, Martin, Duke, & Human, 2006; Kuo, Young, Voorhees, & Haythornthwaite, 2007). Additionally, those that have family support in early adolescence are more likely to continue to be physically active into late adolescence (Bauer, Nelson, Boutelle, & Neumark-Sztainer, 2008; Dowda, Dishman, Pfeiffer, & Pate, 2007). Additonally, Hendri, Coveney, & Cox (2011) found that parental support of phsyical activity accounted for about 9% of the variance in children's health behaviors. Similar results have been shown indicating that parental views of child activity are important, with some emphasizing joint-activities, and others not (Dowda, et al., 2011; Hamilton, Cox, & White, 2012; Loprinzi & Trost, 2010). It is important to note, that for the

purposes of the proposed study, the key part of this variable is the support of the adolescent's participantion in physical activity. This provides a general picture of the household environment around physical activity rather than the behavior itself. This is in keeping with discordance and the other measures that are more concerned with the household environment in which the behaviors are taking place.

Cleland et al. (2011) reported that child physical activity had some weak longitudinal relationships with paternal reinforcement and support and maternal role modeling. This suggests that, for children, mothers and fathers may play a different role in terms of support. Lee et al. (2010) reported family meals, which have been associated with healthy eating habits (Berge, Arikian, Doherty, and Neumark-Sztainer, 2012), are positively associated with parent-child co-physical activity. This is yet another area in the literature where the use of multiple reporters is lacking and little is known about how concordance and discordance on a supportive or non-supportive environment of physical activity may affect adolescent eating behaviors.

Theory. Family systems theory enables a focus on the relational connection between family members and the potential connectedness or disengagement that can result (Doherty & McDaniel, 2010). Family systems theory can serve as scaffolding when considering relationships and interactions within a family because it places so much emphasis on the whole, rather than the individuals. This theory is based largely in the work of Bertalanffy (1968) and Bateson (1972), both of whom did research on systemic interactions. Bertalanffy (1968), a biologist, developed general systems theory which concentrated on the interactions between objects and systems arguing that parts of a whole are interrelated, with the whole being most important. When applied to families, systems theory focuses on the individuals as parts and the family as a whole, thus the interactions between individuals makes up the whole. Therapeutically this manifests as concentrating on how the relationships between family members sustain the problematic behavior, rather than the individual acting out the behavior. The proposed project focuses on disordered eating behaviors (i.e., binge eating and unhealthy weight control behaviors), and with systems theory in mind, it is important to increase understanding of what is happening within the family (i.e., the triad) rather than focus solely on the adolescents' experiences.

Bateson (1972) further emphasized systemic thinking with the development of the idea of cybernetic circularity. This idea is based in the thought that relationships are not linear, but instead circular in nature. For example, in a family where the identified patient (the person who is manifesting the extreme weight controlling behavior) is the adolescent, linear thinking would infer that either the parents' behavior is affecting the adolescent and that the adolescent's behavior is affecting the parents' behavior. Circular thinking allows for both to be true. The current study will focus on the joint perception of each parent and the adolescent and how that is related to adolescent eating behaviors. Examining each direction of the effect, is important, however it is beyond the scope of the current project.

INNOVATION

The innovation of the proposed study lies in the triadic data analysis, thus addressing the barrier of individual self-report data that currently exists in the literature (Maurizi, Gershoff, & Aber, 2012). Using the guiding theory that the sum is greater than the parts (Bateson, 1972), it is essential to utilize multi-report data to increase understanding of associated links to adolescent disordered eating behaviors. The proposed project utilizes triadic reporting (i.e., adolescent, mother, and father) to answer how home environment variables (i.e., family functioning, parental encouragement of dieting, household food insecurity, and support of physical activity) are related to adolescent disordered eating behaviors.

RESEARCH APPROACH

Methodology

The proposed study utilizes data from Projects EAT 2010 and F-EAT to address the specific aims of the project. EAT 2010 was designed to assess adolescent dietary intake, physical activity, weight control behaviors, and weight status, and F-EAT was designed for parents or caregivers of adolescents who participated in EAT 2010. Data collection was in the form of both surveys and anthropometric measures. The EAT study included 2793 adolescents from 20 public middle and high schools in the Minneapolis/St. Paul metropolitan area of Minnesota. The adolescents participated in the study during the 2009-2010 school year. The survey process included asking the adolescents to provide contact information for two parents or caregivers (e.g. grandparents, foster parents, aunts, uncles, etc.). The majority of adolescent participants (70%) provided contact information for two parents or caregivers; the parent/caregiving participants (*N* = 3709) also filled out a survey (Berge et al. 2012). For the purposes of this proposed study, a subset of adolescents (*n* = 1327) will be used due to the necessity of having both parents for each adolescent participate. Adolescents and parents are both racially/ethnically and socio-economically diverse (see Table 1).

Survey Development and Data Collection

EAT 2010. Development of the survey was guided by previous Project EAT surveys and by a multidisciplinary team (Neumark-Sztainer et al. 2002a, b; Neumark-Sztainer, Story, Perry, & Casey, 1999). An initial testing of the EAT 2010 draft was performed by pretesting the survey with 56 adolescents from diverse backgrounds. This portion of the testing was to determine the understandability and relevance of items within the survey. This draft was also reviewed by a multi-disciplinary team of experts in the professional fields of nutrition, physical activity, adolescent development, body image, family social science, and urban design. After the initial reviews, the survey was further tested with 129 middle school and high school students; this information was utilized to examine test-retest reliability, refine wording and inform decisions about reducing the number of items in the survey.

During required health, physical education, and science classes, trained staff administered the surveys and measured adolescent participants' height and weight. Measurements took place in a private area, and surveys were completed over two class periods (typically 45-50 minutes each). Participants were compensated with a $10 gift card. Procedures of the study were approved by the University of Minnesota's and all participating school districts' Institutional Review Board Human Subjects Committees. The majority of adolescents (96.3%), who were present on the days of the survey administration, chose to participate and had parental consent to participate in the study (Berge, Wall, Larson, Loth, & Neumark-Sztainer, 2013).

F-EAT. Parent or caregiver participants reported on their own physical activity and eating behaviors, parenting practices that were food-specific, home food and physical activity environment, and the emotional atmosphere of the home. The same research team, discussed previously developed the survey used in Project F-EAT by using multiple resources, including previous Project EAT surveys (Neumark-Szainer et al., 2008), measures corresponding with EAT 2010, and surveys utilized in previous literature. After a draft of the survey was created, several additional steps needed to be taken to ensure cultural relevancy and sensitivity for the participants. Berge et al. (2012a) describes these steps with the following example, cultural appropriateness was established for the major cultural groups participating in the project (i.e., Hmong, Latino, Native American, Somali, and African-American groups) by having bi-cultural staff from the Wilder Research Foundation in St. Paul, Minnesota, give feedback. The surveys were then pre-tested with focus groups to solicit feedback from diverse parent participants. The survey was finalized in English and then professionally translated.

The Wilder Research Foundation conducted the data collection for the current study. Invitation letters, which described the Project F-EAT study and provided the study contact

information, were sent to each of the parents and caregivers. After two weeks, a follow-up mailing of the Project F-EAT survey, consent form, two-dollar bill, and a return envelope (postage pre-paid). After an additional two weeks, parents and caregivers were mailed a postcard reminder, and if they did not respond within a month, they were sent a second copy of the survey. Participants, who did not respond, were contacted by telephone and were given the opportunity, via telephone, to complete the survey. Trained study staff conducted telephone interviews. Mailed surveys were available in English, Spanish, Hmong, and Somali; phone interviews were offered in these languages and also in Oromo, Amharic, and Karen. Participants who completed either survey were compensated with a $25 gift card.

Statistical Analysis

The *objective* of the proposed project is to show whether and how discordance among family triads (e.g. adolescent-mother-father) exists—in the reporting of family functioning, parental encouragement of dieting, food insecurity in the home, and parental support of physical activity—is associated with adolescent disordered eating behaviors (i.e., binge eating and unhealthy weight control behavior). The *rationale* for this is to better understand the added information of multiple reporters on problems such as binge eating and unhealthy weight control behavior. Some of the items in the EAT and F-EAT surveys utilize similar items to measure the same construct, which allows for an exploration of the relationship of discordant answers between adolescent, mother and father. The constructs that will be utilized are encouragement of dieting, parental support of physical activity, household food insecurity, and family cohesion. The aim of the current study is to examine if discord exists within the adolescent-mother-father triad, and how the discord predicts unhealthy eating behaviors among adolescents. *Aim 1* focuses on the concordance and discordance that exists within each family triad. This will be tested by using chi-squared analysis to compare the significant difference between the groups on each of the variables of interest (i.e., family functioning, parental encouragement of dieting, household food insecurity, and support of physical activity). *Aim 2* focuses on how the concordance and discordance of each of these (i.e., family functioning, parental encouragement of dieting, household food insecurity, and support of physical activity) is associated with adolescent disordered eating behaviors. (i.e., binge eating and unhealthy weight control behavior). This will be tested using logistic regression.

Expected Outcomes. It is expected that through this study, there will be a clearer understanding of the usefulness of triadic reporting within families (i.e., mother, father, and adolescent). Further it will also address how discordance on family functioning, encouragement of dieting, household food insecurity, and parental support of physical activity is related to adolescent eating behaviors (both binge eating and weight control behaviors).

Table 1. Demographics of EAT 2010 and F-EAT

	EAT 2010 (*N* = 2793)	F-EAT Parents (*N* = 3709)
Ethnicity/race		
Black	28%	26%
Asian	20%	21%
Non-Hispanic white	18%	30%
Hispanic white	17%	17%
Native American	4%	3%
Mixed/other	13%	3%
Socio-economic status		
Low or low-middle	62%	51%
Middle	18%	26%
Upper-middle or high	20%	22%
Overweight	41%	68.5%
Age (years)	14.4 (*SD* = 2)	42.9 (*SD* = 8.4)
Female	53.2%	62%
Two parents in F-EAT	*N* = 1,327	NA

Table 2. TIMELINE

Task	Jan – Dec 2013		Jan 2013	Feb 2013	Mar 2013	Apr 2013	May 2013
Proposal Writing and Revisions	←	→					
Proposal Meeting & Schedule Defense			←	→			
Aim #1 Analyses and Written Results				←	→		
Aim #2 Analyses and Written Results				←	→		
Discussion					←	→	
Submit to committee for review					←	→	
Incorporate revisions						←	→
Dissertation defense							← →

Comprehensive Bibliography

Adams, E.J., Grummer-Strawn, L., &Chavez, G. (2003) Food insecurity is associated with increased risk of obesity in California women. *Journal of Nutrition*, *133*, 1070–1074.

Alaimo, K., Olson, C. M., & Frongillo, E.A. Jr. (2002a). Low family income and food insufficiency in relation to overweight in US children: is there a paradox? *Archives of Pediatrics and Adolescent Medicine, 155*, 1161–1167.

Alaimo, K., Olson, C.M., & Frongillo, E.A. Jr. (2002b). Family food insufficiency, but not low family income, is positively associated with dysthymia and suicide symptoms in adolescents. *Journal of Nutrition, 132*, 719–725.

Allen, J. P., Porter, M., McFarland, C., McElhaney, K. B., & Marsh, P. (2007). The relation of attachment security to adolescents' paternal and peer relationships, depression, and externalizing behavior. *Child Development, 78,* 1222-1239.

American Psychological Association. (2013). *Diagnostic and statistical manual of mental disorders (5th ed.)*. Washington D.C.: Author.

Armstrong, B., Carmondy, J. K., & Janicke, D. M. (2013). Predictors of maternal encouragement to diet: A moderated mediation analysis. *Maternal and Child Health Journal.* doi: 10.1007/s10995-01301388-5

Armstrong, B. & Janicke, D. M. (2012). Differentiating the effects of maternal and peer encouragement to diet on child weight control attitudes and behaviors. *Appetite, 59*, 723-729. doi: http://dx.doi.org/10.1016/j.appet.2012.06.022

Austin, S. B., Ziyadeh, N. J., Forman, S., Prokop, L. A., Keliher, A., & Jacobs, D. (2008). Screening high school students for eating disorders of a national initiative. Retrieved January 15, 2013 from, http://www.cdc.gov/pcd/issues/2008/oct/07_0164.htm

Bateson, G. (1972). *Steps to an ecology of mind: A revolutionary approach to man's understanding of himself.* San Francisco, CA: Chandler Publishing Company.

Bauer, K. W., Larson, N. I., Nelson, M. C., Story, M., & Neumark-Sztainer, D. (2009). Fast food intake among adolescents: Secular and longitudinal trends from 1999 to 2004. *Preventive Medicine, 48,* 284-287.

Bauer, K. W., Laska, M. N., Fulkerson, J. A., & Neumark-Sztainer, D. (2011). Longitudinal and secular trends in parental encouragement for healthful eating, physical activity, and dieting throughout the adolescent years. *Journal of Adolescent Health, 23,* 720-723.

Bauer, K. W., Nelson, M. C., Boutelle, K. N., & Neumark-Sztainer, D. (2008). Parental influences on adolescents' physical activity and sedentary behavior: Longitudinal findings from Project EAT-II. *International Journal of Behavioral Nutrition and Physical Activity, 5,* 12. doi: http://dx.doi.org/10.1016/j.jadohealth.2010.12.023

Bedrosian, R. C., Striegel, R. H., Wang, C., & Schwartz, S. (2012). Associations of binge eating

with work productivity impairment, adjusted for other health risk factors. *Journal of Occupational and Environmental Medicine, 54,* 385-393. doi: 10.1097/JOM.0b013e3182479f40

Berge, J. M., Arikian, A., Doherty, W. J., & Neumark-Sztainer, D., (2012a). Healthful eating and physical activity in the home environment: Results from multifamily focus groups. *Journal of Nutrition Education and Behavior, 44,* 123-131. doi:10.1016/j.jneb.2011.06.011

Berge, J. M., Jin, S., Hannan, P. J., & Neumark-Sztainer, D. (2013). Structural and interpersonal characteristics of family meals: Associations with adolescent BMI and dietary patterns. *Journal of the Academy of Nutrition and Dietetics*, *113,* 816-822.

Berge, J. M., MacLehose, R., Loth, K. A., Eisenberg, M. E., Fulkerson, J. A., & Neumark-Sztainer, D. (2012). Family meals. Associations with weight and eating behaviors among mothers and fathers. *Appetite, 58,* 1128-1135.

Berge, J. M., Wall, M., Larson, N., Loth, K. A., & Neumark-Sztainer, D. (2013). Family functioning: Associations with weight status, eating behaviors, and physical activity in adolescents. *Journal of Adolescent Health. 52,* 351-357.

Bertalanffy, L. von. (1968). *General System Theory.* New York: George Braziller.

Blackmer, V. Searight, H. R. & Ratwik, S. H. (2011). The relationship between eating attitudes, body image and perceived family-of-origin climate among college athletes. *North American Journal of Psychology, 13,* 435-446.

Blumberg, S. J., Bialostosky, K., Hamilton, W. L., & Briefel, R. R. (1999). The effectiveness of a short form of the household food security scale. *American Journal of Public Health, 89,* 1231-1234. doi: 10.2105/AJPH.89.8.1231

Branum, A. M. (2012). Fruit and vegetable intake in US children and adolescents: Measurement error and determinants. (Unpublished doctoral dissertation). The Johns Hopkins University, Baltimore, Maryland.

Breland-Noble, A. M. & Weller, B. (2012). Examining African American adolescent depression in a community sample. The impact of parent/child agreement. *Journal of Child and Family Studies, 21,* 869-876. doi. 10.1007/s10826-011-9547-z

Brumariu, L. E. & Kerns, K. A. (2010). Parent-child attachment and internalizing symptoms in childhood and adolescence: A review of empirical findings and future directions. *Development and Psychopathology, 22,* 177-203. doi: 10.1017/S0954579409990344

Casey, P. H., Simposon, P. M., Gossett, J. M., Bogle, M. L., Champagne, C. M., Connell, C., Harsha, D., McCabe-Sellers, B., Robbins, J. M., Stuff, J. E., & Weber, J. (2006) The association of child and household food insecurity with childhood overweight status. *Pediatrics, 118*, e1406-e1413.

Casey, P. H., Szeto, K. L., Robbins, J. M., Stuff, J. E., Connell, C., Gossett, J. M., & Simpson, P.

M. (2005). Child health-related quality of life and household food security. *Archives of Pediatric Adolescent Medicine, 159,* 51-56. doi: 10.1001/archpedi.159.1.51

Center for Disease Control (2011). About BMI for adults. Retrieved June 7, 2012 from, http://www.cdc.gov/healthyweight/assessing/bmi/adult_bmi/index.html

Chi, T. C. & Hinshaw, S. P. (2002). Mother-child relationships of children with ADHD: The role of maternal depressive symptoms and depression-related distortions. *Journal of Abnormal Child Psychology, 30*, 387-400.

Cleland, V., Timperio, A., Salmon, J., Hume, C., Telford, & Crawford, D. (2011). A longitudinal study of the family physical activity environment and physical activity among youth, *American Journal of Health Promotion, 25*(3), 159-167. doi:10.4278/ajhp.090303-QUAN-93

Cohen, J. (1992). A power primer. *Psychological Bulletin, 112*(1), 155-159.

Coleman-Jensen, A., Nord, M., & Singh, A. (2013). Household food security in the United States in 2012. November 22, 2013 from, http://www.ers.usda.gov/publications/err-economic-research-report/err155.aspx#.UuQ4uhDnbcs

De Los Reyes, A. & Kazdin, A. E. (2005). Informant discrepancies in the assessment of childhood psychopathology: A critical review, theoretical framework, and recommendations for further study. *Psychological Bulletin, 131,* 483-509. doi: 10.1037/0033-2909.131.4.483

Doherty, W. J., & McDaniel, S. J. (2010). *Family therapy*. Washington, DC: American Psychological Association.

Dowda, M., Dishman, R. K., Pfeiffer, K. A., & Pate, R. R. (2007). Family support for physical activity in girls from 8th to 12th grade in South Carolina. *Preventive Medicine, 44,* 153-159.doi: http://dx.doi.org/10.1016/j.ypmed.2006.10.001

Dowda, M., Pfeiffer, K. A., Brown, W. H., Mitchell, J. A., Byun, W., & Pate, R. R. (2011). Parental and environmental correlates of physical activity of children attending preschool. *Archives of Pediatric Adolescent Medicine, 165*, 939-944. doi:10.1001/archpediatrics.2011.84

Dubois, L., Farmer, A., Girard, M., & Porcherie, M. (2006). Family food insufficiency is related to overweight among pre-schoolers. *Social Science and Medicine, 63,* 1503–1516

Epstein, N. B., Baldwin, L. M., & Bishop, D. S. (1983). The McMaster family assessment device. *Journal of Marital & Family Therapy, 9*, 171-180. doi:10.1111/j.1752-0606.1983.tb01497.x

Ferdinand, R. F., van der Ende, J., & Verhulst, F. C. (2004). Parent-adolescent disagreement regarding psychopathology in adolescents from the general population as a risk factor for adverse outcome. *Journal of Abnormal Psychology, 113,* 198-206. doi: 10.1037/0021-843X.113.2.198

Field, A. E., Austin, S. B., Taylor, C. B., Malspeis, S., Rosner, B., Rockett, H. R., Gillman, M. W., & Colditz, G. A. (2003). Relation between dieting and weight change among preadolescents and adolescents. *Pediatrics, 112,* 900-906. doi: 10.1542/peds.112.4.900

Finkelstein, E. A., Trogdon, J. G., Cohen, J. W., & Dietz, W. (2009). Annual medical spending attributable to obesity: Payer-and service-specific estimates. *Health Affairs, 28*, w822-w831. doi: 10.1377/hlthaff.28.5.w822

Flegal, K. M., Carroll, M. D., Ogden, C. L., & Curtin, L. R. (2010). Prevalence and trends in obesity among U.S. adults, 1999-2008. *The Journal of the American Medical Association, 303*, 235-241. doi:10.1001/jama.2009.2014

Fontaine, K. R., Redden, D. T., Wang, C., Westfall, A. O. & Allison, D. B. (2003). Years of life lost due to obesity. *The Journal of the American Medical Association, 289*, 187-193. doi: 10.1001/jama.289.2.187.

French, S. A., Perry, C. L., Leon, G. R., & Fulkerson, J. A. (1995). Dieting behaviors and weight change history in female adolescents. *Health Psychology, 14,* 548-555. doi: 10.1037/0278-6133.14.6.548

Fulkerson, J. A., McGuire, M. T., Neumark-Sztainer, D., Story, M., French, S. A., & Perry, C. L. (2002). Weight-related attitudes and behaviors of adolescent boys and girls who are encouraged to diet by their mothers. *International Journal of Obesity. 26,* 1579-1587.

Gooding, H. C., Walls, C. E., & Richmond, T. K. (2012) Food insecurity and increased BMI in young adult women. *Obesity, 20*, 1896-1901. doi:10.1038/oby.2011.233

Haines, J., Neumark-Sztainer, D., Wall, M., & Story, M. (2007). Personal, behavioral, and socio-environmental risk and protective factors for adolescent overweight. *Obesity Research*, *15,* 2748-2760.

Hamilton, K., Cox, S., & White, K. M., (2012). Testing ta model of physical activity among mothers and fathers of young children: integrating self-determined motivation, planning, and the theory of planned behavior. *Journal of Sport & Exercise Psychology, 34*, 124-145.

Hanson, N.I., Neumark-Sztainer, D., Eisenberg, M.E., Story, M., &Wall, M. (2005). Associations between parental report of the home food environment and adolescent intakes of fruits, vegetables, and dairy foods. *Public Health Nutrition, 8,* 77-85.

Helfert, S. & Warschburger, P. (2013). The face of appearance-related social pressure: gender, age and body mass variations in peer and parental pressure during adolescence. *Child & Adolescent Psychiatry & Mental Health, 7*, 1-11.

Heitzler CD, Martin SL, Duke J, Huhman M. (2006). Correlates of physical activity in a national sample of children aged 9–13 years. *Preventative Medicine, 42,* 254–60.

Hendri, G. A., Coveney, J., & Cox, D. N. (2011). Factor analysis shows association between family activity environment and children's health behavior. *Health Behavior, 35*, 524-529.

Henke, R. M., Carls, G. S., Short, M. E., Pei, X., Wang, S., Moley, S., Sullivan, M., & Goetzel, R. Z. (2010). The relationship between health risks and health and productivity costs among employees at Pepsi Bottling Group. *Journal of Occupational & Environmental Medicine, 52,* 519-527. doi: 10.1097/JOM.0b013e3181dce655

Jyoti, D.F., Frongillo, E.A., & Jones, S. J. (2005). Food insecurity affects school children's academic performance, weight gain, and social skills. *Journal Nutrition, 135,* 2831–2839

Kenny, D. A., Kashy, D. A., & Cook, W. L. (2006). *Dyadic Data Analysis.* New York, The Guilford Press.

Keuthen, N. J., Flessner, C. A., Woods, D. W., Franklin, M. E., Piacentini, J. A., Khanna, M. Moore, P., Cashin, S., & The TLC-SAB. (2008). Parent-youth rating concordance for hair pulling variables, functional impairment, and anxiety scale scores in trichotillomania. *Child & Family Behavior Therapy, 30,* 337-353. doi: http://dx.doi.org/10.1080/07317100802483215

Klassen, A. F., Miller, A., & Fine, S. (2006). Agreement between parent and child report of quality of life in children with attention-deficit/hyperactivity disorder. *Child: Care, Health and Development, 32,* 397-406. Doi: 10.1111/j.1365-2214.2006.00609.x

Kluck, A. S. (2008). Family factors in the development of disordered eating: Integrating dynamic and behavior explanations. *Eating Behavior, 9,* 471-483. doi:10.1016/j.eatbeh.2008.07.2006.

Kuo, J., Voorhees, C.C., Haythornthwaite, J.A., & Young, D.R. (2007). Associations between family support, family intimacy, and neighborhood violence and physical activity in urban adolescent girls. *American Journal of Public Health, 97,* 101–3.

Laraia, B.A., Siega-Riz, A.M., & Evenson, K.R. (2004). Self-reported overweight and obesity are not associated with concern about enough food among adults in New York and Louisiana. *Preventative Medicine, 38*, 175–181.

Lee, S. M., Nihiser, A., Strouse, D., Das, B., Michael, S., & Huhman, M. (2010). Correlates of children and parents being physically active together. *Journal of Physical Activity and Health, 7*, 776-783.

Loprinzi, P. D. & Trost, S. G. (2010). Parental influences on physical activity behavior in preschool children. *Preventative Medicine, 50,* 129-133. doi:10.1016/j.ypmed.2009.11.010

Martin, K.S., & Ferris, A.M. (2007). Food insecurity and gender are risk factors for obesity. *Journal of Nutrition Education and Behavior, 39,* 31–36.

Matheson, D.M., Varady, J., Varady, A., & Killen, J. (2002). Household food security and nutritional status of His-panic children in the fifth grade. *American Journal of Clinical Nutrition, 76,* 210-217.

Maurizi, L. K., Gershoff, E. T., & Aber, J. L. (2012) Item-level discordance in parent and adolescent reports of parenting behavior and its implications for adolescents' mental

health and relationships with their parents. *Journal of Youth and Adolescence, 41*, 1035-1052. doi: 10.1007/s10964-011-9741-8

Meesters, C., Muris, P., Hoefnagels, C., & van Gemert, M. (2007). Social and family correlates of eating problems and muscle preoccupation in young adolescents. *Eating Behaviors, 8,* 83-90.

Meyers, A.F., Karp, R.J., & Kral, J.G. (2006). Poverty, food insecurity, and obesity in children. *Pediatrics, 118,* 2265a–2266.

Miller, I. W., Epstein, N. B., Bishop, D. S., & Keitner, G. I. (1985). The McMaster family assessment device: Reliability and validity. *Journal of Marital & Family Therapy, 11,* 345-356. doi:10.1111/j.1752-0606.1985.tb00028.x

Minuchin, S., Rosman, B. L., & Baker, L. (1978). *Psychosomatic families: Anorexia nervosa in context*. United States of America: Harvard University Press.

Neumark-Sztainer, D., Croll, J., Story, M., Hannan, P. J., French, S. A., & Perry, C. (2002a). Ethnic/racial differences in weight related concerns and behaviors among adolescent girls and boys: Findings from Project EAT. *Journal of Psychosomatic Research, 53*, 963–974.

Neumark-Sztainer, D., Eisenberg, M. E., Fulkerson, J. A., Story, M., & Larson, N. I. (2008). Family meals and disordered eating in adolescents. Longitudinal findings from Project EAT. *Archives of Pediatrics and Adolescent Medicine, 162*, 17–22.

Neumark-Sztainer, D., & Hannan, P. J. (2000). Weight-related behaviors among adolescent girls and boys. *Journal of the American Medical Association Pediatrics, 6,* 569-577. doi:10.1001/archpedi.154.6.569

Neumark-Sztainer, D., Story, M., Hannan, P. J., Perry, C. L., & Irving, L. M. (2002b). Weight-related concerns and behaviors among overweight and non-overweight adolescents: Implications for preventing weight-related disorders. *Archives of Pediatrics and Adolescent Medicine, 156*, 171–178.

Neumark-Sztainer, D., Story, M., Perry, C., & Casey, M. (1999). Factors influencing food choices of adolescents: Findings from focus-group discussions with adolescents. *Journal of the American Dietetic Association, 99*, 929–937.

Neumark-Sztainer D., Wall M., Perry C., & Story M. (2003). Correlates of fruit and vegetable intake among adolescents: Findings from Project EAT. *Preventive Medicine*, *37,*198-208.

Nord, M., Andrews, M., & Carlson, S. (2007). Household Food Security in the United States. ERR-49, Washington, DC: US Department of Agriculture, Economic Research Service.

Ogden, C., Carroll, M., Curtin, L., Lamb, M., & Flegal, K. (2010). Prevalence of high body mass index in US children and adolescents, 2007-2008. *Journal of the American Medical Association, 303*, 242-249.

Olson, D. H. (2011). FACES IV and the circumplex model: validation study. *Journal of Marital & Family Therapy, 37*, 64-80. doi: 10.1111/j.1752-0606.2009.00175.x

Reifman, A., Barnes, G. M., Dintcheff, B. A., Farrell, M. P., & Uhteg, L. (1998). Parental and

peer influences on the onset of heavier drinking among adolescents. Journal of Studies on Alcohol, 59, 311–317.

Rodbard, H. W., Fox, K. M., & Grandy, S. (2009). Impact of obesity on work productivity and role disability in individuals with the at risk for diabetes mellitus. *American Journal of Health Promotion, 23*, 353-360. doi: http://dx.doi.org/10.4278/ajhp.081010-QUAN-243

Rogers, R. (2012). Body image: familial influences. *Encyclopedia of Body Image and Human Appearance, 1*, 219-225.

Rose, D., & Bodor, J.N. (2006). Household food insecurity and overweight status in young school children: results from the Early Childhood Longitudinal Study. *Pediatrics, 117*, 464–473.

Savage, J. S., Dinallo, J. M., & Downs, D. S. (2009). Adolescent body satisfaction: the role of perceived parental encouragement for physical activity. *The International Journal Behavioral Nutrition and Physical Activity, 6,* 90.

Serdula, M. K., Ivery, D., Coates, R. J., Freedman, D. S., Williamson, D. F., & Byers, T. (1993). Do obese children become obese adults? A review of the literature. *Preventive Medicine, 22*, 167-177. doi: http://dx.doi.org/10.1006/pmed.1993.1014

Shapira, L. B., & Courbasson, C. M. (2011). Depression and anxiety: Predictors of eating disorder symptoms and substance addiction severity. *Mental health and Substance Use, 40*, 222-238.

Singh, G. K., Kogan, M. D., Van Dyck, P. C., Siahpush, M. (2008). Racial/ethnic, socioeconomic, and behavioral determinants of childhood and adolescent obesity in the United States: Analyzing independent and joint associations. *Annals of Epidemiology, 18,* 682-695. doi: http://dx.doi.org/10.1016/j.annepidem.2008.05.001

Speirs, K. & Fiese, B. (2013, November). Food security and parental feeding practices that impact self-regulation. In j. Wilgen (Facilitator), *Families, Food and Health Outcomes*. Paper Presentation presented at the National Council on Family Relations 75th Annual Conference, San Antonio, TX.

Villarejo, C., Fernández-Aranda, F., Jiménez-Murcia, S., Peñas-Lledó, E., Granero, R., Penelo, E., Tinahones, F. J., Sancho, C., Vilarras, N., Bernabé, M. M., Casanueva, F. F., Fernández-Real, J. M., Frühbeck, G., De la Torre, R., Treasure, J., Botella, C., Menchón, J. M. (2012). Lifetime obesity in patients with eating disorders: Increasing prevalence, clinical and personality correlates. *European Eating Disorders Review, 20,* 250-254. doi: 10.1002/erv.2166

Whitaker, R.C., & Orzol, S. M. (2006). Obesity among US urban preschool children: relationships to race, ethnicity, and socioeconomic status. *Archives of Pediatrics and Adolescent Medicine*, *160*, 578–584.

Widome, R., Neumark-Sztainer, D., Hannan, P. J., Haines, J., & Story, M. (2009). Eating when there is not enough to eat: Eating behaviors and perceptions of food among food-insecure youths. *American Journal of Public Health, 99,* 822-828.

Wilde, P.E. & Peterman, J. N. (2006). Individual weight change is associated with household food security status. *Journal of Nutrition, 136,* 1395–1400.