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INDIVIDUAL AND CONTEXTUAL INFLUENCES ON EARLY ADOLESCENT GIRLS' DISORDERED EATING

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Abstract

Research aims were to 1) use cluster analysis to examine patterns of disordered eating risk (weight status, weight concern, and depression) in age 9 girls, 2) examine associations between cluster membership and multiple disordered eating indicators at ages 11 and 13, 3) examine stability in cluster variables over time and the influence of pubertal development on such risk, and 4) examine if clusters were influence by broader developmental factors within the family environment. Self-report data from 163 girls, assessed at ages 9, 11, and 13 were used to address these aims.

Cluster analyses indicated 3 clusters at age 9: low risk (LR; n = 60), higher weight status (HW; n = 68), and higher depression (HD; n = 35). At ages 11 and 13, girls in the HD cluster significantly higher binge eating scores and emotional eating scores in comparison to the other two clusters. Girls in the HD and HW clusters had higher restraint scores and body dissatisfaction scores at ages 11 and 13, and were more likely to be classified as unhealthy dieters at age 13, relative to girls in the LR cluster. Controlling for age 11 pubertal development did not change results. Instead age 11 pubertal development was associated with higher weight status at ages 11 and 13 and higher weight concern scores and depression scores at age 13.

At ages 7 and 9, girls in the HW and HD were exposed to greater parental encouragement of weight loss and conflict over girls' elevated weight status; these girls were also more likely to have at least one overweight parent relative to girls in the LR cluster. Girls in the HD further differed from girls in the LR cluster in that they perceived more frequent and threatening parental conflict and greater parental use of psychological control. Girls in the LR cluster, in contrast perceived more parental

resolution of conflict and reported more parental monitoring, but less parental use of psychological control. Finally, girls in both the LR and HW reported more social support (i.e. peer and parent support) in contrast to girls in the HD.

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Acknowledgements

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Chapter One

Introduction

Disordered eating behaviors and attitudes are most prevalent in adolescent females but risk for disordered eating and indications of early eating disturbances are present prior to adolescence. Pre-adolescent girls are aware of (Abramovitz & Birch, 2000) and engage in dieting practices and dietary restraint (Jacobi, Agras, & Hammer, 2001; McVey, Tweed, & Blackmore, 2004; Sinton & Birch, 2005; Shunk & Birch, 2004a), are concerned about body shape and appearance (Davison, Markey, & Birch, 2003; Ohring, Graber, & Brooks-Gunn, 2002, Sands & Wardle, 2003; Blowers et al., 2003), and engage in overeating or binge eating behaviors (Birch, Fisher, & Davison, 2003; Tanofsky-Kraff et al., 2004).

These findings indicate that risk for disordered eating is present in girls prior to adolescence. Evidence linking these early risk factors with emergence of disordered eating during adolescence is needed in order clarify the importance and clinical significance of early disordered eating risk factors with disordered eating during puberty (Jacobi et al., 2001; Smolak & Levine, 1992). To date, most studies of disordered eating have focused on examine a single type of disordered eating, so that there is a body of research that has separately examined multiple disordered eating behaviors (e.g. binge eating, unhealthy dieting, and bulimic symptoms) across different samples of adolescent females. A next step is to examine multiple disordered eating behaviors together in one study in order to assess the extent to which girls are at risk for and engage in multiple

disordered eating behaviors, and determine whether different patterns of risk factors are associated with the emergence of specific disordered eating behaviors. Evidence on this point would contribute to an understanding of the etiology of disordered eating behaviors.

In addition, an examination of the family context in which risk emerges would contribute to an understanding of how risk emerges. Early experiences in childhood may influence risk for later disordered eating. For example, maternal control or restriction of child intake (Birch & Fisher, 1998), family dysfunction (e.g. enmeshment, poor communication) (Waller & Calam, 1994), parental pressure to lose weight or an emphasis on appearance (Kanakis & Thelen, 1995; Vander Wal & Thelen, 2000a), maternal disordered eating (e.g. Jacobi et al, 2001; Stice, Agras, & Hammer, 1998), and sexual or physical abuse (Ackard & Neumark-Stzainer, 2003; Neumark-Sztainer, Story, Hannan, Beuhring, & Resnick, 2000) have been linked to disordered eating. Elaboration of how multiple environmental factors influence such risk would provide additional clarification of how different contexts influence disordered eating.

A Developmental Psychopathology Framework

A developmental psychopathology perspective is an appropriate framework for the study of disordered eating (Attie & Brooks-Gunn, 1994; Smolak & Levine, 1992). This framework emphasizes studying the development of both deviant and normal behavior through examination of differences in genetic, biological, physical, and contextual influences on development across the lifespan (Sroufe & Rutter, 1984). Research using this perspective has established that disordered eating is influenced by physical (weight status, pubertal development), psychological, and environmental influences.

Research conducted within this framework has the potential to describe and inform how patterns of behavioral maladaptation (Sroufe & Rutter, 1984), such as disordered eating, emerge across individuals through an examination of group differences on outcomes of interest (Cichetti & Sroufe, 2000). In regard to research on disordered eating, studies examining differences on risk factors for individuals diagnosed with either anorexia nervosa or bulimia nervosa have highlighted important etiological differences between these diagnoses. For example, Fairburn, Cooper, Doll, and Welch (1999) indicated that though individuals diagnosed with anorexia nervosa or bulimia nervosa were similar on a number of risk factors, they differed so that individuals diagnosed with bulimia nervosa had a history of parental and childhood obesity and parental psychiatric disorder (e.g. substance use, depression) and were more exposed to comments about weight and appearance during childhood than individual diagnosed with anorexia nervosa than who else?. This highlights the importance of considering how individual and contextual differences may differentiate different types of eating pathology.

Other studies also highlight how additional differences in co-morbidity among disordered eating patients influence severity of symptoms and outcomes over time (e.g. Keel et al., 2003; Grilo, 2004; Stice & Agras, 1999). Keel et al reported that among patients diagnosed with either anorexia nervosa or bulimia nervosa at baseline assessment, individuals diagnosed with anorexia nervosa at baseline and who were also diagnosed with alcohol use disorder at follow-up had the highest rate of mortality. Studies of sub-groups of individuals with bulimic symptoms has revealed that individuals with elevated dietary restraint and negative affect had more problems with mood and anxiety problems, greater weight and shape concerns, and poor social functioning in

comparison to individuals who only reported high restraint, so that the presence of negative affect and dieting appeared to indicate more severe pathology (Grilo, 2003; Stice & Agras, 1999). Therefore, examination of the different co-morbid patterns among eating disorder patients indicated differences in mortality and in severity of pathological behavior.

Additional support for the idea that the inclusion of groups differing on individual characteristics and family background can provide new insight into the etiology of distinct disordered eating behaviors comes from recent studies examining gender differences in disordered eating (Jones, 2004; McCabe & Ricciardelli, 2005). Such research has highlighted that males are at risk for disordered eating but that the intention behind disordered eating, as well as the patterns of risk factors and behaviors engaged in, is different from that reported among females (Field et al., 2005; McCabe & Ricciardelli). For example, males may focus more on increasing muscle mass through the use of supplements and steroids while girls focus more on weight loss behaviors, such as the use of diuretics and laxatives (Field et al.). Therefore, research examining different patterns of risk factors among individuals may provide additional insight into how different disordered eating behaviors emerge.

Disordered Eating Risk Factors

While there are a wide range of risk factors associated with disordered eating (Herman & Polivy 2001; Jacobi, Hayward, deZwaan, Kraemer, & Agras , 2004; Stice, 2002; Stice & Shaw, 2003), there are three specific risk factors that have been assessed in pre-adolescent girls (Littleton & Ollendick, 2003) and longitudinally associated with

multiple disordered eating behaviors: weight status, weight concern and depression (Littleton & Ollendick; Stice, 2002).

Weight Status. Elevated weight status and overweight has been recently linked to general disordered eating scores (Burrows & Cooper, 2002; Keel, Fulkerson, & Leon, 1997), early dieting awareness and dieting in young girls (Hill & Pallin, 2002; Sinton & Birch, 2005), dietary restraint in girls and adolescents (Field et al., 2003) and to binge eating in both girls and boys (Tanofsky-Kraff et al., 2004). Related to this, girls' perceptions of being overweight also predict disordered eating (Ackard & Peterson, 2001; Field et al., 1999). The longitudinal nature of several of these studies highlights the importance of considering the role of weight status as an early predictor of disordered eating. In addition, the increasing rates of overweight and obesity among children and adolescents (Ogden et al., 2006) and current cultural stigmatization against overweight and the promotion instead of thinness suggests that developing children, particularly girls, may be at increasing risk for disordered eating.

Weight Concern. According to Stice (2002), one of the most robust links to risk for the development of eating disorders is internalization of concerns about weight and/or body shape. Weight concerns are present in young girls prior to adolescence (Davison, Markey, & Birch, 2003; Killen et al., 1996; Maloney, McGuire, Daniels, & Specker, 1989; Sands & Wardle, 2003; Vander Wal & Thelen, 2000a), indicating that an additional disordered eating risk factor is also present in developing girls. Further, young girls' weight concern scores increase risk for disordered eating. Both Davison et al. (2003) and Killen et al. (1996) found young girls' weight concern scores to predict, over time, girls' elevated disordered eating scores; Graber, Brooks-Gunn, Paikoff, and Warren

(1994) also found initial levels of body dissatisfaction in early adolescence to confer risk for disordered eating over an 8-year period. In regard to specific eating behaviors, weight concern is associated with dieting (Hill & Pallin, 1998; Killen et al., 1994, 1996), unhealthy weight loss behaviors (Field et al., 1999; Neumark-Stzainer et al., 2006), and binge eating (Stice et al., 2002). Therefore, there is consistent evidence that young girls enter puberty with concerns about their weight in place (Thelen, Lawrence, & Powell, 1992) and that such concerns place them at risk for multiple forms of disordered eating.

Depression. In general, in comparison to boys, girls are at greater risk for internalizing problems by adolescence, such as depression, and this risk emerges during childhood (Crick & Zahn-Waxler, 2003). In turn, depression in girls prior to adolescence is associated with co-morbid eating disorder diagnoses in adolescence and early adulthood (Kovacs, Obrosky, & Sherrill, 2003). Johnson et al (2002) report that depressive symptoms predicted girls' and boys' increased risk for eating problems even when controlling for earlier levels of eating and other pathology. Stice and colleagues' work has also linked depression with bulimic symptoms (Stice, Burton, & Shaw, 2004) and, in conjunction with other individual traits, with risk for binge eating (Stice, Presnell, & Spangler, 2002). Depression and related internalizing symptoms in middle childhood have been associated with dieting behaviors in pre-adolescent girls (Hill & Pallin, 1998; Leon, Fulkerson, Perry, & Cudeck, 1993; Sinton & Birch, 2005) and negative emotionality assessed in infancy has been associated with girls' disordered eating in early adolescence (Martin et al., 2001). Therefore, it appears that depression may heighten risk for dieting behaviors and bulimic symptoms in girls and that additional examination of the association between childhood depression throughout early adolescent disordered

eating is warranted. Depression, though, may interact with weight status (Sinton & Birch) or be associated with girls' weight concerns (Stice & Bearman, 2001) so that studies that have not examined the interaction of these risk factors may offer limited insight into the development of disordered eating.

Patterns of Risk. The described research indicates that weight status, weight concern, and depression may independently increase risk for disordered eating in girls. However, it is unlikely that these factors in isolation "cause" eating pathology. Instead, risk factors interact with one another in the prediction of disordered eating; multivariate studies of eating pathology often account for more variance in disordered eating scores (Stice, 2002) so that future studies of disordered eating should include multiple risk indicators. Given the consistent association of weight concerns, negative affect, and weight status with disordered eating in girls, and evidence that these factors are associated with one another (Burrows & Cooper, 2002; Stice et al., 2002), the next step is to better evaluate how these constructs create different patterns of risk and if different patterns of these risk factors relate to different levels and/or combinations of disordered eating.

Puberty and Disordered Eating

Theories of developmental psychopathology indicate that transitions may accentuate risk for psychopathology (Graber & Brooks-Gunn, 1996; Rutter, 1994), so that studies of psychopathology may benefit from evaluating the influence of transitions on disordered outcomes. Research on disordered eating has focused on the transition to adolescence, when girls are at increased risk for disordered eating (Attie & Brooks-Gunn, 1992) because of the multiple changes and challenges that girls experience at this time

(Smolak & Levine, 1992). Physical changes associated with pubertal development in girls (i.e. weight gain, increased fat mass, breast development, and first menarche) may increase concerns about weight and eating because girls are generally moving away from the ideal female body shape (Graber, Brooks-Gunn, & Warren, 1999). Normative increases in body dissatisfaction and internalizing symptoms during this time serve to further exacerbate risk for disordered eating during throughout adolescence (Blyth, Simmons, & Zakin, 1985; Graber et al., 1994; Graber, Lewinsohn, Seeley, & Brooks-Gunn, 1997; Stattin & Magnusson, 1990). Early pubertal development may be particularly relevant to disordered eating because girls who experience early puberty may not yet have the cognitive abilities in place to cope with the physical changes that they are going through (Brooks-Gunn & Ruble, 1985; Stattin & Magnusson) or the reactions of others to these changes.

Empirical evidence regarding the role of pubertal development on girls' disordered eating is inconsistent, possibly because different isolated forms of disordered eating have been examined across different studies with different age groups (e.g. Field et al., 1999; Graber et al., 1994; Stice et al., 2002; Stice & Whitenton, 2002; Striegel-Moore et al., 2001). For example, Field et al (1999) found early pubertal development to be associated with purging behaviors in girls and Graber et al (1994) reported that earlier maturing girls were at greater risk for elevated general disordered eating symptoms throughout adolescence. In contrast, Stice et al (2002) did not find early maturation to be associated with binge eating in adolescent girls. Others indicate that it is the weight gain associated with early and late pubertal maturation, as opposed to actual pubertal development, that is associated with risk for disordered eating (Striegel-Moore, et al.,

2001) Finally, it may be the activation of hormones during the transition to adolescence that triggers disordered eating (Klump et al 2005). Given these different findings, studies examining the association of pubertal development with multiple disordered eating behaviors at different times during adolescence would contribute to this area of research. Such research would benefit by including weight status as well as pubertal development in order to differentiate between these two constructs. In addition, given the more consistent evidence that pubertal development is associated with constructs that increase risk for disordered eating, such as body dissatisfaction and depression (Graber et al., 1999), pubertal development may have indirect effects on risk for disordered eating. Future studies should examine if pubertal development directly and/or indirectly influences risk for disordered eating.

Changes within the nature of social relationships during adolescence may interact with girls' pubertal development to heighten risk for disordered eating in girls. Cauffman and Steinberg (1996) found that it was the interaction of early pubertal development and dating and dating, and not pubertal development alone, which increased risk for disordered eating. Related to this, Smolak and Levine (1992) proposed a cumulative stressor model indicating that it is the convergence of a number of challenges and changes during adolescence that increases risk for disordered eating in some girls. Therefore, contextual factors may interact with pubertal development to influence risk for disordered eating.

In addition, studies examining the effects of pubertal development on disordered eating may benefit from the inclusion of pre-adolescent characteristics. Both Caspi and Moffit (1991) and Ge, Conger, and Elder (1996) found that the effects of pubertal

development on externalizing and internalizing behaviors in adolescent girls were best represented by a modeling accounting for girls' pre-adolescent personality characteristics. Similarly, Ackard and Peterson (2001) found that is was girls' pre-pubertal perceptions of the weight that influenced disordered eating in early adolescence, as opposed to actual age at puberty, while the work from Martin et al. (2001) indicates that child temperament is associated with disordered eating during early adolescence. An improved understanding of early adolescent disordered eating may be possible if studies examine both pre-adolescent characteristics and pubertal development as predictors of different forms of disordered eating.

Developmental Context of Disordered Eating Risk

Developmental psychopathologists suggest that studies of psychopathology focus not just on group differences on disordered outcomes but also examine normative developmental processes and influences, such as those within the family environment, which may set the stage for disordered behavior prior to the emergence of such behavior (Cichetti & Rogosoch, 2002). Examination of the role of parental characteristics, including parental weight status, weight concern, and depression, and family environment, such as marital conflict, parenting behaviors, and parental influence on girl's weight loss, may clarify why different disordered eating risk factors emerge in pre-adolescent girls.

In regard to parental characteristics, parental overweight is associated with risk for child overweight (Bouchard, Savard, Despres, Tremblay, & Leblanc, 1985; Stice, Presnell, Shaw, & Rhode, 2005). This risk is likely influenced by a gene x environment interaction (Faith et al., 1999) so that family eating and exercise patterns may trigger

genetic vulnerability for overweight. Maternal weight concern may also influence girls' own weight concern (McHale, Corneal, Crouter, & Birch, 2001; Pike & Rodin, 1991) and parental depression may increase risk for offspring depression (e.g. Pilowsky, Wickramaratne, Nomura, &Weissman, 2006). Again, both genetics and environmental characteristics influence these associations.

Parents may also influence girls' weight concerns and body dissatisfaction through comments about daughter's weight and appearance (Baker, Whisman, & Brownell, 2000; McCabe & Ricciardelli, 2005; Wertheim, Mee & Paxton, 1999). Such comments may particularly affect daughters as opposed to sons (Smolak et al., 1999). Exposure to comments about weight influence weight concern in young girls because girls are more likely to internalize and respond to messages from others; such concerns then influence disordered eating. Costanzo and Woody (1985) proposed that parental investment in a specific domain of child development may lead to parents exerting greater control over child's development within this domain. Relating this to maternal influence on child's weight and eating, maternal concern or preoccupation with her weight and/or her child's weight may be manifest in her efforts to control and daughter's intake by restriction of child intake. However, such control may increase risk of disordered eating if this leads to the reduced likelihood that children recognize internal hunger and satiety cues, which may promote overeating during middle childhood (Birch, Fisher, & Davison, 2003; Birch & Fisher, 2000; Francis & Birch, 2005; Tiggemann & Lowes, 2002).

Broader processes not specifically focused on appearance and weight influence girls' internalizing behaviors. For example, marital conflict has been consistently linked

to depression in girls. Two models have been proposed to explain this association: the emotional-security framework, which suggests negative emotions increase in response to conflict if children feel that their security within the family is threatened (Davies & Cummings, 1994), and the cognitive-contextual framework, which suggests that internalizing problems arise in response to children's appraisals of threat and self-blame in response to parental conflict (Grych & Fincham, 1993). Of particular relevance to this study, Strober and Humphrey (1987) have also suggested that family conflict may trigger feelings of low self-esteem and poor efficacy, which in turn lead to disordered eating.

Parental conflict about child's weight and eating may also be relevant to weight concern and depression in girls. In general, child-related conflict between parents may be particularly harmful to children (Block et al, 1981) and conflict or tension within the family related to family member's appearance, weight, eating behavior and/or during family mealtimes is associated with eating pathology (Ackard & Neumark-Stzainer, 2001; Davis, Shuster, Blackmore, & Fox, 2004; Lalibertè, Boland, & Leichner, 1999; Miller, 1993; Neumark-Stzainer, Wall, Story, & Fulkerson., 2004; Worobey, 2002). Examination of the long term effect of conflict that focuses girls on food and weight may be productive in regard to understanding emergence of concerns about weight and eating (Waller & Calam, 1994).

Finally, parental psychological control has been linked to internalizing symptoms in children because such control undermines children's emotion regulation and feelings of self-worth (Barber, 1996). Parental overprotection has also been linked to disordered eating risk in girls (Tata, Fox, & Cooper, 2001). Understanding how psychological control influences early internalizing symptoms in children adds to an understanding of

why several studies have found patterns of enmeshment, over-control, and general family dysfunction (Waller & Calam, 1994; Minuchin & Baker, 1990). Because of the association between psychological control and both depression and weight concern, and the association between depression and weight concern with disordered eating, additional examination of psychological control in studies of disordered eating would be useful.

Elaboration on additional processes within the family could also highlight protective processes that reduce risk for disordered eating. For example, parental monitoring may decrease weight concerns in girls (May, McHale & Crouter, in press) and reduce risk for depression (Pettit, Laird, Dodge, Bates, & Criss, 2001; Silk, Morris, Kanaya, & Steinberg, 2003)). Parental support is also associated with fewer internalizing symptoms in children (Lewinsohn et al., 1994; Windle, 1992) and may mediate the effects of other risk factors, including marital conflict(Davies, Cummings, & Winter, 2004). Conversely, deficits in parental support may increase risk for binge eating (Stice & Bearman, 2002) and body dissatisfaction (Stice & Whitenton, 2002). These findings highlight specific components of the family environment that may protect against disordered eating; elaboration on the impact of these processes would be useful in understanding why not all girls develop eating problems.

Together, the reviewed research suggests that there are several different processes within the family environment that may simultaneously influence risk factors relevant to pre-adolescent risk for disordered eating. As these processes are not mutually exclusive, girls who experience different exposure to these processes during childhood may develop different patterns of risk. Evidence regarding ways which multiple components of the family environment, including parental characteristics, marital conflict, conflict about

food and weight, and parenting behaviors, distinguish different disordered eating patterns from each other would be a valuable addition to the literature. Such findings would inform researchers on possible developmental differences that differentiate the emergence of disordered eating and contribute to improved prevention of disordered eating.

The Role of Gender and Risk for Disordered Eating

When examining both the development of risk for disordered eating as well as the context in which risk emerges, it is important to not only recognize that being female is the strongest risk factor for eating pathology and body dissatisfaction (Jacobi et al., 2004) but to examine how gender interacts with contextual factors to further heighten risk for disordered eating. Relational theorists suggest that it is the interaction of gender with both current cultural influences and family environments that create a pathological environment in which girls, but not boys, are at risk for disordered eating (Kaplan & Klein, 1985; Steiner-Adair, 1986).

In regard to cultural influences on disordered eating, Frederickson and Roberts (1997) suggest that females are at greater risk for disordered eating because of the broader sociocultural context in which the female body is treated as an object. The objectification of the female body, according to this theory, leads women to self-objectify themselves, which increases risk for disordered eating and body dissatisfaction (Slater & Tiggemann, 2001; Tiggemann & Slater, 2002). Similarly, as initially suggested by Stein-Adair (1986), women who subscribe to the "Superwoman" identity may be at increased risk for disordered eating as part of this identity implies that success (e.g. career advancement, romantic relationships) is contingent on adhering to cultural standard for

attractiveness (Smolak & Murnen, 2001; Yuker & Allison, 1994). There is some empirical support for this (e.g. Hart & Kenny, 1997; Steiner-Adair, 1989), although it may be less the striving for perfection and more the loss of self-confidence and problems arising from having an identity based on external sources and appearances that leads to eating problems (Hart & Kenny).

Examining how the family environment interacts with cultural influences on disordered eating, sociocultural perspectives suggest that girls with a more traditional gender orientation are at risk for disordered eating (Smolak & Murnen, 2001). Gender role orientations are influenced by family dynamics and girls who report more traditional gender roles, which highlight the importance of attractiveness and focus girls on pleasing others, may be at increased risk for disordered eating (Waller & Calam, 1992; McHale, Corneal, Crouter, & Birch, 2001). In their meta-analysis, Murnen and Smolak (1998) concluded that there was a small but significant effect for femininity (more traditional gender roles) to be associated with disordered eating in women. In a study examining how family gender roles influence weight concerns in sons and daughters, McHale et al found that girls from families with more traditional ideas about femininity were at increased risk for weight concerns. Similarly, girls are not only more likely to be at risk for disordered eating and appearance concerns but to also be more affected than boys by maternal comments about child's weight (Smolak, Levine, & Schermer, 1999) and by parenting behaviors, such as over-control (Tata et al., 2001), so that additional contextual factors interact with gender to heighten risk for weight concern and disordered eating in girls.

Gender role orientation and the intensification of such roles during adolescence may also further influence gender differences in internalizing problems (Hill & Lynch, 1983). Within this gender intensification framework, girls who identify more strongly with more traditional female roles, which are characterized by more passive and more poorly developed coping strategies and methods, are considered at risk for internalizing problems, including greater dissatisfaction with appearance when girls feel that they do not reflect a traditional or idealized female body type (Attie & Brooks-Gunn, 1995). Discrepancies between actual weight and appearance and what girls consider to be a desired and/or expected weight and appearance can lead to depression over time.

The parent-child relationship is bi-directional so that child characteristics may influence how parents interact with children. For example, Graber et al (1999) indicate that the emergence of body dissatisfaction during puberty may result not just from pubertal weight gain but from the additional teasing and negative interactions from parents about breast development and/or weight gain that girls may experience. In addition, child weight status may interact with maternal child feeding behaviors to influence child's eating behaviors so that overweight girls who are exposed to greater maternal restraint of daughter's intake are at increased risk for overeating (Birch et al., 2003). Therefore, there are multiple ways in which gender interacts with the family environment and with parenting behaviors to further influence girls' weight concerns.

Socialization processes within the family also heighten the development of internalizing symptoms in girls but not boys (Keenan & Shaw, 1997). This suggests that girls, but not boys, may be placed on an earlier trajectory for disordered eating if depression in childhood is associated with later disordered eating. Girls are not only more

likely to develop internalizing problems by and during adolescence (Noelen-Hoeksema & Girgus, 1994) but they are also, through a heightened investment in relationships, more likely than boys to react with additional internalized distress when exposed to conflict within the family (Buehler & Gerard, 2002). Again, then, specific characteristics of girls may interact with the family context in ways that increase their risk for depression and disordered eating over time.

Summary

To summarize, girls are at increased risk for disordered eating as they are more likely than boys to be exposed to and influenced by contextual factors that heighten this risk. Specifically, certain experiences, such as pubertal development, parental encouragement of weight loss, and family conflict, influence gender differences in weight concern and depression in girls. In addition, a more focused examination of how risk factors such as weight status, weight concern, and depression interact with one another in different ways to influence the emergence of specific disordered eating behaviors would provide insight into how these behaviors differ in their etiology. Finally, extending work on gender socialization to the study of disordered eating may provide additional ways in which to understand how specific interactions and experiences influence risk for disordered eating in girls.

Study Aims

Over the past decade, progress has been made in understanding risk for disordered eating. In addition, recent studies have provided insight into how such risk may emerge and why there are gender differences in disordered eating. However, a review of the literature reveals that we know relatively little about individual and familial factors that

may be early precursors of disordered eating risk factors or how different individual characteristics and contexts interact to influence risk in different ways. Future studies should examine if and how different patterns of disordered eating risk factors are present across different age and ethnic groups in order to examine how risk for disordered eating varies among different sub-groups. Such research may clarify how different risk factors are associated with one another in different ways depending on age and/or ethnic background. Particular emphasis on delineating on how different developmental contexts influence the emergence of different risk patterns may improve prevention efforts, which are currently limited due to limited understanding of how contextual factors influence disordered eating risk factors (Pearson et al., 2003).

This current study addresses these suggestions in a number of ways by:

- Using cluster analysis to examine the underlying associations among 9-year-old girls' weight status, weight concern, and depression (aim 1). Cluster analysis is an appropriate method for studies of developmental psychopathology (O'Connor, 2003; Rutter & Sroufe, 2002; Von Eye & Berman, 2003).
- Examining if age 9 cluster membership is associated with girls reports of binge eating, emotional eating, dietary restraint, unhealthy dieting, and body dissatisfaction at ages 11 and 13 (aim 2),
- Examining the stability of disordered eating risk factors and clusters during early adolescence and examining if early pubertal development at age 11 influences disordered eating risk during early adolescence (aim 3)
- Examining if cluster membership at age 9 is influenced by broader developmental

processes within the family environment (aim 4). Analyses will focus on determining if specific processes or aspects of the family environment measured at ages 7 and/or 9 distinguish cluster membership at age 9.

Chapter 2

METHOD

Participants. Participants were from central Pennsylvania and were part of a longitudinal study of the health and development of young girls. At entry into the study, participants included 197 5-year-old girls (5.4 $\pm$ 0.4) and their parents, of whom 192 families were reassessed 2 years later when girls were 7 years old (7.3 $\pm$ 0.3). A third assessment with 183 families was conducted 2 years later when girls were 9 years old (9.34 $\pm$ 0.3), followed by a fourth assessment with 177 families when girls were age 11 (11.34 $\pm$ 0.3). The final assessment included 168 families when girls were age 13 (13.32 $\pm$ 0.3). Eligibility criteria for girls' participation at the time of recruitment included living with both biological parents, the absence of severe food allergies or chronic medical problems affecting food intake, and the absence of dietary restrictions involving animal products; families were not recruited based on weight status or concerns about weight. Families were recruited for participation in the study using flyers and newspaper advertisements. In addition, families with age-eligible female children within a 5-county radius received mailings and follow-up phone calls (Metromail Inc.)

On average, parents were in their mid 30's at the time of recruitment (mothers 35.4 $\pm$ 4.8 years; fathers 37.4 $\pm$ 5.4). Approximately equal numbers of families reported incomes in the following ranges $20,000-$35,000, $35,000-$50,000, and above $50,000 when girls were 5; by age 13, 68% of the families reported an income greater than $50,000. Parents were well-educated; mothers' reported mean education was 15 $\pm$ 2 years

(range = 12-20) and fathers' was 15 ± 3 years (range=12-20). See table 1 for additional descriptive information.

The Pennsylvania State University Institutional Review Board approved all study procedures, and parents provided consent for their family's participation before the study began. At ages 11 and 13, girls also provided verbal assent prior to data collection.

Procedure

Girls' data were collected during the summer through "camp days". Each girl was paired with a trained interviewer and responded to questions about her eating behaviors, weight and appearance concerns, psychological health, and family functioning throughout the camp visit. Anthropometric data, including height, weight, and breast development, were obtained by trained staff.

Mothers and fathers also provided data on their own psychological health, parenting behaviors, and general family functioning during separate interviews. Parents' heights and weights were also measured by a trained staff member.

Table 1
Demographic Variables for Girls and their Parents (Girl ages 7, 9, 11, and 13)

Variable	Age 7	Age 9	Age 11	Age 13
Girl age	7.30 (.29)	9.34 (.29)	11.34 (.29)	13.33 (.28)
Mom age	37.37 (4.74)	39.46 (4.75)	41.50 (4.77)	43.70 (4.70)
Dad age	39.44 (5.38)	41.58 (5.40)	43.49 (5.23)	45.60 (5.27)
Family income	$35,000-$50,000[a]	$35,000-$50,000[b]	$36,000-$50,000[c]	$51,000-$75,000[d]
Mom work status	76% working	78% working	84% working	88% working
Dad work status	99% working	99% working	97% working	98% working
Mom years of education	14.63 (2.23)	14.76 (2.32)	14.82 (2.33)	14.79 (2.31)
Dad years of education	14.74 (2.60)	14.84 (2.76)	14.99 (2.70)	14.89 (2.73)
Girl BMI	16.69 (2.50)	18.54 (3.42)	20.13 (4.01)	21.35 (4.01)
Mom BMI	26.88 (6.17)	27.50 (6.31)	27.79 (6.54)	28.28 (6.70)
Dad BMI[e]	28.42 (4.27)	28.97 (4.47)	28.99 (4.22)	-

[a] Family Income Proportions: <$20,000 = 3.1% $20-35,000 = 18.8% $35-50,000 = 30.9% +50,000 = 47.1%. [b] Family Income Proportions: <$20,000 = 2.22%, $20-35,000 = 13.33%, $35-50,000 = 27.78%, +50,000 = 56.67%. [c] Family Income Proportions: <$20,000 = 4.57%, $20-35,000 = 12.57%, $36-50,000 = 21.14% $51-75,000 = 26.29%, $76-100,000 = 23.43%, $100,000+ = 12.00%. [d] Family Income Proportions: <$20,000 = 2.44%, $20-35,000 = 10.37%, $36-50,000 = 18.90%, $51-75,000 = 26.22%, $76-100,000 = 24.39%, %100,000+ = 17.68%. [e] data on father's height and weights were not obtained when girls were age 13 so BMI could not be calculated.

Measures

Cluster Variables

Weight Status (BMI): Girls' height and weight measurements were obtained in order to determine girls' BMI (weight (kg)/height $(m)^2$) and BMI z-scores. Height and weight were measured by a trained staff member following procedures described by Gordon et al. (1988). Children were dressed in light clothing and measured without shoes. Height was measured in triplicate to the nearest 10^{th} of a cm using a Shorr Productions stadiometer (Irwin Shorr, Olney MD). Weight was measured in triplicate to the nearest 10th of a kg using a Seca Electronic Scale (Seca Corp., Burmingham, UK). BMI scores were generated based on height and weight measurements. BMI z-scores were created using a program from the the Centers for Disease Control and Prevention created the program EpiInfo. The NutStat module of the CDC EpiInfo program (2003) was used along with girls' gender, age in months, weight (kg) and height (cm) to derive age and gender specific BMI z-scores. At each age, approximately 25% of the sample were classified as overweight, which was defined as at or above the 85^{th} percentile for expected weight for height (based on age and gender).

Weight Concerns. The Stanford Weight Concerns Scale (Killen et al., 1994) was used to assess girls' general concerns about weight gain and overweight. The scale contains 5 items which specifically assess an individual's fear of weight gain, worry about weight and body shape, and the relative importance of weight, diet history, and perceived fatness within an individual's life (Killen et al., 1994). Example items include "How much more or less do you feel you worry about your weight and body shape than other girls your age" and "How afraid are you of gaining 3 pounds?". A sum score was

created so that higher scores indicate a higher level of weight concern. In the present study, Cronbach's alpha for the total weight concern score was .65 at age 9, .78 at age 11, and .84 at age 13.

Depression. The Children's Depression Inventory (Kovacs & Beck, 1977) was used in this study to assess girls' levels of depression. The scale contains 27 items assessing varying levels of depressive symptoms and severity of symptoms. An item regarding suicide ideation was not used in this study, leaving a total of 26 items. Example items and responses include: "What do you think about yourself?" followed by these responses: "I like myself", "I do not like myself", and "I hate myself". A sum score was created so that higher scores indicate increasing levels of depressive symptoms. For this sample, Cronbach's alpha for this measure was .80, .78, and .83 at ages 9, 11, and 13.

Pubertal Development

Tanner Stage. Pubertal status via breast development was assessed through visual inspection by a trained nurse. Ratings were obtained for each breast on a scale of 1-5 (1=*no development*, 5= *mature*), using the Tanner rating system (Marshall & Tanner, 1969). Two raters made the rating for each breast and scores were averaged across raters (although in general ratings were the same). Then scores were averaged for a total breast development score, referred to as Tanner Stage. If scores did not fall on whole numbers (i.e. girls had different ratings for each breast) then scores were rounded down. Breast development for girls at age 11 was as follows: 19 girls (11.6%) Stage 1, 94 girls (57.3%) Stage 2, 41 girls (25%) Stage 3, and 9 girls (5.5%) stage 4. Based on national data for Caucasian girls' pubertal development at age 11, girls with a Tanner stage of 3 or higher

were classified as early developers (*n*=50); all other girls were considered to be later developers.

Disordered Eating Variables

Binge Eating. At age 11, a modified version of the Binge Eating Scale (BES; Gormally, Black, Daston, & Rardin, 1982) was used to assess level of binge eating in girls. This questionnaire specifically taps into the behavioral aspects of binge eating episodes as well as the feelings associated with this behavior. The BES is written in the form of "I . . ." statements and the subject is asked to choose which statement best describes them. Due to the complex nature of this measure and concern that girls at age 11 would not understand all of the 16 original items in the BES or that some items may not be developmentally appropriate, only 6 of the original items (items 2, 3, 8, 10, 11 and 15) were included. These items represent level of control over the pace of eating, feelings of control over eating urges, eating large amounts of food, being able to stop eating, cognitive preoccupation with food, and ability to stop eating when full. Items are scored from 0-3 and are summed to create a total binge eating score, with higher scores indicating a more severe binge eating problem. Internal consistency for the 6 item version was .60 at age 11.

The complete 16 item version of the Binge Eating Scale (Gormally et al., 1982) was used to assess level of binge eating in girls at age 13. Therefore items pertaining to both binge eating behaviors and cognitions were included. Items were again scored from 0-3 to create a total binge eating score, with higher scores indicating a more severe binge eating problem. Internal consistency for the total binge eating score at age 13 was .88.

Dietary Restraint and Emotional Eating: At ages 11 and 13, restrained eating behaviors were assessed using the Dutch Eating Behavior Questionnaire (DEBQ) developed by Van Strien and colleagues (Van Strien, Fritjers, Bergers, & Defares, 1986; Van Strien, Fritjers, van Staveren, Defares, & Deurenberg, 1986). The measure consists of 33 items with 3 subscales*:* restrained eating *(10 items)*, emotional eating *(13 items)*, and external eating *(10 items)*. This study uses the restraint subscale, which measures girls' cognitive control of eating or restraint (e.g. 'Do you deliberately eat less in order not to become heavier?') and the emotional eating subscale, which measures girls' eating in response to emotional triggers (e.g. 'Do you want to eat when you are depressed?'). Responses are on a 5-point scale ranging from 1 (*never*) to 5 (*very often*). Subscale scores are created by summing together the scores across items for each subscale. The reliability and validity of this measure has been tested and reported in several studies (Van Strien et al., 1986). For this sample, internal consistency scores for dietary restraint at ages 11 and 13 was .93 and .94 and .95 for emotional eating.

Healthy and Unhealthy Dieting Strategies. Use of both healthy and unhealthy dieting behavior was assessed using an amended version of the Weight Loss Behavior Scale developed by French, Perry, Leon, and Fulkerson (1995). The measure consists of a 24-item checklist to assess weight loss methods employed by girls. The response scale for all checklist items was amended from a simple yes/no response option to a 5-point response option scale ranging from 1 (never) to 5 (always). Dieting behaviors are divided into two sub-scales: (a) Healthy (13 items), which assesses girls' use of healthy dieting strategies including eating more fruits and vegetables and reducing fat intake; and Unhealthy (10 items) which assesses girls' use of unhealthy dieting strategies including

the use of diet pills and vomiting. Total sub-scale scores are calculated by summing respective checklist items. For this sample at age 13, girls' used an average of 8 healthy dieting strategies and 1 unhealthy dieting strategies; 32 (19%) girls were classified at unhealthy dieters, 74 (44%) were classified as healthy dieters, and 62 (37%) girls reported not dieting.

Body Dissatisfaction. At age 9, the Body Esteem Scale (Mendelson & White, 1982) was used to assess girls' body dissatisfaction. This measure is a 24-item scale that assesses overall, non-specific body satisfaction, and is suitable for use with young children (Mendelson & White, 1982). Examples of items include, "I like what I look like in pictures" and "I wish I were thinner". To increase variability in responses, the original scale was modified from a two-item response set (*Yes/No*) to a three-item response set (*Yes/No/Sometimes*). For discussion purposes, items were reversed score so that higher scores indicated greater dissatisfaction with one's body. Responses were averaged to create a total body dissatisfaction score. Previous research illustrates the reliability and validity of this scale (Mendelson & White). In the present sample, the internal consistency coefficient was .87

At ages 11 and 13, the adolescent/adult version of the Body Esteem Scale was used to assess body dissatisfaction (Mendelsohn, Mendelsohn, & White, 2001). This 24-item scale contains 3 subscales assessing: 1) appearance related body esteem (10 items) (e.g. 'I feel ashamed of how I look'), 2) weight related body esteem (8 items) (e.g. 'My weight makes me unhappy'), and 3) individual attribution of external evaluations to one's body and appearance (6 items) (e.g. 'Other people consider me good looking'; 'I think my appearance would help me get a job'). For this study, only the appearance and weight

related subscales were used. For discussion purposes, scores were reverse coded so that higher scores indicate greater dissatisfaction with weight or appearance. A mean score was calculated for each subscale. Mendelson et al. provide information on the reliability and validity of this measure and report internal consistency scores of: .81-.94. Cronbach's alpha for this sample at ages 11 and 13 was .92 and .93 for appearance related dissatisfaction and .93 and .91 for weight related dissatisfaction.

Family Environment Variables

Parenting Behaviors. Girls' perceptions of their parent's child-rearing style were assessed using the Children's Report of Parental Behavior Inventory (CRPBI-revised) (Burger & Armentrout, 1971). This 56-item measure was designed to investigate children's perceptions of their parents' child-rearing behavior on three dimensions: acceptance vs. rejection, psychological autonomy vs. psychological control, and firm control vs. lax control or discipline. This study uses the psychological control subscale. Psychological control measures the degree to which children perceive their parents' use of guilt, intrusiveness, nagging, and directing behavior to control their behavior (16 items) (e.g. 'My parents say that someday I will be punished for my bad behavior'). Items are on a 3-point scale from 1 (*not like my parents*) to 3 (*a lot like my parents*). At age 9, Cronbach's alpha was .82 for psychological control.

Both mother and father reports of their child-rearing practices were assessed using a modified version of the Children's Report of Parental Behavior Inventory (CRPBI-revised) (Burger & Armentrout, 1971). Although this measure was designed for children, modifications were made so that parents could report on their own behaviors.

The measure is similar to the children's version described above except that items were phrased "I am a parent who…" as opposed to "My parents…". Items are on a 3 point scale from 1 (*not like me*) to 3 (*a lot like me*). Maternal and paternal reports of psychological control were used for this study. Cronbach's alpha were .82 for mothers and fathers at wave 3 (girls' age 9) for psychological control.

Parental Monitoring. Girls' perceptions of parental monitoring and autonomy granting were assessed using items created by Kerr and Stattin (2000). 40 items measuring autonomy granting and monitoring were grouped into six scales: monitoring, child disclosure of information to parents, parental solicitation of information from children, parental control, children's feeling of being controlled by parents and quality of relationships with parents. This study uses the monitoring subscale (9 items), which assesses girls' perceptions of their parents' knowledge on the girls' whereabouts, activities and associations (e.g. 'Do your parents know what you do during your free time?'). Responses are on a 5-point scale and vary across subscales; for the monitoring subscale the response options range from *never* to *always*. At age 9, Cronbach's alpha was for .75 monitoring.

Mothers and fathers also reported on their autonomy granting and monitoring using items developed by Kerr & Stattin (2000). Three of the original subscales were included: monitoring (items 1-9), child disclosure of information to parents (items 10-14) and parental solicitation of information from children (items 15-19); this study uses both maternal and paternal reports of monitoring. Example items from the monitoring subscale include "Do you know what your child does during her free time?" and "Do you talk at home about how your child is doing in school?" A 5-point Likert type scale is provided

with response options ranging from *really no* to *really yes* and higher scores indicate greater parental monitoring. Internal consistency for maternal and paternal reports of monitoring when girls were age 9 were .66 and .86 respectively.

Marital Conflict. Mothers' reports of their marital relationship were assessed using the Relationships Scale (Braiker & Kelley, 1979). The measure contains 15 items assessing marital love (10 items) and conflict (5 items). Example items include 'To what extent do you have a sense of belonging with your partner?' and 'How often do you feel angry or resentful toward your partner?'. Items are on a 9-point Likert Scale from 1 (*not at all*) to 9 (*very much*). Internal consistency for mothers and fathers on the conflict subscale was .82 and .71 at wave 2(girls' age 7) and .76 and .76 at wave 3 (girls age 9).

Girls' perceptions of parental conflict were assessed using the Children's Perception of Interparental Conflict (CPIC) scale (Grych, Seid, & Fincham, 1992). The original measure contains 51 items and 9 subscales. The current study uses 4 subscales: frequency (6 items), intensity (7 items), resolution (6 items), and perceived threat (6 items). Example items include "I often see my parents arguing" (*frequency)*, "My parents get really mad when they argue" (*intensity*), "Even after my parents stop arguing, they stay mad at each other" (*resolution*), and "When my parents argue, I'm afraid something bad will happen" (*perceived threat*). For this study, the 3-point response set was changed from: *true*, *sort of true*, and *false* to *yes*, *sometimes*, and *no* as these response options were easier for girls to interpret. Grych et al. reported an internal consistency range of 0.78-0.90 for all subscales. At age 7, the internal consistency scores were .71, .71, .77, and .78 for frequency, intensity, resolution, and perceived threat subscales and, at age 9, were .80, .78, .85, and .87 for the same subscales. Internal

consistency for self-blame and child-centered conflict at age 9 was .60 and .78, respectively.

Conflict over Food. Mothers' and fathers' beliefs about the degree to which they argue or disagree with their spouse about their own weight and eating behaviors and about child eating and weight behaviors were assessed using the Conflict over Food Scale. This instrument was designed as a part of the larger longitudinal study to measure spousal conflict related to spousal and child eating and weight. There are four sub-scales: (1) Mother/Father Overweight, (2) Mother/Father Underweight, (3) Daughter Overweight, and (4) Daughter Underweight, to which mothers respond on a 4-point Likert-type scale ranging from 1 (*never*) to 4 (*always*). Examples of items on the spouse-focused sub-scales include, "My spouse tells me what I should eat," and "My spouse criticizes me for eating too much." Examples of items on the daughter-focused sub-scales include, "My spouse criticizes my daughter about eating at the wrong time," and "My spouse and I argue about our daughter not weighing enough." Subscale scores are calculated by summing respective items with higher scores indicating greater conflict. Possible scores range from 8 to 32 for each of the subscales except the Daughter Underweight subscale, which ranges from 6 to 24. Internal consistency scores for mothers in this sample at wave 2 were .90 for the Mother Overweight Scale, .93 for the Mother Underweight Scale, .91 for the Daughter Underweight Scale, and .73 for the Daughter Overweight Scale. At wave 3, internal consistency scores were .92, .90, .87, and .68, respectively. Internal consistency scores for fathers at wave 2 were .92 for the Father Overweight Scale, .89 for the Father Underweight Scale, .87 for the Daughter

Underweight Scale, and .79 for the Daughter Overweight Scale. At wave 3, internal consistency scores were .92, .84, .85, and .73, respectively.

Girls' perceptions of parental conflict over food and weight were assessed by a subscale included as a part of the Children's Perceptions of Interparental Conflict scale described above. As with mothers' reports on conflict over food, this subscale was created for the larger longitudinal study and assesses girls' perceptions of parental conflict resulting from food/weight related disputes. The subscale consists of 8 items and response options range from 1 (*no*) to 3 (*yes*). Example items include "My parents often disagree about the kinds of foods that I eat", "My parents often get into arguments about how much I weigh", and "My parents often get into arguments about how much my mom weighs". Internal consistency for this subscale was .73 at age 7 and .63 at age 9.

Encouragement of Daughter's Weight Loss. The Parent Encouragement of Child Weight Loss Scale was designed as a part of the larger longitudinal study and is used to assess both maternal and paternal encouragement of daughter's weight loss practices and behaviors. Mothers and fathers separately reported on these behaviors. This scale contains 6 multi- component items which increase in the intensity with which parents may encourage weight loss. The progression of items takes the form of (a) whether parents are concerned with their daughter's weight status; (b) whether they have expressed concern to their daughter; (c) whether they have encouraged their daughter to lose weight; (d) whether they have talked to their daughter about *how* to lose weight; (e) whether they have used their own behavior to model the behavior they seek in their child; (f) whether they have helped their daughter lose weight (i.e., put the child on a weight

loss program); (g) whether the child is currently on a weight loss program. Internal consistency for this scale was .91 for mothers and .92 for fathers when girls were age 9.

Parental Characteristics

Weight Status. Parents' BMI (weight (kg)/height $(m)^2$) was calculated using the average of three height and weight measurements obtained by trained staff. Height was taken to the nearest .5 cm using a stadiometer and weight taken to the nearest .1 kg using a platform beam balance. These BMI standards are established by the National Institute of Health (NIH) and are widely used and recommended for use in obtaining growth and adiposity data.

Weight Concerns. Mothers' and fathers' concern with weight and body shape was assessed using the Weight Concerns Scale developed by Killen et al. (1994). This measure is the same as the one girls completed (see above) and ascertains individuals' fear of weight gain, worry over weight and body shape, importance of weight, diet history, and perceived fatness. The measure consists of five items and uses a 5-point Likert type response scale. For purposes of this study, one item, which read "When was the last time you went on a diet?," was changed to "Have you ever gone on a diet?" to tap the frequency of dieting in the past. Response options for this question were 1 (*No*), 2 (*I have gone on a diet once before)* and 3 (*I have gone on a diet more than once before*). A total weight concern score is created by taking the average of all items; higher scores indicating greater weight concerns. Internal consistency for mothers and fathers was .77 and .73 when girls were age 7 and .83 and .74 age 9.

Depression. The Center for Epidemiological Studies Depression Scale (CES-D) was used to assess mothers' level of depression (Radloff, 1977). This measure consists of 20 items assessing a range of self-reported depressive symptoms over the past week. Example items include "I thought my life had been a failure" and "I enjoyed life". Responses are on a 4-point scale ranging from 0 (*rarely or none of the time*) to 3 (*most or all of the time*). Cronbach's alpha for mothers in this sample was .90 when girls' were ages 7 and 9 and .89 and .85 for fathers.

Individual Variables (ages 7 and 9)

Anxiety. The adapted Manifest Anxiety Scale (Reynolds & Richmond, 1997), appropriate for children in grades 1-12, was used to assess girls' symptoms and level of anxiety. The revised version for children contains 28 items assessing 1) physiological manifestations of anxiety, 2) worry and oversensitivity, and 3) social concerns/concentration. Example items include "I get nervous when things do not go the right way for me", "I worry a lot of the time", and "I worry about what other people think about me". All items have a response option of 1(*yes/true*) or 2(*no/false*). A sum score was created so that higher scores indicate greater anxiety. Reliability coefficients for this sample were .90 at age 7 and .91 at age 9.

Self-Concept. The Perceived Competence Scale for Children was used to assess girls' self-concept at age 7. This measure contains 24 items assessing general and social domains of self-concept. This studies uses the general self-competence (12 items) and peer acceptance (6 items) subscales. Each item contains a description of 2 "kids" and girls were asked to choose the "kid" most like them. Then they decided whether the

"kid" they chose is "a lot" like them or "a little" like them. Items are rated on a 4 point scale from 1 (*really disagree*) to 4 (*really agree*). Mean scores were created for each subscale so that higher scores indicate greater satisfaction with one's self and with peer relationships. At age7, Cronbach's alpha was .71 and .77 for the peer and general self-worth subscales, respectively.

The Self-Perception Profile for Children was used when girls were age 9. This measure contains 36 items, which fall into six subscales (scholastic competence, social acceptance, athletic competence, physical appearance, behavioral conduct and global self worth). The subscales relevant to this study are physical appearance (6 items), social acceptance (6 items), and global self-worth (6 items). Items are similar to those used when girls were age 7 so that each item again contained 2 descriptions of a "kid" and girls selected which "kid" they were most like. Items are rated on a 4-point scale from 1 (*really disagree*) to 4 (*really agree*). Mean scores were created for each subscale so that higher scores indicate greater satisfaction with one's physical appearance and peer relationships, and greater acceptance of and satisfaction with one's self. Reliability and validity for this measure are well established (Harter, 1985). Reliability coefficients for this sample at age 9 were .76 for physical appearance, .78 for social acceptance, and .78 for global self-worth.

Table 2

Mean (SD) for Relevant Variables

Measure (Construct)	Mean (SD)			
	Age 7	**Age 9**	**Age 11**	**Age 13**
Cluster Variables				
Weight Status (BMI)	16.69	18.54	20.01	21.35
	(2.50)	(3.42)	(4.02)	(4.51)
Weight Status (BMI z-score)	.34	.52	.49	.45
	(0.97)	(0.95)	(0.96)	(0.92)
Weight Concerns Scale (overweight concerns)	-	.39	.72	1.10
		(0.34)	(0.60)	(0.78)
Children's Depression Inventory (depression)	-	4.37	3.80	4.06
		(4.25)	(3.65)	(4.27)
Disordered Eating Behaviors				
Dutch Eating Behavior Questionnaire (dietary	-	-	1.80	1.77
restraint)			(0.75)	(0.73)
Dutch Eating Behavior Questionnaire (emotional			1.68	1.63
eating)			(0.69)	(0.64)
Binge Eating Scale (Binge Eating)	-	-	2.22	6.98
			(2.00)	(.5.75)

Table 2 (*continued)*.

Mean (SD) for Relevant Variables

Measure (Construct)	Mean (SD)			
	Age 7	**Age 9**	**Age 11**	**Age 13**
Weight/Body Concerns				
Body Esteem Scale	-	0.33 (0.25)	-	-
Adolescent Body Esteem Scale (appearance-related)	-	-	.84 (0.70)	1.33 (0.80)
Adolescent Body Esteem Scale (weight-related)	-	-	0.76 (0.73)	1.28 (0.93)
Physical Appearance Self-Concept	-	3.34 (0.63)	3.29 (0.60)	3.05 (0.63)
Parenting				-
Monitoring[a]	-	4.85 (0.21)	-	-
Psychological Control[a]	-	1.34 (0.26)	-	-
Monitoring[b]		4.37 (0.58)		

Table 2 (*continued)*.

Mean (SD) for Relevant Variables

Measure (Construct)	Mean (SD)			
	Age 7	**Age 9**	**Age 11**	**Age 13**
Psychological Control[b]		1.35		
		(0.26)		
Monitoring	-	4.25	-	-
		(0.58)		
Psychological Control	-	1.99	-	-
		(0.35)		
Marital Conflict				
Marital Conflict[a]	3.89	3.86	-	-
	(1.33)	(1.31)		
Marital Conflict[b]	3.61	3.52		
	(1.19)	(1.26)		
Frequency of Conflict	1.68	1.68	-	-
	(0.48)	(0.53)		
Intensity of Conflict	1.76	1.79	-	-
	(0.46)	(0.47)		
Conflict Resolution	-	2.40	-	-
		(0.34)		

Table 2 (*continued)*.

Mean (SD) for Relevant Variables

Measure (Construct)	Mean (SD)			
	Age 7	**Age 9**	**Age 11**	**Age 13**
Perceived Threat	1.72	1.82	-	-
	(0.58)	(0.63)		
Child-Centered Conflict	-	1.29	-	-
		(0.39)		
Self-Blame for Conflict	-	1.24	-	-
		(0.32)		
Conflict over Food and Weight			-	-
Conflict about Mother Overweight[a]	1.29	1.28	-	-
	(0.43)	(0.46)		
Conflict about Mother Underweight[a]	1.10	1.08	-	-
	(0.31)	(0.24)		
Conflict about Daughter Overweight[a]	1.07	1.09	-	-
	(0.23)	(0.25)		
Conflict about Daughter Underweight[a]	1.12	1.10	-	-
	(0.26)	(0.22)		
Conflict about Father Overweight[b]	1.44	1.39	-	-
	(0.52)	(0.53)		

Table 2 (*continued)*.

Mean (SD) for Relevant Variables

Measure (Construct)	Mean (SD)			
	Age 7	**Age 9**	**Age 11**	**Age 13**
Conflict about Father Underweight[b]	1.14	1.09	-	-
	(0.29)	(0.22)		
Conflict about Daughter Overweight[b]	1.12	1.11	-	-
	(0.24)	(0.25)		
Conflict about Daughter Underweight[b]	1.15	1.16	-	-
	(0.34)	(0.24)		
Parental Conflict over Food and Weight	1.26	1.08	-	-
	(0.32)	(0.17)		
Parental Encouragement of Weight Loss				
Encouragement of Weight Loss[a]	-	1.39	-	-
		(0.58)		
Encouragement of Weight Loss[b]	-	1.42	-	-
		(0.61)		
Maternal Characteristics			-	-
Depression[a]	9.46	9.90	-	-
	(7.91)	(7.97)		

Table 2 (*continued)*.

Mean (SD) for Relevant Variables

Measure (Construct)	Mean (SD)			
	Age 7	**Age 9**	**Age 11**	**Age 13**
Weight Concerns[a]	1.72	1.64	-	-
	(0.80)	(0.72)		
Paternal Characteristics				
Depression[b]	8.83	8.93	-	-
	(7.38)	(6.32)		
Weight Concerns[b]	1.17	1.18	-	-
	(0.65)	(0.65)		
Individual Characteristics				
General Self-Concept	7.32	3.45	-	-
	(0.69)	(0.45)		
Social Acceptance Self-Concept	3.13	3.17	-	-
	(0.65)	(0.58)		
Anxiety	1.45	1.32	-	-
	(0.25)	(0.24)		

Note. All data are girl report/data unless noted by [a] or [b].

[a] maternal report. [b] paternal report.

Analysis Strategy

Aim 1: Cluster Analysis. Hierarchical cluster analysis (Ward's method) was used to create groups of girls who varied on weight status (BMI z-score), weight concerns, and depression at age 9. Age 9 variables were the focus on these analyses because girls at this age are reliably able to report on concerns about weight (Shunk & Birch, 2004b) while there are questions if younger girls (e.g. ages 5-7) provide reliable information on concerns about weight, appearance, and related eating behaviors (Maloney et al, 1989; Shunk & Birch; Thelen et al., 1992).

Bergman and Magnusson (1997) suggest cluster analysis (CA) is an appropriate approach to studies of development and psychopathology. K-Means clustering was also used as a means of replicating the initial cluster solution. Using alternative/multiple clustering approaches is appropriate for selecting optimal cluster solutions as well as for verifying and replicating cluster solutions.

Discriminant function analysis (DA) was also used as a means of elaborating on the cluster solution. The purpose of DA is to examine the percentage of correct classifications. Cluster or group membership was treated as the dependent variable and the original cluster variables (BMI z-score, weight concerns, and depression) were treated as the independent variables. These analyses were also used to determine which variable or variables were driving group membership, which in turn aided in selecting appropriate labels for each cluster.

Finally, in order to validate the cluster solution, additional self-report data was examined. Multivariate analysis of variance (MANOVA) was used to examine mean differences among the clusters (groups) on additional physical and psychological

variables. In addition, frequency analyses were used to examine the proportion of girls classified as overweight (at or above the 85th percentile for expected weight for height). It was expected that girls' classified as overweight would not be in the *LR cluster* at age 9.

Disordered Eating at ages 11 and 13. As multiple dependent variables were used to represent girls' disordered eating behaviors and attitudes, MANOVA was used to determine if there were mean differences among the clusters on specific disordered eating behaviors and attitudes at ages 11 and 13. Dependent variables included girls' reports of general disordered eating (chEAT/EAT score), binge eating, dietary restraint, and both appearance and weight-related body dissatisfaction. When main effects for group membership were found, Tukey follow-up tests were used to determine which group(s) differed from the others. Logistic regression was also used in order to examine the likelihood of being classified in the unhealthy dieting group based on age 9 cluster membership.

Additional analyses controlling for girls' pubertal development at age 11 were also conducted. Given that prior research has revealed that early pubertal development may be a risk factor for disordered eating behaviors and attitudes during early adolescence, girls were categorized at age 11 (Tanner stage 3 or higher) as either early or on-time/late developers (Tanner stage 1 or 2). Therefore, multivariate analysis of covariance was used to control for girls' level of pubertal development.

Cluster Differences. Three separate MANOVAs were conducted in order to examine whether there were pre-existing differences among cluster on 1) family environment variables (i.e. parenting, marital conflict, encouragement of weight loss, and

conflict over food and weight), 2) parental characteristics (weight concerns, depression) and individual characteristics (anxiety and self-concept) at ages 7, and/or 9. When main effects for group membership were found, Tukey follow-up tests were used to determine which group(s) differed from the others. Logistic regression was used to examine if cluster membership was associated with maternal and paternal overweight.

Chapter 3

RESULTS

Aim 1: Disordered Eating Risk Groups at age 9

Sample Description for Cluster Variables. As shown in Table 3, among the total sample girls, on average, at age 9 had low weight concern scores (M = 0.38, SD = 0.3) and low depression scores (M = 4.71, SD = 3.17); these scores indicate girls were generally not concerned about weight gain at age 9 and had relatively few symptoms of depression. The average BMI for this sample was slightly higher than national averages for girls at this age as evidenced by the mean BMI z-score (M = 0.50, SD = 0.93).

Correlations. These three constructs were, in turn, correlated with one another so that as BMI scores increased, so did girls' depression (r =.18, p = .05) and weight concern scores (r = .42, p < .001). Girls' depression and weight concern scores were also significantly associated with one another (r = .25, p <. 01).

Cluster Analysis. Hierarchical cluster analyses using Ward's Method resulted in three distinct clusters. 163 girls were included in the solution. The three cluster solution was deemed most appropriate through comparison to a four cluster solution, which resulted in a solution with too few individuals in a fourth cluster (n < 10) and less distinction between clusters on the cluster variables. Table 3 provides an overview of the mean scores and standard deviations on the cluster variables for the whole sample and each cluster.

Table 3

Means (SD) for Girls' BMI, Weight Concerns, and Depression

		Age 9 Cluster		
	Total Sample (*N* = 163)	**LR (*n* = 60)**	**HW (*n* = 68)**	**HD (*n* = 35)**
BMI				
Age 9	18.37	16.37	20.23	18.83
	(2.99)	(1.32)	(2.87)	(3.70)
BMI Z-Score				
Age 9	0.50	-0.13	1.09	0.45
	(0.93)	(0.65)	(0.68)	(0.89)
Weight Concerns				
Age 9	0.39	0.10	0.55	0.54
	(0.30)	(0.10)	(0.30)	(0.23)
Depression				
Age 9	4.17	2.42	3.19	7.22
	(3.71)	(2.37)	(2.19)	(4.89)

NOTE. LR= lower risk cluster; HW = higher weight status cluster; HD = higher depression cluster

Mean scores for girls' weight status, weight concerns, and depression were generated for each cluster for descriptive purposes. As presented in Table 3, one cluster contained girls (*n* = 60*)* low on all three clustering variables; in other words, girls in this cluster had lower BMI, few weight concerns, and fewer depressive symptoms. This cluster was labeled the lower risk cluster (LR). A second cluster (*n* = 68*)* had contained girls with elevated BMIs (weight status) and weight concerns but few depressive symptoms; this cluster was labeled higher weight status (HW) cluster. A final cluster contained fewer girls (*n* = 35*)* and was labeled the higher depression (HD).The mean depression score for this group was higher than the mean scores for the previous two clusters. Mean scores for this cluster also indicated girls in this group had slightly elevated BMI z-scores and elevated weight concerns at age 9. There were no differences across clusters on demographic variables (paternal and maternal education, family income).

In regard to the association between overweight status and cluster membership at age 9, frequency analyses indicated that none of the girls in the LR cluster were classified as overweight, defined as at or above the 85th percentile for expected weight for height, at age 9. In contrast, 31 of the 68 girls in the HW cluster and 11 girls of the 35 girls in the HD cluster were classified as overweight at age 9.

ANOVA was used to verify group differences on the clustering variables. Findings are presented in Table 4. Tukey post hoc analyses indicated that the girls in the HW had higher BMIs in comparison to girls in the HD and LR clusters. Girls in the HD, in turn, had higher BMI z-scores than girls in the LR cluster. In regard to weight concerns, girls in the LR had lower weight concern scores than the HW and HDclusters. The HW and HD clusters did not differ significantly on weight concerns. Finally, girls in

the HDHWC cluster had a higher depression scores in comparison to girls in the LR and HWHWC clusters.

Table 4

Differences on Weight Status, Weight Concerns, and Depression by Cluster Membership

Construct	Age 9 Cluster			F-value	η^2
	LR (*n* = 60)	**HW (*n* = 68)**	**HD (*n* = 35)**		
BMI	16.44 ± 0.32[a]	20.12 ±0.30[b]	18.17 ± 0.13[c]	38.63***	.29
BMI Z-score	-0.13 ± 0.10[a]	1.09 ± 0.09[b]	.40 ± 0.43[c]	38.40***	.32
Weight Concerns	.10 ± 0.02[a]	.55 ± 0.03[b]	.54 ± 0.04[b]	68.79***	.46
Depression	2.42 ± 0.34[a]	3.19 ± 0.32[a]	9.22 ± 0.43[b]	78.71***	.50

Note. Results presented as mean ± standard error. LR=LR cluster, HW= cluster with girls with the highest weight status (BMI) and high weight concern scores, HD= cluster with girls with the highest depression scores and high weight concern scores. Different subscript letters (a,b,c) indicate statistically significant differences at $p<0.05$ among cluster (low, weight status, depression) on each construct.

* = $p<.05$ ** = $p<.01$ *** = $p<.001$

However, given that the purpose of cluster analysis is to maximize group differences, these results are expected. Therefore, to more appropriately validate this cluster solution and to further describe how the clusters differed from one another, additional analyses were conducted.

Replication of Cluster Solution. First, a different cluster method, an iterative cluster method referred to as K-Means clustering (a non-hierarchical cluster method), was used to examine similarities in cluster solutions. A similar 3 cluster solution was found so that one cluster contained girls with low BMI z-scores and low depression and weight concerns, a second cluster contained girls with slightly elevated BMI z-scores and elevated weight concern and depression scores, and a third cluster contained girls with high BMI z-scores and high weight concerns. A comparison between cluster solutions showed that approximately 75% of girls were placed in the same cluster for each solution. The similar cluster patterns and interpretations between the two different clustering techniques suggested that the initial hierarchical cluster solution was indicative of the underlying risk patterns in the sample at age 9.

Discriminant Function Analysis. Discriminant function analysis was used to examine correct and incorrect classification of girls into clusters. The three clustering variables were treated as predictors of membership in the groups or clusters previously described. According to the classification matrix, which reports on correct and incorrect classification (or "hits and misses"), 87% of the sample were correctly classified (13% misclassified). In sum, 23 of the 163 girls were misclassified and 140 were correctly classified. Examination of the incorrect classification cases indicated that there were more misclassifications between the weight status and HD clusters. Possible

explanations for the higher rate of misclassification for these groups are related to the correlation between the clustering variables, measurement error, and the overall small sample size and small number of cases within each cluster.

Additional Description of Clusters. Additional analyses were conducted in order to more fully validate and describe the three cluster solution. Given that girls across clusters differed on weight status, weight concerns, and depression, it was expected that girls in these clusters would also differ on similar physical and psychological constructs. ANOVA was used to examine group differences on girls' fat mass, anxiety, global self-concept, body dissatisfaction, and appearance-related self-concept. Findings are presented in Table 5.

As shown in table 5, follow-up analyses indicated that all three clusters differed from one another on fat mass, anxiety, physical appearance self-concept, and body dissatisfaction. More specifically, girls in the HW cluster had the highest measured fat mass, the girls in the HD the second highest and girls in the LR cluster, the lowest fat mass. In regards to the additional psychological constructs, the girls in the HD had a higher average anxiety score, a lower average physical appearance self-concept score, and higher body dissatisfaction in comparison to girls in either the weight status or LR clusters. Girls in the HW cluster in turn had a higher average anxiety score, a lower average physical appearance self-concept score, and a higher body dissatisfaction score in comparison to girls in the LR cluster. Finally, the girls in the HDHWC reported lower self-worth and felt less socially accepted in comparison to girls in the weight status and LR clusters.

Table 5

Cluster Differences on Age 9 Physical and Psychological Characteristics.

	Age 9 Cluster				
Construct	**LR (*n* = 60)**	**HW (*n* = 68)**	**HD (*n* = 35)**	**F-value**	**η^2**
Fat Mass	5.76 ± 0.37[a]	9.60 ± 0.40[b]	7.72 ± 0.49[c]	27.77***	.19
Global Self-Worth	3.63 ± 0.06 [a]	3.44 ± 0.06[b]	3.08 ± 0.08[c]	16.70***	.17
Anxiety	1.22 ± 0.03 [a]	1.34 ± 0.03[b]	1.50 ± 0.04[c]	16.52***	.17
Physical Appearance Self-Worth	3.60 ± 0.06[a]	3.31 ± 0.06[b]	2.94 ± 0.08[c]	22.61***	.19
Body Dissatisfaction	1.22 ± 0.03 [a]	1.33 ± 0.03 [b]	1.54 ± 0.04[c]	19.10***	.22

Note. Results presented as mean ± standard error. LR=LR cluster, HW= cluster with girls with the highest weight status (BMI) and high weight concern scores, HD= cluster with girls with the highest depression scores and high weight concern scores. Different subscript letters (a,b,c) indicate statistically significant differences at $p<0.05$ among cluster (low, weight status, depression) on each construct.

*** = $p<.001$

Aim 2: Associations with Specific Disordered Eating Behaviors and Attitudes at age 13

Correlations. Table 6 contains Pearson correlations among girls' dietary restraint, binge eating, emotional eating, and appearance and weight related body dissatisfaction at ages 11 (Table 6a) and 13 (Table 6b). Overall, at each age all disordered eating outcomes were significantly and positively associated with one another, suggesting a general overlap in disordered eating behaviors among girls at these ages. Correlations were used to assess stability for each construct between ages 11 and 13. Results indicated strong stability for dietary restraint (r .60), appearance-related body dissatisfaction (r .58) and weight-related body-dissatisfaction (r .63) and moderate stability for binge eating (r .45) and emotional eating (r .50)

Table 6

Correlations among Age 11 Disordered Eating Variables and Age 13 Disordered Eating Variables

	Age 13				
Age 11	**Dietary Restraint**	**Binge Eating**	**Emotional Eating**	**Weight-Related BD[a]**	**Appearance-Related BD[a]**
Dietary Restraint	.60***	.25**	.30***	.50***	.38***
Binge Eating	.29***	.40***	.34***	.23**	.26**
Emotional Eating	.25**	.25**	.48***	.20**	.22**
Weight-Related BD[a]	.48***	.32***	.28***	.64***	.49***
Appearance-Related BD[a]	.39***	.32***	.32***	.50***	.52***

Note. ** $p < .01$ *** $p < .001$

[a] BD= Body Dissatisfaction

Cluster Differences on Disordered Eating. Due to the correlations among disordered eating outcome variables, MANOVA was used to examine mean differences on dietary restraint, binge eating, emotional eating, and appearance and weight related body dissatisfaction at age 13; age 9 clusters were treated as the independent variable. Findings are presented in Table 7. The omnibus main effect test was statistically significant for cluster membership, $F(14, 310)$ 4.15, $p <. 001$.

Tukey post hoc tests were used to examine which group(s) differed from one another (see Table 7). Results indicated that girls in the HD cluster had significantly higher binge eating and dietary restraint scores than girls in the LR cluster. Girls in the HW and HD clusters did not significantly differ from one another on binge eating, emotional eating, or dietary restraint scores and girls in the HW cluster also did not differ from girls in the LR cluster on binge or emotional eating scores. Girls across clusters also differed on both appearance and weight-related body dissatisfaction so that girls in both the HW and HD clusters reported more appearance and weight-related dissatisfaction in comparison to girls in the LR cluster.

In regard to healthy and unhealthy dieting at age 13, 32 (19%) girls were classified at unhealthy dieters, 74 (44%) were classified as healthy dieters, and 62 (37%) girls reported not dieting. Girls who were classified as unhealthy dieters also reported using healthy dieting so that unhealthy behaviors were used in conjunction with healthy dieting behaviors for this subset of girls. Logistic regression was used to examine the likelihood of being classified as an unhealthy dieter at age 13 based on age 9 cluster membership. Results indicated that girls in the HW cluster were 5 times (Odds ratio (OR) = 5.0, Confidence Interval (CI) = 1.6-15.9) as likely and girls in the HD were 4

times (OR = 4.1, CI = 1.1-15.0) as likely to be classified as unhealthy dieters relative to girls in the LR cluster.

Table 7

Cluster Differences on Age 11 and Age 13 Disordered Eating Behaviors and Attitudes

	Age 9 Cluster				
Construct	**LR (*n* = 60)**	**HW (*n* = 68)**	**HD (*n* = 35)**	**F-value**	**η^2**
Binge Eating					
Age 11	1.77 ± 0.30[a]	2.26 ± 0.27[ab]	3.24 ± 0.38[b]	4.56**	.08
Age 13	6.01 ± 0.70[a]	6.53 ± 0.65[ab]	8.66 ± 0.91[b]	2.95*	.06
Emotional Eating					
Age 11	1.52± 0.08[a]	1.64± 0.08[ab]	1.96± 0.11[b]	5.06***	.06
Age 13	1.53± 0.08[a]	1.60± 0.07[ab]	1.88± 0.11[b]	2.86*	.05
Dietary Restraint					
Age 11	1.35± 0.09[a]	2.18± 0.08[b]	1.95± .12[b]	23.95***	.23
Age 13	1.45± 0.08[a]	1.98± 0.07[b]	1.89± .11[b]	10.20***	.12
Weight BD[a]					
Age 11	0.41± 0.09[a]	0.97± 0.08[b]	1.04± .12[b]	11.23***	.14
Age 13	0.85± 0.10[a]	1.58± 0.11[b]	1.54± .11[b]	5.03***	.12
Appearance BD[a]					
Age 11	0.54± 0.09[a]	0.99± 0.08[a]	1.10± .12[b]	14.16***	.11
Age 13	1.12± 0.08[a]	1.51± 0.10[a]	1.54± .13[b]	12.07***	.08

Note. Results presented as mean ± standard error. LR=LR cluster, HW= cluster with girls with the highest weight status (BMI) and high weight concern scores, HD= cluster with girls with the highest depression scores and high weight concern scores. Different subscript letters (a,b) indicate statistically significant differences at $p<0.05$ among clusters on each construct.
[a]BD= Body Dissatisfaction
* = $p<.05$ ** = $p<.01$ *** = $p<.001$

Pubertal Development and Disordered Eating. MANOVA was used to examine if early pubertal development at age 11 was also associated with age 11 and age 13 disordered eating outcomes. Age 11 pubertal development data was selected for these analyses as there was the most variability in breast development at this age. In addition, use of age 11 data provided an opportunity to assess if age 11 pubertal development reduced the previously described associations between age 9 cluster membership and disordered eating outcomes at ages 11 and 13. Finally, use of age 11 pubertal development data permitted an examination of both the concurrent (age 11) and longitudinal (age 13) influences of early pubertal development on disordered eating outcomes.

Prior to treating Tanner stage as a covariate, it was verified that there was no interaction between age 9 cluster membership and age 11 Tanner stage. As presented in Table 8, MANOVA analyses indicated that pubertal development at age 11 was significantly associated only with girls' dietary restraint and weight and appearance body dissatisfaction at age 11 and with girls' binge eating and weight and appearance body dissatisfaction at age 13. Therefore, initial analyses examining associations between cluster membership and these specific outcomes were re-run controlling for age 11 Tanner stage. Findings are presented in Table 9.

MANCOVA was used to determine if age 9 cluster membership was associated with girls' dietary restraint scores and weight and appearance body dissatisfaction scores at age 11 and with girls' binge eating scores and weight and appearance body dissatisfaction scores at age 13 when controlling for age 11 pubertal development. The overall model effect for cluster membership remained significant, $F(12, 310)$ 5.61, $p <$

.001, when controlling for Tanner stage. Follow-up analyses indicated the same pattern of cluster differences on binge eating, dietary restraint, and body dissatisfaction and appearance internalization scores as initially described.

In regard to unhealthy dieting, logistic regression controlling for pubertal development at age 11 did not alter results described above.

Table 8

Effect of Early Pubertal Development at age 11 on Disordered Eating at ages 11 and 13

	Pubertal Development			
Construct	**Early (*n*= 50)**	**Later (*n*=113)**	**F-value**	**η^2**
Binge Eating				
Age 11	2.16 ± 0.21	2.62 ± 0.34	1.34	.00
Age 13	8.27 ± 0.79[a]	6.25 ± 0.49[b]	4.74*	.05
Emotional Eating				
Age 11	1.68± 0.09[a]	1.65± 0.06[a]	0.04	.01
Age 13	1.71± 0.09[a]	1.60± 0.06[a]	1.10	.01
Dietary Restraint				
Age 11	2.04± 0.11[a]	1.74± 0.07[b]	5.06*	.05
Age 13	1.92± 0.10	1.70± 0.06	3.50	.02
Weight BD[a]				
Age 11	0.96± 0.11[a]	0.70± 0.07[b]	4.06*	.04
Age 13	1.56± 0.14[a]	1.17± 0.08[b]	5.90*	.05
Appearance BD[a]				
Age 11	1.03± 0.10[a]	0.78± 0.06[b]	4.26*	.05
Age 13	1.67± 0.12[a]	1.26± 0.07[b]	9.25**	.06

Note. Results presented as mean ± standard error. LR=LR cluster, HWHWC= cluster with girls with the highest weight status (BMI) and high weight concern scores, HDHWC= cluster with girls with the highest depression scores and high weight concern scores. Different subscript letters (a,b) indicate statistically significant differences at $p<0.05$ among clusters on each construct.

[a]BD= Body Dissatisfaction

* = p<.05 ** = p<.01 *** = p<.001

Table 9

Cluster Differences on Age 11 and Age 13 Disordered Eating Behaviors and Attitudes Controlling for Age 11 Pubertal Development[a]

	Age 9 Cluster				
Construct	**LR (*n* = 60)**	**HW (*n* = 68)**	**HD (*n* = 35)**	**F-value**	**η^2**
Binge Eating					
Age 11	1.77 ± 0.30[a]	2.26 ± 0.27[ab]	3.24 ± 0.38[b]	4.56**	.08
Age 13	6.47 ± 0.72[a]	6.95 ± 0.67[ab]	9.26 ± 0.92[b]	3.27*	.06
Emotional Eating					
Age 11	1.52± 0.08[a]	1.64± 0.08[ab]	1.96± 0.11[b]	5.06***	.06
Age 13	1.53± 0.08[a]	1.60± 0.07[ab]	1.88± 0.11[b]	2.86*	.05
Dietary Restraint					
Age 11	1.42± 0.09[a]	2.23± 0.08[b]	2.08± .12[b]	24.49***	.23
Age 13	1.45± 0.08[a]	1.98± 0.07[b]	1.89± .11[b]	10.20***	.12
Weight BD[b]					
Age 11	0.48± 0.09[a]	1.02± 0.08[b]	1.11± .12[b]	11.23***	.14
Age 13	0.93± 0.10[a]	1.66± 0.11[b]	1.50± .11[b]	5.03***	.12
Appearance BD[b]					
Age 11	0.59± 0.09[a]	1.04± 0.08[a]	1.20± .12[b]	14.16***	.12
Age 13	1.21± 0.08[a]	1.59± 0.10[a]	1.65± .13[b]	12.07***	.08

Note. Results presented as mean ± standard error. LR=LR cluster, HW= cluster with girls with the highest weight status (BMI) and high weight concern scores, HD= cluster with girls with the highest depression scores and high weight concern scores. Different subscript letters (a,b) indicate statistically significant differences at $p<0.05$ among clusters on each construct.

[a] controlling for age 11 pubertal development for age 11 dietary restraint, age 13 binge eating, age 11 and 13 weight-related body dissatisfaction, and age 11 and 13 appearance-related body dissatisfaction.

[b] BD= body dissatisfaction.

* = $p<.05$ ** = $p<.01$ *** = $p<.001$

Aim 3: Do clusters remain different on original cluster variables over time?

Pearson correlations were used to assess stability on weight concerns, depression, and BMI within the general sample. Results indicate strong stability for BMI over time (*r*'s .82-.97), and low to moderate stability for weight concern (*r*'s .37-.57) and depression (*r*'s .43-51) scores over time. Additional analyses examined differences over ages 9, 11 and 13 on these variables across clusters.

Repeated Measures Analyses. Given that there were three time points and the possibility that these three constructs may change at different rates for the different clusters over time, repeated measures analysis of variance (RMANOVA) was used. This permitted an examination of main effects for group and time, as well as to examine the interaction of group membership with time. Time in these analyses refers to the three time points of data collection, when girls were ages 9, 11, and 13. Figures 1-3 illustrate the trends for each variable over time for each cluster.

BMI over Time. Table 10 presents the mean (SD) for girls' BMI for total sample and for each cluster at ages 9, 11, and 13. RMANOVA results indicated that there was a main effect for group membership, $F(2,162)$ 27.06, $p <. 001$, and for time, $F(2,162)$ 153.07, $p <. 001$, for girls' BMI over time. There was no group x time interaction so that all three groups increased in BMI at a similar rate. Post hoc tests indicated that all three clusters differed from one another at each age on BMI so that the HW cluster consistently had the highest BMI and the LR cluster, the lowest. At age 13, the difference between the HW and HD clusters was not significant. Figure 1 illustrates these trends. To further determine that clusters did not differ on weight gain over time, ANOVA results indicate

that clusters did not differ on their weight gain between ages 9 and 13, $F(2,162)$ .69, $p > .10$.

Weight Concerns over Time. Table 10 presents the mean (SD) for girls' weight concern scores for total sample and for each cluster at ages 9, 11, and 13. RMANOVA results indicated a significant effect for cluster membership, $F(2,162)$ 33.15, $p < .001$, and for time $F(2,162)$ 89.30, $p < .001$ There was no group x time interaction so that all three groups increased on weight concerns at a similar rate. In general, examination of the mean scores over time indicated a consistent increase on weight concerns among girls in all risk groups. Post hoc tests indicated that at each age girls in both the HD and HW clusters had significantly higher weight concern scores in comparison to girls in the LR cluster. Figure 2 illustrates these findings.

Depression over Time. Table 10 presents the mean (SD) for girls' depression concern scores for total sample and for each cluster at ages 9, 11, and 13. RMANOVA results indicated a significant main effect for cluster membership $F(2,162)$ 32.03, $p < .001$, and for time $F(2,162)$ 4.64, $p = .01$. These findings are qualified by the significant cluster x time interaction, $F(2,162)$ 7.96, $p < .001$. As illustrated in Figure 3, this interaction was due to the decrease in depression scores between ages 9 and 13 among girls in the HD cluster. Post hoc tests indicated that girls in the HD cluster had higher depression scores in comparison to girls in the HW and LR cluster.

Table 10

Means (SD) for Cluster Variables at ages 9, 11, and 13.

		Age 9 Cluster		
	Total Sample (*N* = 163)	**LR (*n* = 60)**	**HW (*n* = 68)**	**HD (*n* = 35)**
BMI				
Age 9	18.37 (2.99)	16.37 (1.32)[a]	20.23 (2.87)[b]	18.83 (3.70)[c]
Age 11	20.01 (4.02)	17.07 (1.34)[a]	21.78 (2.88)[b]	19.71 (3.15)[c]
Age 13	21.13 (4.05)	19.15 (2.27)[a]	22.80 (4.32)[b]	21.29 (4.47)[b]
BMI Z-Score				
Age 9	0.50 (0.93)	-0.13 (0.65)[a]	1.09 (0.68)[b]	0.40 (0.89)[c]
Age 11	0.52 (0.95)	-0.10 (0.66)[a]	1.07 (0.68)[b]	0.41 (1.00)[c]
Age 13	0.42 (0.90)	-0.04 (0.72)[a]	0.83 (0.72)[b]	0.52 (0.40)[b]
Weight Concerns				
Age 9	0.39 (0.30)	0.10 (0.10)[a]	0.55 (0.30)[b]	0.54 (0.23)[b]
Age 11	0.72 (0.60)	0.37 (.40)[a]	0.96 (0.58)[b]	0.83 (0.61)[b]
Age 13	1.09 (0.77)	0.76 (0.10)[a]	1.33 (0.30)[b]	1.19 (1.00)[b]
Depression				
Age 9	4.17 (3.71)	2.42 (2.37)[a]	3.19 (2.19)[a]	7.22 (4.89)[b]
Age 11	3.80 (3.65)	2.68 (2.39)[a]	3.38 (2.21)[a]	6.54 (4.27)[b]
Age 13	3.91 (3.97)	2.76 (2.10)[a]	3.90 (3.67)[a]	5.91 (4.94)[b]

Note. Results presented as mean (SD). LR=LR cluster, HW= cluster with girls with the highest weight status (BMI) and high weight concern scores, HD= cluster with girls with the highest depression scores and high weight concern scores. Different subscript letters (a,b,c) indicate statistically significant differences at $p<0.05$ among clusters on each construct ($p<.05$).

Figure 1

Mean BMI by Cluster Ages 9, 11, and 13

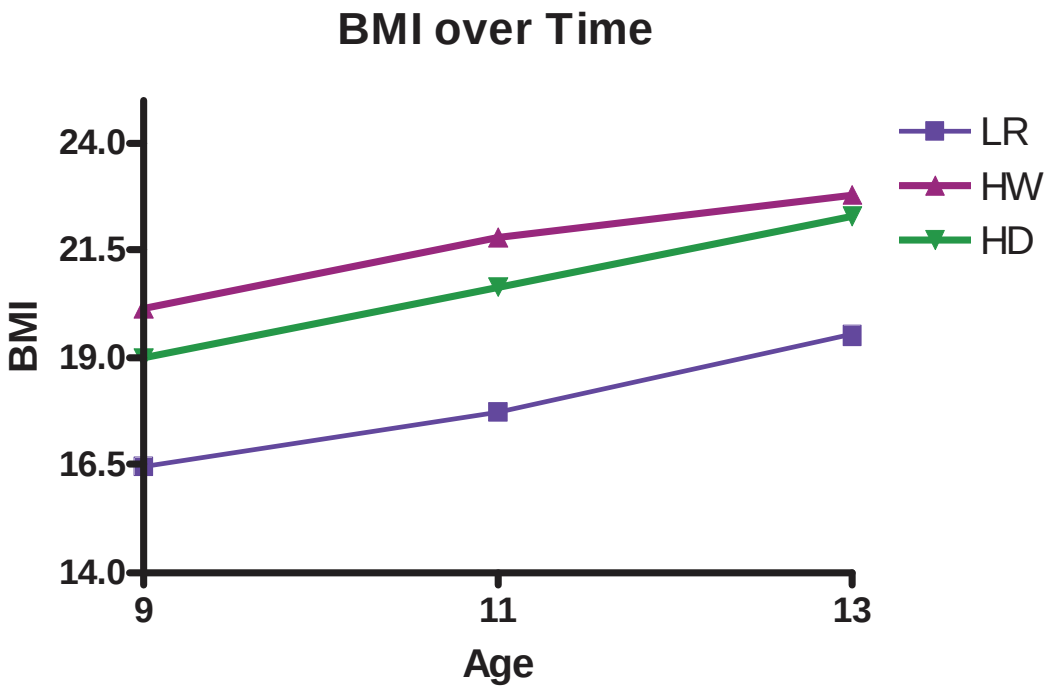

Figure 1. Mean BMI by age 9 cluster membership. There was a significant effect for cluster membership, $F(2,162)$ 27.06, p <. 001, and for time, $F(2,162)$ 153.07, p <. 001. Girls in the lower risk cluster (LR) continued to have the lowest BMIs at each age; girls in the high weight status and high weight concern (HW) and high depression and high weight concern (HD) clusters significantly differed on BMI at ages 9 and 11 but not at age 13.

Figure 2

Weight Concern Scores by Cluster over ages 9, 11, and 13

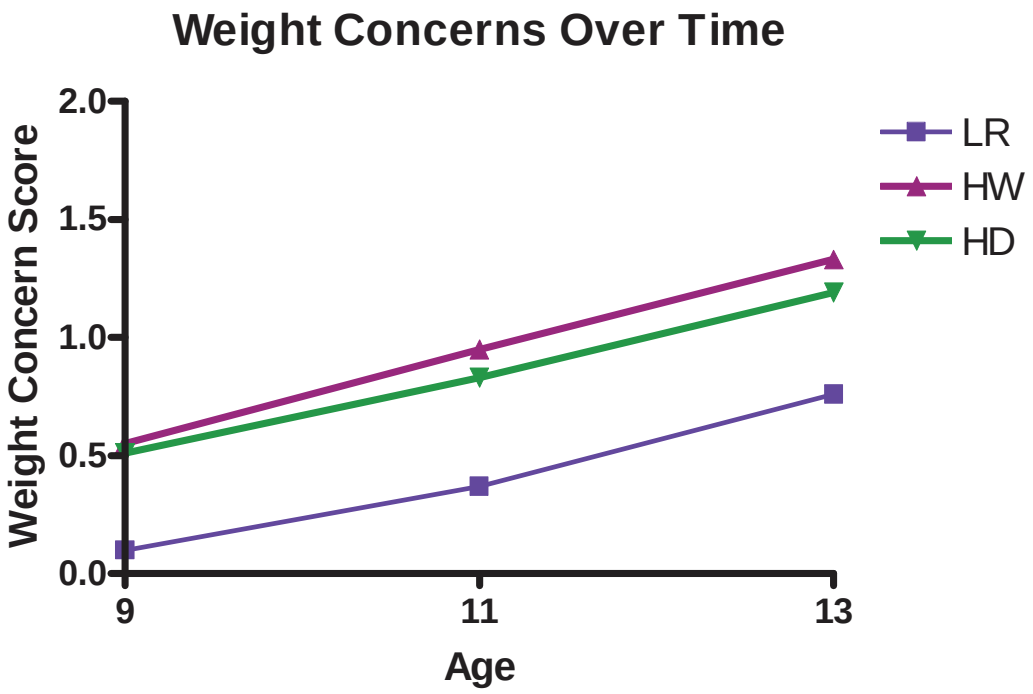

Figure 2. Mean weight concern score by age 9 cluster membership. There was a significant effect for cluster membership, $F(2,162)$ 33.15, $p < .001$, and for time $F(2,162)$ 89.30, $p < .001$. Girls in the LR cluster continued to have the lowest BMIs at each age; girls in the HW and HD did not significantly differ from one another at any age.

Figure 3

Depression Scores by Cluster at ages 9, 11, and 13

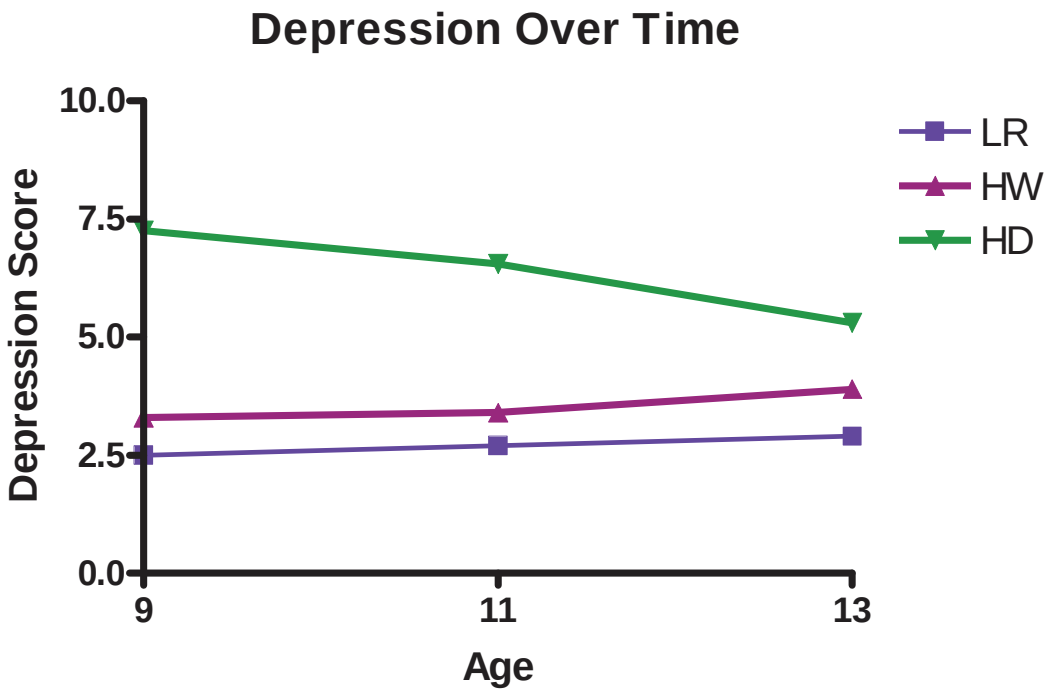

Figure 3. Mean depression score by age 9 cluster membership. There was a significant interaction effect for the group x time interaction, $F(2,162)$ 7.96, $p < .001$ such that girls in the HD cluster had decreasing scores over time while depression scores among girls in the HW cluster and LR cluster remained similar over time. Despite the decline in mean depression score, girls in the HD cluster had significantly higher depression scores at each age.

Stability in Cluster Membership between ages 9 and 13. Pearson correlations were used to examine the associations among girls' BMIs, weight concern scores, and depression scores at each age. Correlations are presented in Tables 11a and 11b. In general, results indicate that these three constructs became more strongly associated with one another over time. For example, at age 9, the correlation between BMI and depression score was .10 ($p = .17$), at age 11 the correlation was .16 ($p < .05$), and at age 13, the correlation was .27 ($p < .001$). Similarly, the associations between weight concern scores and depression scores and between weight concern scores and BMI were stronger at age 13 than at age 9. In general, then, the associations among these three constructs changed between age 9 and 13.

Table 11a

Correlations among Weight Status, Weight Concern Scores, and Depression Scores at Age 9

Variable	BMI	Weight Concern	Depression
BMI	-	.44***	.10
Weight Concern	-	-	.25***
Depression	-	-	-

Note. *** p <. 001

Table 11b

Correlations among Weight Status, Weight Concern Scores, and Depression Scores at Ages 11 and Age 13

Age 13	Age 11		
	BMI	**Weight Concern**	**Depression**
BMI	.88***	.60***	.16*
Weight Concern	.53***	.54***	.37***
Depression	.27***	.42***	.47***

Note. * p = .05 *** p <. 001

In order to examine if girls remained in the same cluster over time, hierarchical cluster analysis was used to create a 3 cluster solution using girls' BMI z-score, weight concern score, and depression score at age 13. Examination of means on these variables across clusters indicated a change in the underlying latent structure of the clusters at age 13. Table 12 contains means for each age 13 cluster on BMI z-scores, weight concern scores, and depression scores.

At age 13, there was again a cluster containing girls low on the three cluster variables (n = 65). Another cluster contained girls who had slightly elevated BMI z-scores and weight concern scores (n = 64). The final cluster contained girls with elevated BMI z-scores and high depression and weight concern scores (n = 36).

ANOVA was used to examine cluster differences on girls' BMI z-scores, weight concern scores, and depression scores at age 13. Findings are presented in Table 12. At age 13, there was again a cluster (n = 65) containing girls with significantly lower BMI z-scores, weight concern scores, and depression scores; this cluster was labeled as the lower risk cluster (LR). Another cluster contained girls who had slightly elevated BMI z-scores and weight concern scores (n = 64); these girls were considered to be at moderate risk for disordered eating so that the cluster was labeled as moderate risk (MR). The final cluster contained girls with elevated BMI z-scores and high depression and weight concern scores (n = 34); this cluster was labeled as high risk (HR). Girls in the HR cluster had significantly higher BMI z-scores than girls in the MR and LR clusters and girls in the MR cluster had higher BMI z-scores than girls in the LR risk cluster. Girls in the MR and HR clusters did not significantly differ on weight concern scores. Girls in

the HR cluster had significantly higher depression scores than girls in the MR and LR clusters.

These results indicate that the latent structure of two of these two elevated risk clusters was different from the age 9 latent structure, where the HW cluster contained girls with higher BMI z-scores and higher weight concerns but *low* depression scores and the HD cluster contained girls with the highest depression scores and higher weight concern scores but only *slightly* elevated BMI z-scores. This change limited the ability to more thoroughly examine stability in cluster membership over time. Explanations for the change in the underlying structure include 1) the effect of pubertal development on girls' weight, weight concern, and depression, 2) effect of the correlation among cluster variables, which were stronger at age 13 than they were at age 9, 3) changing interactions among cluster variables, 4) measurement error, and 5) lack of stability of underlying latent constructs of depression (Cole & Martin, 2004).

Table 12

Age 13 Weight Status, Weight Concerns, and Depression by Age 13 Cluster Membership

	Age 13 Cluster			
Construct	**LR (*n* = 65)**	**MR (*n* = 64)**	**HR (*n* = 34)**	**F-value**
BMI	18.46 ± 0.39^{a}	21.60 ± 0.39^{b}	25.37 ± 0.53^{c}	55.64^{***}
BMI Z-score	-0.21 ± 0.08^{a}	0.57 ± 0.09^{b}	1.35 ± 0.12^{c}	61.69^{***}
Weight Concerns	0.45 ± 0.06^{a}	1.24 ± 0.06^{b}	2.02 ± 0.08^{b}	80.63^{***}
Depression	1.60 ± 0.38^{a}	3.80 ± 0.38^{a}	8.56 ± 0.52^{b}	58.98^{***}

Note. Results presented as mean ± standard error. LR= cluster containing girls with the lowest BMIs, lowest weight concern scores, and lowest depression scores at age 13. MR= girls with high weight concern scores and BMIs at age 13. HR= girls with the highest BMIs, high weight concerns scores, and highest depression scores at age 13. Different subscript letters (a,b,c) indicate statistically significant differences at $p<0.05$ among clusters (low, middle, high) on each construct.
*** = $p<.001$

Age 11 Pubertal Development and Weight Concern, Body Dissatisfaction, and Depression. Given that the latent structure of the disordered eating risk factors changed between ages 9 and 13, additional analyses examining the impact of early pubertal development at age 11 on the disordered eating risk factors were conducted. T-tests examined if early developers differed from later developers on BMI, weight concern, and depression at ages 11 and 13. Results are presented in Table 13. Early and later developing girls did differ on BMI at ages 11 and 13 so that early developing girls had higher BMIs at each age. Early and later developing girls did not differ on weight concerns or depression at age 11 but did significantly differ on these outcomes at age 13 such that early developing girls had higher weight concern scores and higher depression scores at age 13.

Age 13 Cluster Membership and Age 11 Pubertal Development. Given the change in the latent structure of the disordered eating risk variables and the association between early development and higher BMI, higher weight concern scores, and higher depression scores at age13, additional analyses focused on evaluating the effect of early pubertal development on age 13 cluster membership. Overall, 8 of the 65 girls in the LR cluster at age 13 were classified as early developers at age 11, 20 of the 64 girls in the middle risk cluster were early developers, and 16 of the 34 girls in the high risk cluster were early developers at age 11. Logistic regressions results indicated that girls in the HR cluster at age 13 were 6 times as likely to have been classified as an early developer at age 11 (OR = 6.3, CI = 2.3-17.2) relative to girls in the LR cluster and that girls in the MR cluster were 3 times as likely to have been classified as an early developer at age 11 (OR = 3.1, CI = 1.3-8.0) relative to girls in the LR cluster. Girls in the HR cluster were

not more likely than girls in the MR cluster to have been classified as an early developer at age 11. Therefore, girls in the LR cluster at age 13 were less likely to have been classified as an early developer at age 11 in comparison to girls in either the MR or HR clusters.

Table 13

Differences on BMI, Weight Concerns, and Depression between Early and Later Developing Girls

Construct	Early Developers (*n* = 50)	Later Developers (*n* = 113)	*t*
BMI			
Age 11	20.81 ± 0.48	19.39 ± 0.31	-2.51**
Age 13	22.40 ± 0.60	20.65 ± 0.36	-2.52**
Weight Concern			
Age 11	0.84 ± 0.10	0.67 ± 0.05	-1.60
Age 13	1.32 ± 0.12	1.00 ± 0.07	-2.38*
Depression			
Age 11	4.04 ± 0.61	3.68 ± 0.30	-0.58
Age 13	5.10 ± 0.70	3.47 ± 0.33	-2.33**

Note. Results presented as mean ± standard error.

* $p < .05$ ** $p < .10$

Aim 4: Associations with Family and Individual ages 7 and 9

The third aim of this study was to examine how the age 9 risk groups differed on a number of family and individual variables hypothesized to be associated with risk for disordered eating.

Family Environment. Both girls and their mothers reported on several aspects of the family environment when girls were ages 7 and 9. Findings are presented in Table 14. ANOVA was used to examine differences across the clusters on maternal and girl reports of parenting behaviors (i.e. monitoring and psychological control), marital conflict, and conflict over food and weight.

Girls in the HD cluster perceived more psychological control from their parents in comparison to girls in the LR cluster. In contrast, girls in the LR cluster reported more parental monitoring in comparison to girls in the HD cluster. Girls in the HW cluster did not differ from either cluster on these variables.

In regard to differences across clusters on experiences with parental marital conflict, maternal and paternal reports of conflict were not significant. However, girls in the HD and HW risk clusters perceived more frequent conflict, more intense conflict, and felt more threatened by parental conflict in comparison to girls in the LR cluster. At age 9, girls in the HD and HW clusters again perceived more intense conflict and felt more threatened by conflict; however, at this age, only girls in the HD cluster reported more frequent inter-parental conflict in comparison to girls in the LR cluster. Girls in the LR cluster perceived greater resolution of conflict in contrast to girls in the HD cluster only. Finally, girls in the HD cluster reported feeling greater self-blame for parental conflict in comparison to girls in either the HW or LR clusters.

Girls across clusters also differed on exposure to conflict over food and weight and to parental encouragement of weight loss. Both mothers and fathers of girls in the HW cluster reported greater conflict with one another about daughter's overweight when girls were ages 7 and 9. However, girls in the HD cluster perceived more conflict over food and weight in comparison to girls in the LR cluster at each age; at age 7 girls in the HW cluster also perceived more conflict over food and weight in comparison to girls in the LR cluster. In addition, mothers and fathers of girls in the HW cluster reported greater encouragement of daughter's weight loss in comparison to mothers and fathers of girls in the depression and LR clusters; mothers (but not fathers) of girls in the HD cluster also reported greater encouragement of daughter's weight loss in comparison to mothers of girls in the LR cluster.

Table 14

Cluster Differences on Family Environment Variables ages 7 and 9

	Age 9 Cluster				
Construct	**LR (*n* = 60)**	**HWH (*n* = 68)**	**HD (*n* = 35)**	**F-value**	**η^2**
Maternal Report Marital Conflict					
age 7	3.58 ± 0.16	3.82 ± 0.16	4.20 ± 0.21	2.69	.04
age 9	3.66 ± 0.17	4.04 ± 0.17	3.98 ± 0.23	1.13	.02
Paternal Report Marital Conflict					
age 7	3.53 ± 0.16	3.62 ± 0.16	3.52 ± 0.20	.10	.00
age 9	3.50 ± 0.17	3.53 ± 0.17	3.54 ± 0.23	.01	.00
Girl Report Frequency of Conflict					
age 7	1.43 ± 0.06^{a}	1.71 ± 0.06^{b}	1.85 ± 0.08^{b}	10.55^{***}	.12
age 9	1.45 ± 0.07^{a}	1.70 ± 0.06^{ab}	1.90 ± 0.09^{b}	9.37^{***}	.13
Girl Report Perceived Threat					
age 7	1.58 ± 0.08^{a}	1.84 ± 0.07^{b}	1.92 ± 0.10^{b}	7.88^{***}	.07
age 9	$1.50 \pm 0.08^{a\,a}$	1.79 ± 0.06^{b}	1.92 ± 0.13^{b}	5.86^{**}	.15

Table 14 (*Continued).*

Cluster Differences on Family Environment Variables ages 7 and 9

	Age 9 Cluster				
Construct	**LR (*n* = 60)**	**HW (*n* = 68)**	**HD (*n* = 35)**	**F-value**	**η^2**
Girl Report Conflict Resolution					
age 7	-	-	-	-	
age 9	2.51± 0.04[a]	2.45± 0.04[ab]	2.31± 0.06[b]	3.83[*]	.07
Girl Report Child Conflict					
age 7	-	-	-	-	
age 9	1.19± 0.05	1.24± 0.0	1.28± 0.06	.71	.02
Girl Report Self-Blame					
age 7	-	-	-	-	
age 9	1.14 ± 0.04[a]	1.21± 0.04[a]	1.36± 0.0[b]	6.48[**]	.10
Maternal Report Conflict over					
mother's underweight	1.11± 0.06	1.15± 0.06	1.10± 0.07	.25	.02
age 7	1.09± 0.05	1.13± 0.04	1.10± 0.05	.18	.00
age 9					

Table 14 (*Continued).*

Cluster Differences on Family Environment Variables ages 7 and 9

	Age 9 Cluster				
Construct	**LR (*n* = 60)**	**HW (*n* = 68)**	**HD (*n* = 35)**	**F-value**	**η^2**
Maternal Report Conflict over mother's overweight					
age 7	1.30± 0.10	1.33± 0.09	1.32± 0.10	1.20	.00
age 9	1.29± 0.10	1.27± 0.10	1.33± 0.11	.24	.01
Maternal Report Conflict over daughter's overweight	.98± 0.04[a]	1.05 ± 0.04[b]	1.01± 0.04[a]	2.97*	.05
age 7	1.04± 0.04[a]	1.18 ± 0.04[b]	1.09± 0.04[a]	1.87*	.10
age 9					
Maternal Report Conflict over daughter's underweight					
age 7	1.11± 0.05	1.08± 0.05	1.13± 0.06	.94	.03
age 9	1.13± 0.05	1.08± 0.04	1.13± 0.05	.94	.02
Paternal Report Conflict over father's underweight	1.17± 0.05	1.12± 0.06	1.11± 0.06	.76	.00
age 7	1.16± 0.04	1.17± 0.06	1.13± 0.06	.26	.00
age 9					

Table 14 (*Continued).*

Cluster Differences on Family Environment Variables ages 7 and 9

	Age 9 Cluster				
Construct	**LR (*n* = 60)**	**HW (*n* = 68)**	**HD (*n* = 35)**	**F-value**	**η^2**
Paternal Report Conflict over					
father's overweight	1.49± 0.10	1.41± 0.10	1.55± 0.11	2.60	.02
age 7	1.48± 0.10	1.50± 0.10	1.69± 0.11	1.44	.03
age 9					
Paternal Report Conflict over					
daughter's overweight	.99± 0.04^{a}	1.09± 0.04^{b}	1.01± 0.05^{a}	3.10*	.08
age 7	.99± 0.04^{a}	1.13± 0.05^{b}	1.04± 0.05^{a}	5.05**	.09
age 9					
Paternal Report Conflict over					
daughter's underweight					
age 7	1.28± 0.06	1.15± 0.04	1.22± 0.06	2.31	.03
age 9	1.16± 0.05	1.14± 0.05	1.15± 0.05	.05	.01
Girl Report Conflict over food &					
weight	1.14± 0.04^{a}	1.26± 0.04^{ab}	1.39± 0.05^{b}	7.91***	.10
age 7	1.06± 0.02^{a}	1.06± 0.02^{a}	1.15± 0.03^{b}	4.04*	.08
age 9					

Table 14 (*Continued).*

Cluster Differences on Family Environment Variables ages 7 and 9

	Age 9 Cluster				
Construct	**LR (*n* = 60)**	**HW (*n* = 68)**	**HD (*n* = 35)**	**F-value**	**η^2**
Maternal Report Monitoring					
age 7	-	-	-	-	
age 9	4.88± 0.06	4.82± 0.06	4.84± 0.06	1.13	.02
Maternal Report Psychological Control					
age 7	-	-	-	-	
age 9	1.32± 0.06	1.36± 0.06	1.34± 0.06	.32	.00
Paternal Report Monitoring					
age 7	-	-	-	-	
age 9	4.43 ± .06	4.42 ± .06	4.31 ± .09	.69	.02
Paternal Report Psychological Control					
age 7	-	-	-	-	
age 9	1.36 ± 0.03	1.34 ± 0.03	1.37 ± 0.05	.17	.00
Girl Report Monitoring					
age 7	-	-	-	-	
age 9	4.44 ± 0.07[a]	4.25 ± 0.07[ab]	4.13 ± 0.09[b]	3.86[*]	.08

Table 14 (*Continued).*

Cluster Differences on Family Environment Variables ages 7 and 9

	Age 9 Cluster				
Construct	**LR (*n* = 60)**	**HW (*n* = 68)**	**HD (*n* = 35)**	**F-value**	**η^2**
Girl Report Psychological Control					
age 7	-	-	-	-	
age 9	1.59 ± 0.03 [a]	1.63± 0.07[ab]	1.80 ± 0.08 [b]	3.32[*]	.08
Maternal Report Encouragement of Daughter Weight Loss	-	-	-	-	
age 7	1.09± 0.08[a]	1.71± 0.07[b]	1.33± 0.10[a]	20.07[***]	.08
age 9					
Paternal Report Encouragement of Daughter Weight Loss	-	-	-	-	
age 7	1.11± 0.07[a]	1.70± 0.07[b]	1.45± 0.09[b]	17.61[***]	.15
age 9					

Note. Results reported as means ± standard error. LR = lower risk cluster, HW = high weight status high weight concern cluster, HD = high depression high weight concern cluster. Means within rows with different superscripts (a, b, c) were significantly different using Tukey's Post Hoc Test.
[*] = $p<.05$ [**] = $p<.01$ [***] = $p<.001$.

Parental Characteristics. A separate ANOVA was used to examine differences across clusters on maternal and paternal depression and weight concern, when girls were ages 7 and 9. Findings are presented in Table 15.

Logistic regression was used to examine cluster differences in regard to the likelihood of having one or both parents overweight. Relative to girls in the LR cluster, girls in the HW cluster were more twice as likely to have a mother classified as overweight (odds ratio [OR] = 2.4, confidence interval [CI], 1.2-4.9) and almost three times as likely to have a father classified as overweight (OR = 2.7, CI 1.1-6.9). In addition, girls in the HD cluster were four times as likely to have a father classified as overweight (OR = 3.9, CI = 1.1-14.6) relative to girls in the LR cluster.

Table 15

Comparison of Parental Characteristics across Age 9 Clusters

	Age 9 Cluster				
Construct	**LR (*n* = 60)**	**HW (*n* = 68)**	**HD (*n* = 35)**	**F-Value**	**η^2**
Maternal Weight Concern					
Age 7	1.56 ± 0.09	1.69 ± 0.09	1.59 ± 0.13	.34	.02
Age 9	1.68 ± 0.10	1.68 ± 0.10	1.80 ± 0.14	.51	.03
Maternal Depression					
Age 7	6.75 ± 0.98	10.34 ± 0.92	9.00 ± 1.09	1.10	.02
Age 9	8.89 ± 0.97	10.88 ± 0.94	9.45 ± 1.30	1.01	.02
Paternal Weight Concern					
Age 7	1.09 ± 0.08	1.25 ± 0.08	1.26 ± 0.06	1.16	.01
Age 9	1.09 ± 0.08	1.26 ± 0.08	1.22 ± 0.11	1.09	.01
Paternal Depression					
Age 7	7.22 ± 0.87	8.41 ± 0.85	9.93 ± 1.01	.17	.02
Age 9	8.75 ± 0.84	9.38 ± 0.81	8.85 ± 1.03	1.75	.01

Note. Results presented as mean ± standard error. LR = lower risk cluster, HW = high weight status high weight concern cluster, HD = high depression high weight concern cluster.

Individual Characteristics. ANOVA was used to examine if there were pre-existing differences among clusters on girls' anxiety and level of self-concept at age 7. Findings are presented in Table 16. Girls in the LR cluster had lower mean anxiety scores in comparison to girls in either the HW or HD clusters. The HD cluster had lower average general self-concept, maternal acceptance, and social acceptance scores in comparison to the HW and LR clusters; these two clusters did not differ statistically from one another on these variables.

Table 16

Age 9 Cluster Differences on Individual Characteristics Assessed at Age 7

	Age 9 Cluster				
Construct	**LR (*n* = 60)**	**HW (*n* = 68)**	**HD (*n* = 35)**	**F-value**	**η^2**
Anxiety	1.38 ± 0.03[a]	1.48 ± 0.03[b]	1.56 ± 0.04[b]	5.96**	.10
Global Self-Concept	7.48 ± 0.09[a]	7.39 ± 0.08[a]	6.97 ± 0.11[b]	6.96***	.09
Maternal Acceptance	3.44 ± 0.06[a]	3.39 ± 0.05[a]	3.05 ± 0.04[b]	9.16***	.10
Peer Acceptance	3.74 ± 0.05[a]	3.39 ± 0.07[a]	3.05 ± 0.07[b]	3.89*	.07

Note. Results presented as mean ± standard error. LR = lower risk cluster, HW = high weight status high weight concern cluster, HD = high depression high weight concern cluster.

* $p<.05$ ** $p<.01$ *** $p<.001$.

Chapter 4

DISCUSSION

To date, no study has longitudinally evaluated if patterns of disordered eating risk in pre-adolescent girls are associated with early adolescent disordered eating. Using longitudinal data, this study is the first to show that clusters based on risk factors for disordered eating, obtained at age 9, predicted differences in patterns of disordered eating behaviors and attitudes during the transition to puberty (ages 11 and 13). Findings provide needed empirical evidence to support prior assertions that risk for disordered eating emerges prior to adolescence. The first and second aims of this study were to examine patterns of disordered eating risk factors in girls at age 9 and to examine if such patterns would be associated with self-reported disordered eating behaviors and attitudes at ages 11 and 13. Use of hierarchical cluster analysis resulted in three distinct patterns of risk in girls at age 9. One cluster contained girls with lower BMIs, low weight concern scores, and low depression scores and was labeled the low risk (LR cluster), a second cluster, referred to as the high weight status and high weight concern cluster (HW cluster) contained girls with the highest BMIs and weight concern scores, and the final cluster was distinguished by girls with the highest depression scores, high weight concern scores, and elevated BMIs and was referred to as the high depression and high weight concern cluster (HD cluster). Membership in the HD and HW clusters at age 9 was then associated, in different ways, with binge eating, dietary restraint, emotional eating, and body dissatisfaction scores at ages 11 and 13 and unhealthy dieting at age 13.

Aim 1: Disordered eating risk patterns in 9-year-old girls

Cluster analysis results, which indicated underlying latent structures within the data on girls' weight status, weight concern, and depression, contributed to an understanding of how different patterns of disordered eating risk factors emerge in young girls during childhood. Of note, no cluster was defined by one risk factor; even though girls in the HW cluster had the highest BMIs, they also had elevated weight concern scores and though girls in the HD cluster had more symptoms of depression and/or greater severity of symptoms, they too had elevated weight concern scores and slightly elevated BMIs. Therefore, results support prior research which has indicated that disordered eating risk factors are present in pre-adolescent girls (Davison et al., 2003; Killen et al., 1994; Levine et al., 1994; Sinton & Birch, 2005; Thelen et al., 1994) and builds on this research by indicating 1) that multiple risk factors are concurrently present in girls and 2) that these risk factors are associated with one another in meaningful ways.

The patterning of risk observed within this study converges with recent research that has noted associations between weight status and weight concerns (Burrows & Cooper, 2002; Presnell, Bearman, & Stice, 2004; Stice & Whitenton, 2003) and weight concerns and negative affect (Leon, Fulkerson, Perry, Keel, & Klump, 1999; Nolen-Hoeksema, 2001; Petersen, Sarigiani, & Kennedy, 1991; Stice & Bearman, 2001). The disordered eating risk clusters also differed from one another on additional physical and psychological characteristics. Girls in the HW and HD clusters had greater fat mass and body dissatisfaction than girls in the LR cluster and, as expected, girls in the HD cluster had lower self-concept and greater anxiety than girls in the HW and LR clusters. Prior studies have found fat mass (Attie & Brooks-Gunn, 1989; Graber et al., 1994), self-

concept (Hill & Pallin, 1998; Sinton & Birch, 2005; Wonderlich et al., 1996), body dissatisfaction (e.g. Davison et al., 2003; Killen et al., 1996; Ohring et al., 2002; Stice & Shaw, 2003), and anxiety (Bulik, Sullivan, Fear, & Joyce, 1997) to be additionally associated with risk for disordered eating. Future studies, as well as prevention efforts, may then benefit from assessing multiple risk factors in order to more fully describe how disordered eating risk is manifest in young girls.

Both risk groups were defined in part by elevated weight concerns so that weight concerns may not only be a potent risk factor for disordered eating (Stice, 2002) but also a risk factor that is associated with, moderates, or otherwise interacts with additional disordered eating risk factors. The temporal association between risk factors was not examined in the current study but it may be that girls in these two groups reported more concerns about their weight in response to their actual weight status given that both risk groups were also defined, to different degrees, by elevated BMIs and reported greater body dissatisfaction at age 9, were exposed to more encouragement to lose weight from both their parents, had parents who reported interparental conflict about daughter's overweight. Girls in the HD cluster also had higher anxiety and lower self-concept at ages 7 and 9 and lower physical appearance self-concept at age 9 so that they were more likely be attuned to and internalize comments about their weight and appearance. Theorists have suggested that girls likely report dissatisfaction with their weight because they are aware of cultural ideals relating to weight and appearance (Stice, 2002; Stice & Shaw, 2002). Therefore, the finding that girls with elevated BMIs, but not girls with low BMIs, had higher weight concern scores by age 9 implies that these girls are aware that they do not reflect an ideal body shape and are concerned about this discrepancy. Such

discrepancies may lead to more general negative self-evaluation and depression over time (Crocker & Wolfe, 2002; Harter, 2006; Nolen-Hoeksema, 2001), as reflected by girls in the HD cluster who had both higher weight concern scores and depression scores.

In regard to associations between weight status and depression, girls in the HW cluster did not have significantly higher depression scores than girls in the LR cluster, mirroring other research that has not found concurrent associations between higher weight status and/or overweight and higher depression scores (Tanofsky-Kraff et al, 2004; Wardle, Williamson, Johnson, & Edwards, 2006). However, girls with higher depression scores did have higher BMIs than girls in the LR cluster, indicating that the association between negative affect, weight concerns, and/or weight status is complex. As mentioned above, girls in the HD cluster had poorer general and physical appearance related self-concept scores so that concerns about appearance and weight may have been a part of more general negative self-evaluation.

Aim 2: Is cluster membership associated with engagement in disordered eating at ages 11 and 13?

The second aim of this study was to evaluate whether or not cluster membership at age 9 would be associated with disordered eating behaviors and attitudes at ages 11 and 13. To more fully examine if patterns of risk would be associated with different disordered eating behaviors, several specific disordered eating behaviors assessed at ages 11 and 13, including binge eating, emotional eating, dietary restraint, unhealthy dieting, and body dissatisfaction, were included in analyses. Results revealed that cluster membership was associated with multiple disordered eating behaviors so that early

adolescent girls appear to be at risk for several types of disordered eating. Cluster differences on disordered eating outcomes were the same at ages 11 and 13, and correlations indicated moderate to high stability for dietary restraint, binge eating, emotional eating, and both appearance and weight related body dissatisfaction, so that early adolescent disordered eating behaviors and attitudes were, among girls in the sample, somewhat stable during early adolescence.

Dietary Restraint and Body Dissatisfaction. Girls in the HW and HD clusters had significantly higher dietary restraint and appearance and weight-related body dissatisfaction at ages 11 and 13. These two risk groups contained girls with both elevated BMIs and equal levels of weight concern, so it is probable that appearance and weight body dissatisfaction and dietary restraint scores were influenced by these two characteristics.

In the current study, higher weight status and weight concern were already associated with one another at age 9, suggesting that girls are at risk for such concerns during middle childhood (Lowes & Tiggemann, 2003; Sands & Wardle, 2003). Prior studies have indicated that elevated weight status or overweight is associated with greater body dissatisfaction in pre-adolescent girls (e.g. Burrows & Cooper, 2002; Shunk & Birch, 2004a; Stice & Shaw, 2002; Vander Wal & Thelen, 2000a). In addition, girls in this study remained concerned about their weight and dissatisfied with their appearance into early adolescence, suggesting some stability in concerns about weight over time, similar to conclusions about stability in elevated body dissatisfaction in young girls and adolescent girls (Davison et al., 2003; Ohring et al., 2002). Stability in weight concerns and body dissatisfaction may increase risk for early and more chronic eating problems

(Davison et al., 2003; Ohring et al., 2002), as evidenced by the correlations between body dissatisfaction and the additional disordered eating outcomes and the finding that girls in the HW and HD clusters did not significantly differ on body dissatisfaction or dietary restraint at either age 11 or 13.

Individuals with higher weight status and/or concerns about weight likely engage in restraint and related disordered eating behaviors (e.g. unhealthy dieting) in order to reduce intake and lose weight or prevent additional weight gain. This association has been noted in young girls. Shunk and Birch (2004), for example, reported that girls who were at risk for overweight at age 5 had higher on dietary restraint scores at age 9 and also reported lower dietary intake. The current study supports these findings as girls in the HW and HD clusters were also more likely to be overweight at age 9 and to have higher restraint scores at ages 11 and 13. Results of the current study also correspond with growing evidence that overweight in girls associated with dieting and dietary restraint behaviors. Several studies have found positive associations between weight status in young girls or adolescents and dieting behaviors (Field et al., 2003; Hill & Pallin, 1998; Sinton & Birch, 2005) and both Burrows and Cooper (2002) and Crow et al (2006) reported that overweight girls had higher levels of dietary restraint or dieting in comparison to non-overweight girls.

Girls in the HW and HD clusters reported not only higher dietary restraint scores than girls in the LR clusters but also reporter greater appearance and weight-related body dissatisfaction at ages 11 and 13. Other studies have found similar longitudinal associations between body dissatisfaction and dietary restraint (Davison et al, 2003) and disordered eating scores (Killen et al., 1994, 1996; Ohring et al., 2002) and theorists

indicate that disordered eating is used as a means to address and reduce concerns about weight and appearance (Stice & Shaw, 2002). Therefore, that girls in the two risk clusters had higher dietary restraint scores indicates that young girls may actively attempt to control their weight and their concerns about appearance through dietary restraint. However, there is growing and consistent evidence that restraint and dieting are not associated with weight loss but with weight gain over time (Field et al., 2003; Lowe et al., 2006; Stice et al. 2005); in support of this, girls in both the HW and HD clusters continued to have significantly higher BMIs and greater fat mass at ages 11 and 13 and did not gain less weight over time than girls in the LR cluster despite indicating that they used greater dietary restraint at ages 11 and 13.

Elevated internalizing symptoms among girls in the HD cluster may have also influenced dietary restraint scores. Martin et al (2000) found negative emotionality to be associated with early adolescent girls' Body Dissatisfaction and Drive for Thinness scores on the Eating Disorders Inventory and Hill and Pallin (1998) found lower self-concept scores to be associated with girls' dieting awareness. Other research has found that girls' depression scores independently and as part of an interaction with girls' BMIs contributed to the prediction of girls' dieting scores (Sinton & Birch, 2005). In the current study, although girls in the HD cluster did not have the highest BMIs, BMI was associated with higher depression scores and this association was in turn associated with higher dietary restraint scores at ages 11 and 13. Continued examination of the role of depression in the development of dietary restraint is needed.

Examination of broader sociocultural trends provides insight into the association between membership in either the HW or HD clusters and greater weight concern, body

dissatisfaction, and dietary restraint scores. In general, current appearance standards promote the "thin ideal" and these messages seem to be so pervasive that young children report bias against overweight children (e.g. Musher-Eizenman, Holub, Miller, Goldstein, & Edwards-Leeper, 2004). Young girls are aware of and influenced by these messages so that they may live in a "culture of thinness" (Levine et al., 1994) where body dissatisfaction and related dieting behaviors are normative (Rodin, Silberstein, & Striegel-Moore, 1984). Gender differences in body dissatisfaction also emerge by middle childhood (Lowes & Tiggemann, 2003; Thelen, et al., 1994) so that girls are more likely to perceive themselves as overweight (e.g. Field et al., 2001; 2005) even though the prevalence of overweight is higher for boys (Field et al.; Ogden et al., 2006). Perceiving oneself to be overweight, and/or being overweight, in turn increases risk for dieting behaviors and body dissatisfaction (Ackard & Peterson, 2001; Boutelle et al, 2002; Crow et al, 2006; Stice & Whitenton, 2002; Vander Wal & Thelen, 2000a). Therefore, girls in this study were already at risk for greater concerns about weight and appearance by age 9 and the girls in the HW and HD clusters appear to have been at increased risk for body dissatisfaction and restraint behaviors because of their weight status.

In regard to the role of specific contextual influences on girls' weight concern scores in the current study, girls in the HD and HW clusters had mothers and fathers who reported greater encouragement of weight loss than parents of girls in the LR cluster so that these girls were exposed to more comments about their weight and were encouraged to reduce their weight. In addition, parents of girls in the HW cluster reported greater interparental conflict about daughter's overweight so that girls in this cluster, who also perceived more conflict about their weight between their parents, may have been

distressed by their weight because it caused conflict between parents. Girls in the HDH cluster also perceived more interparental conflict about food and weight and also felt more self-blame for parental conflict, indicating that they may have attributed some blame about parental conflict to their weight status, leading to increased concern about weight. In general, then, girls in the HW and HD clusters were exposed to more comments and conflict directly related to their weight, which likely heightened their focus on and distress about their weight. These contextual influences explain, in part, why girls in these two clusters were reported greater weight concern, body dissatisfaction, and dietary restraint at ages 11 and 13. These findings correspond with earlier work indicating that parents reinforce cultural messages about weight and appearance and that parental comments about girl's weight and promotion of weight loss behaviors and/or dieting are associated with higher weight concern and body dissatisfaction in girls (Baker et al., 2000; Hill & Franklin, 1998; Pike & Rodin, 1991; Smolak et al., 1999).

Unhealthy Dieting Practices. While most girls who reported use of dieting behaviors report generally healthy dieting (i.e. increased exercise, increase fruit/vegetable intake, decrease snacking), a small percentage of girls also reported using unhealthy dieting strategies (i.e. skipping meals to control weight, use of laxatives and diuretics) as a means to lose weight or prevent weight gain. In the current study, approximately 18% of the total sample was classified as unhealthy dieters. The most common unhealthy dieting strategy among girls in the current study was skipping meals; girls also reported using meal supplements and appetite suppressants to lose weight or prevent weigh gain. These rates correspond with other larger scale studies examining dieting practices in

adolescent females: French et al (1995) reported 15% of high school females to be using unhealthy dieting behaviors and a report from the Center for Disease Control (CDC; 2000) found 18.8% of girls reported skipping meals and about 10% reported using appetite suppressants or some form of meal replacement. Of interest, rates of unhealthy dieting behaviors increased among girls from 1999-2004 (Neumark-Stzainer, Wall, Eisenberg, Story, & Hannan, 2006), indicating the importance of assessing these behaviors and studying how these specific behaviors emerge.

As with body dissatisfaction and dietary restraint, cluster membership was associated with use of unhealthy dieting practices at age 13. Results revealed that, relative to the LR cluster, girls in the HW were 5 times as likely and girls in the HD cluster were 4 times as likely to report use of at least one unhealthy dieting practice. The association between cluster membership at age 9 and unhealthy dieting at age 13 extends the findings from prior studies, which indicated an association between overweight, perceived overweight and concerns about weight, and unhealthy dieting in adolescent females (Krowchuk, Kreiter, Woods, Sinal, & DuRant, 1998; Middleman, Vazquez, & Durant, 1998; Serdula et al., 1993). Additional research has found an association between adolescent depressive symptoms and unhealthy weight control behaviors (Fulkerson, Sherwood, Perry, Neumark-Sztainer, & Story, 2004) and results of this study indicate that depressive symptoms prior to adolescence may also influence later use of unhealthy weight control behaviors for some girls.

Several studies have found that unhealthy or other severe dieting is associated with additional disordered eating behaviors (Krowchuk et al, 1998; Neumark-Sztainer & Hannan, 2000; Neumark-Sztainer et al, 2006; Patton, Selzer, Coffey, Carlin, & Wolfe,

1998) similar to the finding in the current study that girls reported simultaneously higher restraint and, for girls in the HD cluster, greater binge eating. Unhealthy dieting behaviors reported in the current and prior studies likely reflect more extreme forms of restraint (in response to weight status and weight concerns and/or binge eating) and are similarly influenced by the previously described sociocultural and family influences on appearance and weigh concerns. Findings from this and other studies indicate that it is useful to not only assess broad disordered eating behaviors, such as binge eating, restraint, and related attitudes, but to also survey specific dieting behaviors, particularly given recent evidence that unhealthy dieting predicts binge eating and purging over time (Neumark-Sztainer et al.). In addition, girls in this study who were classified as unhealthy dieters also reported using healthy dieting behaviors (e.g. increased exercise, decreased snacking, increased fruit intake) so that unhealthy dieting behaviors were used along with healthy behaviors, indicating the need to examine how girls incorporate unhealthy dieting practices with healthy dieting behaviors. Future studies should examine why girls use unhealthy dieting behaviors and if use of unhealthy dieting behaviors follows on earlier use of healthy dieting behaviors.

Binge Eating and Emotional Eating. Only girls in the HD cluster had significantly higher binge eating and emotional eating scores than girls in the LR cluster. Prior studies have indicated that affective disturbance may be associated with binge eating in adolescent females (e.g. Stice, 1998; Stice et al., 2002) and results of this study support this. While it is not clear if it was solely the depressive symptoms or the combination of these symptoms with weight concerns and slightly elevated weight status at age 9 that influenced the these higher scores, it is noteworthy that girls in the HW

cluster, who had higher BMIs and similarly high weight concerns at age 9, did not have higher binge eating or emotional eating scores in comparison to girls in the LR cluster. It is likely then that binge eating is in part influenced by negative emotional states and may be triggered by emotions or emotional eating (Stice & Agras, 1998; Stice et al., 1998; Stice et al., 2002; Van Strien, Engels, Van Leeuwe, & Snoek, 2006). Results of this study confirm associations between depression and binge eating previously found in adults (Heatherton, Polivy, & Herman, 1991) and older adolescents females (Stice et al., 2002) and indicate that this association is present in early adolescent girls.

Elaborating on the role of depression in the etiology of binge eating, researchers have suggested that binge eating may provide an escape from or distraction from negative emotions (Heatherton et al., 1991; Stice et al., 2002). This association may be amplified by girls' level of dietary restraint. As reviewed by Polivy and Herman (2005), restrained eaters may engage in binge eating behaviors in response to feelings of depression (van den Berg, Thompson, Obremski-Brandon, & Coovert, 2002). Restrained eaters and dieters may be particularly at risk for overeating and binge eating when distressed (ego-threatened) (Heatherton et al.; Polivy & Herman, 1985), although support for the association between dietary restraint and binge eating has been questioned (Stice, 1998). As girls who had elevated binge eating and emotional eating scores also had elevated restraint and dieting behaviors, it is important to continue to elaboration on the association between dietary restraint and binge eating in young girls.

In accordance with a developmental psychopathology perspective, which highlights the need to elucidate contexts that may have increased risk for deviant outcomes, research on early childhood socialization experiences provides insight into

why depression and binge eating are associated with one another in girls. As will be more fully discussed later, at a young age girls are taught to control their emotions instead of displaying them, leading to internalized emotions (Crick & Zahn-Waxler, 2003; Hayward & Sanborn, 2002; Rutter & Sroufe, 2000). Socialization becomes intensified during adolescence (Hill & Lynch, 1983) and prior emotional states and behaviors may be heightened (Caspi & Moffit, 1991; Graber & Brooks-Gunn, 1996) and those who have not learned to appropriately express emotions and/or who internalize emotional reactions are at risk for depression (Crick & Zahn-Waxler). Without appropriate coping skills in place, binge eating may be used to reduce negative emotions, especially if individuals also report higher levels of dietary restraint (Heatherton et al., 1991). Providing girls with more appropriate emotion regulation skills may be one effective method for preventing disordered eating during adolescence.

Integration of Disordered Eating Results (Aims 1 and 2). Results of the present study indicate not only different patterns of disordered eating risk in pre-adolescent girls but that these girls, over time, engage in multiple disordered eating behaviors. Girls in the HW and HD did not differ on dietary restraint, body dissatisfaction (appearance and weight-related), or use of unhealthy dieting strategies but did differ on binge eating and emotional eating. Examination of the correlations among the relevant disordered eating constructs indicated that dietary restraint, binge eating, emotional eating, and appearance and weight-related body dissatisfaction were positively correlated with one another at each age (see Tables 6a and 6b). These associations provide an explanation for why more specific differences on disordered eating were not found between the HW and HD clusters. These associations have implications for how to define and prevent early

adolescent disordered eating as results indicate that it is important to assess multiple forms of disordered eating.

Girls in the HW and HD clusters had similar levels of body dissatisfaction, dietary restraint, and use of unhealthy dieting at ages 11 and 13, indicating that the similarly elevated BMIs and weight concern scores among girls in these two clusters may have influenced these disordered eating outcomes. These associations are likely to be highly influenced by current appearance standards, obesity stigmatization, and general pressure to be thin. Therefore, even at a young age, girls appear to be at risk for not only being influenced by these messages but also appear to be acting on them in potentially unhealthy ways. In contrast, elevated binge eating and emotional eating scores may have been influenced by girls depression, as only girls in the HD cluster had significantly higher emotional and binge eating scores at ages 11 and 13. Girls in this cluster in general reported more psychosocial problems, including greater weight concern, body dissatisfaction, depression, anxiety, and poorer self-concept, and their engagement in binge eating and emotional eating may be a poorly developed coping mechanism resulting from early socialization experiences and from feelings of distress (Heatherton et al., 1991; Humphrey, 1986).

Girls in this study, particularly girls in the HD cluster, may be at increased risk for future eating and psychological problems throughout adolescence, particularly if binge eating, depression, and dietary restraint co-occur (Grilo, 2003; Stice & Agras, 1998). In general, early use of disordered eating behaviors sets girls on a trajectory leading to more chronic and severe eating pathology over time (Shisslak, Crago, & Estes, 1995) so that girls in HW and HD clusters, who reported disordered eating at an early age, may be at

greater risk for later adolescent eating problems. In addition, girls in this study reported use of dietary restraint and unhealthy dieting behaviors, which are associated with weight gain and overweight (Crow et al., 2006; Field et al., 2003). In addition, girls who reported higher binge eating scores in this study may be at risk for later alcohol and substance use problems as bulimic behaviors appear to confer risk for these problems (Bulik & Sullivan, 2001). Therefore, girls in the HW and HD clusters may be at greater risk for additional physical and psychosocial problems; additional longitudinal examination of the effects of early adolescent disordered eating on later adolescent developmental outcomes is needed.

Aim 3: Puberty and Risk for Disordered Eating

Stability of Disordered Eating Risk during Early Adolescence. The transition to puberty is associated with heightened levels of disordered eating risk; girls gain more weight, particularly fat mass and report greater body dissatisfaction and increased feelings of depression (Graber & Brooks-Gunn, 1999). Therefore, this transition may influence stability in weight status, weight concern, and depression between ages 9 and 13. To address this, additional analyses examined cluster differences on BMI, weight concerns, and depression from ages 9 to 13 and also examined if early pubertal development at age 11 was associated with these three constructs.

Repeated measures ANOVA results indicated that girls in the LR cluster continued to have the lowest BMIs and lowest weight concern scores at ages 11 and 13. In addition, girls in the HD and HW clusters both continued to have elevated weight concern scores over time. Girls in the HD cluster had lower BMIs than girls in the HW

cluster at ages 9 and 11, but they no longer differed in BMI from girls in the HW cluster at age 13. Finally, while girls in the depression score continued to have the highest depression scores at each time, these scores decreased slightly over time. Therefore, clusters continued to have the same pattern of differences on weight status, weight concern, and depression over time, except that girls in the HW and HD clusters did not differ significantly on weight status at age 13.

Girls in all three of the clusters had increased weight concerns between ages 9 and 13. This corresponds with prior work indicating that concerns about weight and appearance emerge during early adolescence when girls tend to place an increased value on physical appearance (Harter, 2006) but also put on more weight and fat mass (Graber et al., 1999). Therefore, even though girls in the LR cluster continued to have lower weight concern scores at each age relative to girls in the other clusters, these girls did report increasing concerns about their weight. Similarly, girls in the HW and HD clusters, who had the highest weight concern scores at age 9, continued to have the highest weight concern scores at ages 11 and 13 and these concerns increased during early adolescence. This suggests that girls in this study generally experienced increased concerns about weight between ages 9 and 13.

A different trend was associated with girls' depression scores. Girls in both the LR cluster and HWHWC clusters did not have scores that markedly increased from ages 9 to 13 while scores associated with the HD cluster decreased slightly. This corresponds with work from Angold, Erkanli, Silberg, Eaves, and Costello (2002) who found that depressive symptoms in girls either decreased or did not increase between ages 9 and 11; this decrease may reflect a change in the latent structure of measures of depression in

children, which may only assess a stable dimension of depression once children enter adolescence (Cole & Martin, 2004). In addition, internalizing symptoms are expected to increase in females from early to mid-adolescence (Ge, Natsuaki, & Conger, 2006; Noelen-Hoeksema, 2001) so that heightened internalizing symptoms may not emerge until further into adolescence, once pubertal development is complete. However, it is also possible that these girls will not experience increased internalizing problems as not all girls experience increases in depression, anxiety, or decreases in self-esteem (e.g. Kelly, Wall, Eisenberg, Story, Neumark-Stzainer, 2005). This could be because additional processes associated with girls in the LR and HW clusters, such as less frequent parental conflict, higher parental monitoring, and/or high levels of social support, protected against internalizing problems in girls (discussed later). In addition, as the data in this study are longitudinal, girls may have been influenced by social bias (Jorm, Duncanjones, & Scott, 1989) and developed the cognitive skills to better understand and interpret questions about emotions and emotional states (Rolland, Farnill, & Griffiths, 1997; Wood, Becker, & Thompson, 1996). It would be useful to determine if the decreases in these scores reflect actual decrease in symptoms over time or if girls continue to have other internalizing or externalizing problems to indicate that problems are present, even if self-report measures suggest otherwise.

However, while the patterns of difference on weight status, weight concern, and depression were similar over time, the latent structure related to these risk factors changed between ages 9 and 13. Correlations among weight concerns, BMI, and depression became stronger from ages 9 to 13 so that the underlying associations among these variables would be expected to change. In accordance with the changing

associations among these three constructs, the latent structure related to these risk factors changed between ages 9 and 13. At each age there was a cluster containing girls with lower BMIs, lower weight concern scores, and lower depression scores (lower risk (LR) cluster). In regard to elevated risk for disordered eating, the pattern of risk factors in the two additional risk groups changed so that there was a cluster containing girls with slightly elevated BMIs and weight concern scores (moderate risk (MR) cluster) and a cluster containing girls with high BMIs and high weight concern and depression scores at age 13 (high risk (HR) cluster). In other words, the risk patterns at age 13 reflected a progression of risk ranging from low to high risk that differed from age 9 risk patterns.

Early pubertal development influenced changes between age 9 and age 13 cluster patterns. Logistic regression results revealed that girls in either the MR and HR risk clusters were more likely to have been classified as an early developer at age 11 relative to girls in the age 13 LR cluster. Additional analyses indicated that early developing girls reported higher weight concern scores and depression scores at age 13, and had higher BMIs at ages 11 and 13 and the finding that early developing girls were more likely to be classified in the middle or high risk clusters at age 13 corresponds with these differences. Early pubertal development, then, appeared to be associated not just with increases in weight concerns and internalizing symptoms but also with how these constructs were associated with one another. This change in the latent structure relevant to the disordered eating risk factors suggests that patterns of risk for disordered eating may change from middle childhood through early adolescence and that this change may be due in part to early pubertal development.

Pubertal Development and Disordered Eating. An additional aim of this study was to examine associations between girls' pubertal development at age 11 and multiple disordered eating behaviors and attitudes at ages 11 and 13. Additional analyses also examined if early developing girls differed on the relevant disordered eating risk factors. The examination of the association between early pubertal development and both disordered eating risk factors and actual disordered eating behaviors was done to better understand the direct and/or indirect influence of early pubertal development on early adolescent disordered eating.

In regard to disordered eating behaviors, early pubertal development was associated only with dietary restraint scores at age 11 and binge eating scores at age 13; early developing girls had higher restraint scores at age 11 and higher binge eating scores at age 13. Early and later developing girls did not differ on dietary restraint at age 13, binge eating at age 11, and emotional eating scores at either age, and early developers were no more likely to be classified as unhealthy dieters relative to later developing girls. The differences on dietary restraint and binge eating scores at different ages suggests that pubertal development may impact different disordered eating behaviors at different times during adolescence. Clearly, additional examination and clarification of how puberty does and does not influence disordered eating behaviors is necessary and if these associations vary depending on type of disordered eating behavior considered and when such outcomes are assessed.

Of interest, results support the contention that early pubertal development is associated with increases in body dissatisfaction, weight gain, and depression, which in turn increase risk for disordered eating behaviors. Early developing girls did report

greater weight and appearance related body dissatisfaction at both ages 11 and 13. These findings correspond with other studies that have found early pubertal development to be associated with increased body dissatisfaction (Graber et al., 1994; Ohring et al., 2002). In addition, relative to later developing girls, early developing girls had higher depression scores and higher weight concern scores at age 13; indicating that early development at age 11 set in motion increased internalizing problems and weight concerns by age 13. In addition, as previously mentioned, early pubertal development was associated with age 13 cluster membership; relative to girls in the age 13 LR cluster, girls in the middle risk cluster were 3 times as likely, and girls in the high risk cluster were 6 times as likely, to have been classified as an early developer at age 11. Therefore, though age 11 early maturation was not associated with risk for disordered eating in general, early development was associated with increased disordered eating risk factors and with membership in the age 13 clusters.

Summary. To summarize, findings from this study therefore suggest that early pubertal has influences risk factors associated with disordered eating (e.g. body dissatisfaction and depression) but may have limited influence on actual engagement in disordered eating during early adolescence. Early pubertal development influenced level of disordered eating risk at age 13; girls who were early pubertal developers were more likely to be at elevated risk for disordered eating at age 13 relative to girls who were later developers. Early pubertal development was also associated with higher BMIs, higher weight concern scores, higher body dissatisfaction scores, and higher depression scores at age 13. However, though early pubertal development was associated with these disordered eating risk factors and with cluster membership, early pubertal development

was not, in general, associated with disordered eating at ages 11 and 13. Overall, these findings imply that early pubertal development may elevate risk for disordered eating indirectly through an association with increased internalizing problems and appearance concerns during early adolescence. This supports work from Stice, Presnell, and Bearman (2002) who found that body dissatisfaction and dieting mediated the association between pubertal status and eating disorder symptoms in adolescent girls and corresponds with Koff and Rierdan's (1993) conclusion that it may be psychological reactions, such as increased concerns about appearance, as opposed to the actual physical changes that occur during puberty, that promote eating disturbance in adolescent girls.

Aim 4: Family Environment and Disordered Eating Risk Factors

An additional aim of this study was to provide a broader description of how the disordered eating risk clusters varied on additional family environment characteristics and parental behaviors. This study extends prior research that has examined the role of the family environment on disordered eating by revealing how disordered eating risk factors may emerge in response to different family contexts and influences.

Results from this study suggest that several aspects of the family environment may be associated with different patterns of disordered eating risk variables. Constructs related to parental conflict, parenting behaviors, and specific behaviors surrounding food and weight, as well as parental overweight, were associated, in varying ways, with cluster membership. In particular, weight and food related constructs differentiated girls in the HD and HW clusters from girls in the LR cluster. Family dysfunction variables additionally differentiated the girls in the HD cluster from girls in the LR cluster. Although causal relations were not examined in the current study, these associations

support past research and provide some potential explanations for how girls came to be associated with different patterns of disordered eating risk at age 9.

Family Environment and Weight Status. In line with other research, parental overweight was associated with membership in the HWHWC cluster. Fathers of girls in this cluster were 3 times as likely to have been classified as overweight in comparison to fathers of girls in the LR cluster and mothers of girls in the HW cluster were 2.4 times as likely to be overweight in comparison to mother of girls in the LR cluster. Girls in the HD and HW clusters were also more twice as likely to have both parents classified as overweight. Other studies have found parental weight status to be associated with child weight status (Stice et al., 2005) and for bulimic behaviors (Fairburn et al., 1999). Therefore, current findings imply that concern about the effects of child and adolescent overweight and disordered eating should extend to consider the impact of parental overweight as it pertains to risk for disordered eating.

The association between parent and daughter weight status in this and other studies is likely influenced by both genetic and environmental factors. However, as reviewed by Davison and Birch (2001) who proposed a contextual model for understanding childhood overweight, non-genetic factors present within the family environment can influence development of overweight in children. These influences include dietary intake and physical activity patterns, child feeding practices, and the modeling of healthy and unhealthy eating and exercise behaviors. As has been suggested, programs targeting overweight in children should focus on families in order to be more effective. Such efforts aimed may then reduce risk for disordered eating.

Family Environment and Girls' Weight Concerns. Similar to studies that have found an effect for parental comments but not for modeling of maternal weight concern and eating behavior (e.g. Baker et al., 2000; Smolak, et al., 1999; Thelen & Cormier, 1995), the current study found that both maternal and paternal encouragement of weight loss scores differed among clusters while maternal and paternal weight concern scores did not. Specifically, both mothers and fathers of girls in the HW cluster reported greater encouragement of daughter's weight loss in comparison to mothers and fathers of girls in the depression and LR clusters; mothers, but not fathers, of girls in the HDcluster also reported greater encouragement of daughter's weight loss in comparison to mothers of girls in the LR cluster. Parents' weight concerns, though, did not vary across clusters.

Several studies have reported similar associations between parental comments about child weight and appearance and girls' weight concerns and risk for disordered eating. For example, one study found that adolescent girls who perceived that their thinness was important to their mother were more likely to be concerned about being thin and to be more frequent dieters (Field et al., 2004); another study found messages about weight loss from mothers be associated with increased use of weight loss strategies in girls (McCabe & Ricciardelli, 2005a). Smolak et al. (1999) also found that maternal comments about child's weight were associated with weight concerns among elementary school age girls and Thelen and Cormier (1995) found maternal and paternal encouragement of weight loss to be associated with young girls' weight control behaviors and desire to be thinner. Therefore, as girls in both the HD and HWclusters were concerned about their weight and maternal and paternal encouragement were significantly correlated with girls' BMI it is likely that girls' weight status promoted

girls' weight concerns both directly and also indirectly by eliciting parental encouragement of weight loss. However, as previously discussed, there is growing evidence that dieting actually increases risk for weight gain in children and adolescents (Field et al., 2003). Parents, then, should be informed of this risk and should instead encourage and model healthier eating and promote physical activity among family members.

In addition, parents of girls in the HW cluster reported greater conflict about daughter's overweight and girls in this cluster and the HD cluster reported similarly higher levels of parental conflict about food and weight. The finding about conflict about daughter's overweight is novel as no other study has examined this aspect of parental conflict in this manner; the finding suggests that daughter's weight status is a salient issue to not just the parent-child relationship but also to the marital relationship. Together, the findings pertaining to parental encouragement of weight loss as well parent and girl reports of interparental conflict about daughter's overweight, suggests that young girls with higher BMIs may be inadvertently exposed to pathological environments that focus girls on weight and appearance (Waller & Calam, 1994; Levine et al., 1994).

With respect to possible reasons why weight and food related conflict was relevant to cluster membership in this study, girls are more likely to internalize their reactions to parental conflict and feel more blame for conflict (Crick & Zahn-Waxler, 2002), and conflict centered on child characteristics and/or parent child-rearing behaviors, such as conflict related to child weight status and eating practices, may be particularly associated with internalizing reactions (Block, Block, & Morrison, 1981; Grych & Fincham, 1992), such as the heightened concern about weight and depression

noted in these clusters. Following Grych and Fincham's cognitive-contextual framework, it is possible that girls experienced greater weight concerns if they attributed parental conflict to their weight and physical appearance. In support of this, girls in the HD not only perceived more parental conflict about girl's overweight but also reported feeling greater self-blame for parental conflict. In addition, prior research has found that negativity surrounding meals or a heightened emphasis or tension surrounding appearance within the family heighten risk for disordered eating (Davis et al., 2004; Lalibertè et al., 1999; Miller, 1993; Neumark-Stzainer et al., 2004; Worobey, 2002). This study adds to this area of research by suggesting that parents do engage in conflict over daughter's elevated weight; more specifically, parents of girls in the HW cluster indicated that they argued over daughter's eating the wrong kind of foods, eating at the wrong time of day, and/or about daughter weighing too much. Furthermore, girls in the HW and HD clusters indicated that they were exposed to such conflict and exposure to parental conflict, particularly conflict about child behaviors and characteristics, appeared to increase risk for higher weight concern.

Though maternal and paternal encouragement of daughter's weight loss and conflict over daughter's elevated weight did distinguish girls in the HW and HD clusters from girls in the LR cluster, maternal and paternal weight concern scores were not associated with cluster membership at age 9. The finding for fathers is not surprising as there is little indication that paternal weight concern would influence child's weight concern; other studies, though, have found an effect for maternal influence on girl's weight concern (Hill & Franklin, 1998; Pike & Rodin, 1991). However, these studies

often used adolescent samples and it may be that adolescent girls, but not pre-adolescent girls, are more aware of and influenced by maternal weight concerns.

In addition, as suggested by Pike and Rodin (1991), mothers weight concerns and eating problems may be evident in their comments and concerns about their daughter's weight and appearance; this may be true for fathers as well. In the current study, maternal weight concern scores were positively associated with their encouragement of daughter's weight loss (r =.20, p = .01); a similar association was present between paternal weight concern scores and reports of encouragement of weight loss (r =.26, p < .001). Results of this study indicate the importance of considering both maternal and paternal influence on girls' weight concerns as both data from both parents was associated with cluster membership. Related to this, the effect size for paternal encouragement of weight loss (.15) was stronger than that for maternal encouragement (.08), indicating that fathers may exert a stronger influence than mothers on young girls' weight concerns. This corresponds with theories indicating that paternal concern with daughter's physical attractiveness may have specific influence on girls' developmental outcomes and risk for disordered eating (Bruch, 1973; Minuchin & Baker, 1993).

Family Dysfunction and Risk for Disordered Eating. Similar to the findings for parental weight concern, parental depression scores were not associated with cluster membership in the current study. Additional parental behaviors and family characteristics, though, did again distinguish clusters from one another. The current study found multiple aspects of marital conflict, including greater frequency and self-blame and parental use of psychological control to be associated, in different ways, with membership in the risk clusters. In contrast, greater resolution of conflict and higher

levels of parental monitoring were associated with membership in the LR cluster. These different experiences with parental conflict and parenting behaviors mirror past studies that have found conflict and psychological control to be associated with internalizing symptoms and provide particular insight into why one subset of girls reported elevated depression scores at age 9.

Girls with the highest depression scores at age 9 (HD cluster) reported more frequent parental conflict at ages 7 and 9, adding to a body of research indicating that parental conflict increases risk for internalizing problems in children. In general, family conflict is considered a stressor that arouses negative affect (Cummings, 1987) and chronic exposure may maintain elevated internalizing symptoms over time. From a biological perspective, long-term exposure to frequent conflict may lead to greater release of stress hormones (Gunnar, 1998; Repetti, Taylor, & Seeman, 2002) and consistently high levels of corticosteroids reduce the development of emotion regulation (Gunnar), leading to internalizing symptoms and problems over time. In addition, chronic exposure to conflict and consistently feeling threatened by conflict increases depression and anxiety over time and leads to increased likelihood that children will continue to feel threatened by conflict (Grych, Harold, & Miles, 2003); this may explain why girls in the HD, who reported more frequent parental conflict at more than one occasion, had more internalizing problems at ages 7 and 9.

Girls in the HD cluster further differed from girls in the LR cluster on additional components of interparental conflict. For example, girls in the HD cluster reported greater self-blame for parental conflict. Such feelings of self-blame emerge from the causal attributions that children make (Grych & Fincham, 1992) so that attributions of

self-blame or feeling at fault for parental conflict increases risk for depression in children (Bennett et al., 2005; Grych, 1998). Results from the current study indicated that girls in HD cluster were exposed to more parental conflict focused on girl's elevated weight and eating behaviors so that girls may have perceived parental conflict to result from their higher weight status and/or eating behaviors.

In contrast to girls in the HD cluster, girls in the LR cluster perceived greater resolution of parental conflict and felt less threatened by parental conflict. Effective resolution of conflict within the family may indicate greater family warmth and support within family relationships (Maccoby & Martin, 1983; Steinberg, 1990) so that girls in these two clusters may have experienced different levels of warmth and emotional security within the family environment. In support of this, girls in the HD cluster did have lower maternal support scores and lower social support scores at ages 7 and 9 relative to girls in both the LR and HWclusters. Therefore, as prior research has revealed that conflict resolution and feelings of security within the family reduce risk for internalizing problems (Cummings, 1987; Davies & Cummings, 1994; Grych & Fincham, 1993), these differences on family conflict provide one reason for why girls in the LR cluster also had fewer internalizing symptoms than girls in the HD cluster at ages 7 and 9.

In addition to perceiving more parental conflict and feeling more threatened by such conflict, girls in the HD cluster, who had reported more internalizing problems such as depression and anxiety than girls in the LR cluster, also perceived greater use of psychological control relative to girls in the LR cluster. The association between membership in the HD cluster and increased internalizing symptoms corresponds with

earlier research which has revealed that parental use of psychological control increases risk for internalizing symptoms in children and adolescents (Barber, 1996; Barber et al., 2001; Pettit & Laird , 2002). Psychological control may also increase risk for bulimic behaviors; as previously noted, girls in the HD also had higher binge eating scores at ages 11 and 13 than girls in the LR cluster. Findings from this sample are similar to those reported by Tata et al (2001), who found parental use of over-control to be associated with disordered eating symptoms in adolescent girls. Humphrey and colleagues, who also found that girls who reported bulimic behaviors had parents who were more likely to undermine their daughter's self-assertion and autonomy, suggests that bulimic symptoms, particularly binge eating or overeating, arise in girls in response to the need to feel comfort and nurturance (Humphrey; Humprhey & Stern, 1988, Strober & Humphrey, 1987).

Girls in the LR cluster reported more parental monitoring, which may have protected girls against depression (Petit & Laird, 2003; Silk et al., 2001). In addition, girls in the LR cluster has lower weight concern scores than girls in both the HD and HW clusters and parental monitoring may have protected against early weight concerns in these girls. In support of this, Fonesca, Resnick, and Ireland (2001) found parental monitoring to protect against extreme dieting in girls and May et al (in press) found maternal monitoring to be associated with lower weight concerns in adolescent girls. It may be that non-intrusive parental monitoring and involvement in children's lives provides children with a sense of support and connectedness (Pettitt et al., 2001) that reduces risk for internalizing symptoms and disordered eating.

Clearly, delineating between parental psychological control and monitoring has implications for understanding risk and protective factors related to disordered eating. Future studies should elaborate on this and further consider the role of child disclosure and parental solicitation to further clarify the role of monitoring (Crouter & Head, 2002). There is recent evidence that psychological control is associated with internalizing problems across cultures and may equally effect boys and girls so that examination of this construct as a risk factor for disordered eating across different samples may be particularly useful (Barber & Harmon, 2001; Barber, Stolz, & Olsen, 2005).

Social Support and Disordered Eating Risk. In addition to generally perceiving more problematic family relationships, girls in the HD cluster had lower social acceptance scores at ages 7 and 9, so that these girls also felt generally less supported by and connected with parents, as well as with others, supporting prior research linking low support with internalizing symptoms (Ackard, Neumark-Stzainer, Story, & Perry, 2006; Lewinsohn et al., 1994; Windle, 1992) and disordered eating (Ackard & Neumark-Stzainer, 2001; Ackard et al.; Stice et al., 2002). Therefore, the association between social support, membership in the HD cluster, and engagement in restraint, unhealthy dieting, and binge eating in this study corresponds to previous findings. The findings reflect the "interpersonal vulnerability" component of Striegel-Moore and Cachelin's (1999) dual pathway model; this pathway suggests that inadequate parental nurturance influences self-evaluations and social interactions and feelings of body dissatisfaction and restraint arise in response to feelings of ineffectiveness (see also Littleton & Ollendick, 2003).

In contrast, girls in the HW cluster perceived equal levels of social acceptance in comparison to girls in the LR cluster. As mentioned, family acceptance and warmth may lead to greater resolution of conflict, which is also illustrated by greater perceptions of conflict resolution and low psychological control as reported by girls in the LR cluster. Several studies of risk and resilience in children have indicated that ability to seek out and maintain social contacts with others (e.g. extended family, peers, and teachers) serves as a protective factor (Werner, 1989; Masten, 2001). Of particular relevance to the current study, Nicolotti, El-Sheikh, and Whitson (2003) found that within exposure to marital conflict, girls' heightened ability to actively cope and find sources of social support was associated with fewer depressive symptoms. McVey, Peppler, Davis, Flett, and Abdolell (2002) also found that parental support was protective against feelings of stress in girls, leading to decreased risk for disordered eating. Therefore, it may be that feeling accepted by family and peers served as a protective factor for girls in the HW cluster, who may have otherwise been at risk for internalizing problems due to exposure to parental conflict, including conflict over daughter's elevated weight.

Integration of Family Environment Findings (aim 3). The discussed results provide an overview of how different family contexts influenced cluster membership at age 9. For example, girls in the LR cluster were exposed to fewer family factors that would have likely elevated their risk for overweight, weight concern, and depression. Instead, these girls were exposed to factors, such as conflict resolution, parental monitoring, and higher social support, which likely reduced their risk for weight concern and depression. In contrast, girls in the HD and HW cluster were exposed to factors that heightened their risk for weight concern. Specifically, girls in the HW cluster were more

likely to have an overweight parent and to be exposed to conflict and pressure surrounding their weight. These findings are of interest in that it was parental reports (as opposed to girl reports) of conflict about daughter's weight and their reports about encouraging weight loss, along with their weight status, that were associated with membership in this cluster. Therefore, the same environments that promoted overweight for girls in the HW cluster, either through genetic or environmental factors, were the same that are associated with these girls' weight concerns. This suggests that girls may be receiving mixed messages from parents about eating patterns, behaviors, weight loss, and weight concerns; these mixed messages may clarify why girls engaged in more restraint and unhealthy dieting over time but remained at risk for overweight.

Girls in the HD cluster also perceived more conflict about food and weight and had mothers who encouraged them to lose weight. However, girls in the HD cluster were exposed to additional factors that indicate general family dysfunction, including increased self-blame for parental conflict and exposure to more frequent parental conflict over time, poorer resolution of parental conflict, and greater parental use of psychological control. These additional experiences appear clarify why these girls reported greater depression at age 9. In general, girls in the HD cluster appear to have been exposed to processes that heightened both their weight concern and depression scores; these processes may then have set in motion early risk for the multiple disordered eating behaviors, particularly binge eating, that girls in this cluster reported at ages 11 and 13.

Effect of Gender Socialization on Risk for Disordered Eating

While results of the current study indicate that girls' weight status, weight concerns, and depression are 1) present in different patterns prior to adolescence, 2) associated with disordered eating behaviors and attitudes at ages 11 and 13, and 3) influenced by or associated with broader family contextual factors and additional individual characteristics, it is necessary to further examine a final underlying construct associated with the risk factors, disordered eating, and family environment: the role of gender. Specifically, though not a modifiable risk factor, examining the effects of gender is pertinent to understanding the development not just of disordered eating behaviors but also of the emergence of disordered eating risk factors.

Gender Socialization and Girls' Internalizing Problems. Several studies have examined gender differences in the development of psychopathology and have consistently found girls to be at greater risk for internalizing symptoms and problems (i.e. anxiety and depression). In the current study, there were subsets of girls at both ages 9 and 13 who had elevated internalizing symptoms. Girls, through socialization processes aimed to decrease aggressive responses in girls, are taught, more than boys, to consider how their behaviors and actions impact other people. This leads girls to be more focused on the reactions and emotions in other people and sensitizes girls to displays of negativity and conflict in others (Crick & Zahn-Waxler, 2003; Zahn-Waxler et al., 2000). Related to this, girls also experience feelings of distress and self-blame in response to conflict (Grych et al., 2003) which may explain why girls in the HD cluster, who perceived more parental conflict, also had higher depression scores than girls in the other clusters at age 9. Girls' heightened proclivity for internalizing symptoms and the influence that conflict within relationships may have on girls provides insight into why family conflict was, in

this study, associated with higher depression scores in some girls. The very qualities that are desired in girls may be the same that cause internalizing problems when girls are exposed to (or at least perceive that they are exposed to) greater stress and conflict within the family (Gore, Aseltine, & Colten, 1993).

Socialization and the Transition to Puberty. Previous sections highlighted the general increase in body dissatisfaction and depression among females during the transition to puberty; in the current study, concerns about weight increased across all three age 9 clusters throughout early adolescence and girls who were early developers were more likely that later developers to report greater body dissatisfaction, weight concerns, and depression by age 13. Gender socialization research additionally aides in understanding why these internalizing symptoms and appearance concerns may be heightened and more pronounced in girls during the transition to puberty. Nolen-Hoeksema and Girgus (1994) contend that girls carry more risk factors for depression in comparison to boys; if girls are socialized to respond with internalized behaviors throughout middle childhood and tend to react to conflict and interpersonal problems with feelings of anxiety, depression, and self-blame, then it is not surprising that girls carry forward such learned responses, along with already present internalizing problems, with them into adolescence. This explains why girls in the HD and HW clusters, continued to report more concern about their weight over time in comparison to girls in the LR cluster and also why girls in the HD cluster may have continued to have higher depression scores relative to girls in the other two clusters.

Interpersonal Orientation and Risk for Disordered Eating. Interpersonal orientation also heightens girls' receptivity to messages from others so that girls are also

more likely to accommodate and respond to others' wishes and to want to fulfill others' expectations (Crick & Zahn-Waxler, 2002). Therefore, that girls in the HD and HW clusters were not only exposed to more parental comments and conflict about girls' elevated weight, but were also more likely to have higher dietary restraint and unhealthy dieting behaviors during early adolescence may reflect a desire to reduce parental conflict about girl's weight and eating, as well as a desire to respond to parental encouragement of weight loss. Socialization processes and parental messages about appearance may create a pathological environment in which they are at risk for weight concern, body dissatisfaction, and disordered eating (Waller & Calam, 1992).

Objectification Theory and Weight Concerns in Girls. As mentioned above, girls may be exposed to a pathological environment in which internalizing symptoms and problems are promoted and appearance and weight concerns are promoted. However, despite the pervasive nature of these messages within normal developmental contexts, not all girls engaged in disordered eating behaviors or indicated elevated weight concerns or body dissatisfaction. As Frederickson and Rogers (1997) suggest, it may be that differences in self-objectification of the female body and exposure to objectification influence risk for disordered eating.

Several recent studies have indicated that self-objectification and body shame are associated with depressed mood, body dissatisfaction, and disordered eating (Frederickson, Roberts, Noll, Quinn, & Twenge, 1998; Tiggeman & Slater, 2001), all constructs that were associated with one another among girls in this study. Weight concerns may lead to depression over time if girls' self-evaluation and sense of worth become based on weight and appearance (Crocker & Wolfe, 2002); girls in the HD

cluster illustrate this point as they reported both generally negative self-evaluations but also more concerns about their physical appearance at age 9. The association between weight concerns and depression in girls in the HD cluster and the HR cluster at age 13 can be further understood as a product of socialization processes that emphasize and objectify the female body.

In recognition that the family context and that parental socialization occurs within a larger cultural environment, it may be that parents themselves, and not just the girls, are influenced by the broader objectification of the female body and the "culture of thinness" (Levine et al., 1994). Results from the current study revealed that girls were exposed to this "culture of thinness" through parental encouragement of weight loss and parental conflict over daughter's elevated weight. As described earlier, girls with higher BMIs were more likely to elicit parental encouragement of weight loss; this encouragement was associated with parents' weight concern scores, indicating that parental concerns about weight were manifest in their encouragement of daughter's weight loss. This corresponds with prior research indicting that parental investment in appearance and weight (Hill & Franklin, 1998; Pike & Rodin, 1991; Woody & Costanzo, 1986) increases risk for eating problems and weight concerns. Therefore, it is important to assess how parents to not just contribute to this culture of thinness but how their own internalization of cultural appearance standards and concerns about appearance influence their behaviors towards their daughters.

Summary. In regard to the current study, understanding the early emergence of internalizing symptoms in girls and that girls are influenced by tensions and stress within salient relationships provides further insight into the association between membership in

the HD cluster and perceptions of marital conflict and psychological control in the current study. In addition, girls' interpersonal orientation aides in explaining why girls may be responsive to parental comments about weight and appearance and why such some girls may, through a desire to please others, be more likely to engage in disordered eating over time. Finally, considering the broader sociocultural environment that influences both girls and their parents clarifies why parents may encourage daughter's weight loss and engage in conflict about daughter's weight and why girls weight concerns and depression are interconnected.

The described research on socialization, interpersonal orientation, and objectification, when considered together, suggest that these girls may be simultaneously exposed to several specific, gender-oriented expectations. The emergence of different patterns of depression and weight concerns indicates that girls may be differentially exposed to and influenced by these processes. Studies evaluating the emergence and development of disordered eating should include, within a broad developmental or developmental psychopathology framework, an examination of how early gender socialization behaviors may exacerbate risk for disordered eating in girls.

Limitations

There are some limitations within the current study that limit the conclusions that can be made. In general, the current sample was comprised of non-Hispanic Caucasian girls from the Central PA region so that results can not be generalized to other ethnic or cultural groups or to males. Future studies should examine if patterns of risk vary among these different groups and how such differences may influence patterns of disordered

eating during adolescence. In addition, effect sizes were generally small, likely because of the small sample size, as well as the likelihood that additional factors influenced disordered eating risk factors and behaviors. Additional constructs not considered in this study, such as sibling, peer, and media influences, contribute to the development of risk for disordered eating. In addition, this study relied on self-report data so that response bias on more sensitive topics, such as marital relationships, eating behaviors, and parenting styles, may have influenced findings. Finally, due to the study design, causal processes were not examined and it is likely that additional factors were also relevant to the emergence of disordered eating risk factors and that additional individual and contextual factors influenced engagement in disordered eating during early adolescence.

In regard to the use of cluster analysis and the patterning of disordered eating risk factors, it is likely that different results would have been found had different variables been included in analyses. Though weight status, weight concern, and depression were chosen because they are consistently associated with disordered eating, additional individual variables, such as anxiety, may have influenced different cluster results. Future studies may benefit from including additional or different risk variables in order to provide additional insight into patterns of disordered eating risk factors in girls. Related to this, the pattern of risk changed between ages 9 and 13, suggesting that the age 9 cluster pattern may not be stable over time.

Though differences were found on multiple disordered eating behaviors, differences on certain disordered eating behaviors, such as purging behaviors and more extreme dieting behaviors, were not found as no girls reported engaging in such behaviors. This may be due to response bias or that girls in the sample have not yet

engaged in these behaviors. In addition, the generally low prevalence of purging behaviors and related abuse of laxatives is low, making it harder to meaningful examine these behaviors in such a small sample. It should also be noted that recent studies have called into question the validity of self-report data on dietary restraint (Stice et al, 2005) so that the findings pertaining to dietary restraint in this study may be limited in their validity. Related to this, the measure of binge eating is limited in its ability to distinguish between perceived and objective loss of control when eating so that more detailed conclusions about binge eating are not possible. Finally, though meaningful differences were present across clusters, results may have been different if clinical interviews or assessments were used.

In regard to the effects of pubertal development, though findings from this study attempted to clarify how early pubertal development was and was not associated with disordered eating among girls, it is possible that additional aspects associated with pubertal development may influence disordered eating behaviors. For example, recent work from Klump et al (2006) indicates that hormones activated following pubertal development were associated with risk for disordered eating. Additional changes within the social environment and how parents and peers react to girl's pubertal development may also influence risk for disordered eating. Therefore, future studies should examine the interaction of both physical and contextual changes that may simultaneously occur during early adolescence and these interactions influence risk for disordered eating. Importantly, it is also necessary to note that additional longitudinal research is needed to determine if it was early pubertal development that influenced risk for disordered eating or if it simply the process of going through puberty, regardless of timing of such

development, that influences risk for disordered eating. It may be that later developing girls in this study will experience increased risk for disordered eating at a later point following pubertal development.

This study examined only certain components of the family environment that may increase risk for disordered eating risk factors. Additional variables are likely relevant to such risk. Given the findings pertaining to parental conflict and psychological control, it may be useful to include observational assessments of family interactions that may not be captured by self-report measures. Future studies would also benefit from studying not just parents but also the effect of siblings on risk for disordered eating. Few studies of disordered eating include sibling data yet it is likely that such an important developmental relationship would influence risk for disordered eating. Further, though not examined in this study, it is well established that peers and the media influence risk for disordered eating. In addition, it is possible that it was girls' depressed mood that caused girls to perceive and report heightened parental conflict and psychological control or that there were temperamental differences that made these girls more susceptible to conflict and negativity within the family environment.

Finally, this study focused only on early adolescence, when risk for disordered eating is just emerging. Further examination of how pre-adolescent characteristics do or do not influence later adolescent disordered eating are needed to more fully elucidate on the development of adolescent eating pathology. Such studies would benefit from also studying additional forms of psychopathology, such as anxiety disorders, personality disorders, and alcohol and substance use, in order to determine if patterns of co-morbidity

are influenced by pre-adolescent characteristics and/or how such co-morbid patterns influence disordered eating behaviors over time.

Implications and Future Directions

Results of the current study indicate that pre-adolescent characteristics are associated with multiple disordered eating behaviors during early adolescence. These characteristics were associated in different but meaningful ways across girls so that disordered eating risk was present in different ways in pre-adolescent girls. These patterns were then associated due varying degrees with girls' dietary restraint, binge eating, emotional eating, and appearance and weight-related body dissatisfaction, as well as use of unhealthy dieting strategies, at ages 11 and 13. Results of this study indicate not only that young girls are reporting use of unhealthy dieting and have elevated dietary restraint and binge eating scores in early adolescence but that it may be possible to detect risk for such behaviors during middle childhood. Further, such risk appears to be in part influenced by specific components of the family environment. This suggests several avenues for future research and, more importantly, for the detection and prevention of early disordered eating.

Findings from this study have implications for the manner in which to evaluate early risk for disordered eating. Given growing discontent with the applicability and developmental appropriateness of current eating disorder diagnostic criteria as it pertains to children (Garfinkel, Kennedy, & Kaplan, 1995; Nicholls, Chater, & Lask, 2000), it may be that focusing on more tangible risk factors, such as childhood overweight, as well as screening for early weight concerns, may be a feasible and practical focus for

disordered eating prevention. In addition, results of this study indicate the importance of evaluating disordered eating behaviors among girls who report elevated internalizing symptoms as these girls appear to be a particular risk for a number of pathological eating behaviors at a young age.

Results revealed that risk for disordered eating was influenced by specific contextual factors, including parental conflict, parental encouragement of weight loss, parental overweight, parental conflict over daughter's elevated weight, and parental use of psychological control, so that risk for disordered eating is influenced through normative relationships and processes within the family. Given the role of family conflict and parenting behaviors in the development of internalizing problems, and possibly of binge eating, it may be additionally appropriate and necessary to target children, particularly girls, from dysfunctional families. Continued examination of the effects of marital conflict and psychological control on risk for disordered eating is needed but results of this and other studies do indicate that such constructs do increase risk for anxiety and depression in girls, which may in turn influence disordered eating behaviors. It could be potentially useful, in terms of more targeted and focused examination of the role of family conflict on risk for disordered eating, to study families in some sort of counseling for marital or family problems and/or to consider examining the effect of divorce on risk for disordered eating.

In addition, results further support the need to address and prevent childhood overweight and obesity and to also address elevated concerns about weight and appearance among girls. At both ages, cluster analysis results indicated two "at-risk" clusters which were both defined, in part, by elevated BMIs and high weight concern

scores. Given that rates of childhood overweight continue to increase (Ogden et al., 2006) and elevated weight status is associated with risk for multiple forms of disordered eating, reducing childhood overweight will likely reduce rates of adolescent disordered eating, which also appear to be increasing (Neumark-Stzainer et al., 2006). As elevated weight status increases risk for unhealthy dieting and overeating, which in turn increases risk for additional weight gain and overweight, it is possible that disordered eating will become part of a cycle of weight gain and unhealthy eating among adolescent girls. To prevent such cycles of weight gain and unhealthy dieting, girls need to be taught healthy approaches to weight loss, such as healthy eating patterns and increased physical activity, and should also be made more aware that unhealthy dieting behaviors do not aide in weight loss. Such efforts should target families so that parents and other family members become involved in and model a healthier lifestyle.

Related to this, there is a growing need to address weight and appearance concerns among girls. Results from this study revealed that these concerns were present in girls prior to adolescence, that these concerns increased for all girls over time, and that these concerns were associated not just with pre-adolescent characteristics but also with early pubertal development. Therefore, multiple normative characteristics and processes independently influence increase vulnerability for increased body dissatisfaction in early adolescent girls. Weight concern was associated with risk for multiple forms of disordered eating so that, as Stice (2002) indicated, weight concern and body dissatisfaction may a robust predictor of disordered eating. Prevention efforts that target weight and appearance concerns need to begin during middle childhood and should continue throughout early adolescence.

Finally, results from this study indicate that young girls are at risk for a number of disordered eating behaviors, including dietary restraint, binge eating, and unhealthy dieting. Therefore, prevention programs aimed at reducing disordered eating in girls need to broadly target multiple eating problems. In addition, evaluations of such programs should screen for multiple forms of disordered eating behaviors and attitudes in order to determine which behaviors are and are not reduced through prevention programs.

CONCLUSION

Results from the current study revealed that pre-adolescent characteristics do confer risk for multiple disordered eating behaviors during early adolescence. In addition, risk for disordered eating was present in different patterns among pre-adolescent girls and these patterns were associated with different disordered eating behaviors during early adolescence. Use of cluster analysis proved to be useful approach to examining how disordered eating risk factors are associated with one another in young girls.

Results also indicated that specific components of the family environment heighten risk for disordered eating in young girls. Examination of multiple constructs related to parental conflict, parenting behaviors, and parent characteristics distinguished risk groups from one another. Of interest, results suggested that parental monitoring, effective resolution of parental conflict, and elevated perceptions of social support may serve as protective factors in regard to the development of early risk for disordered eating. Findings also highlight the importance of including multiple reporters, including fathers, in studies of disordered eating risk as data from mothers and fathers provided further insight into the development of girls' weight concerns.

Of note, results revealed that both pre-adolescent characteristics and early pubertal development may separately increase risk for disordered eating, so that continued elaboration on the multiple pathways that influence disordered eating is warranted. Results have implications for how we should think about risk for disordered eating as it emerges and is manifest in young girls and highlight the importance of evaluating how pre-adolescent characteristics and experiences impact risk for early

adolescent disordered eating. Finally, findings imply that early adolescent girls may be at risk for a number of disordered eating behaviors and that girls may engage in multiple disordered eating behaviors during this time so future studies should assess multiple forms of disordered eating in order to more accurately describe and evaluate the etiology of early adolescent eating pathology.

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Appendix A

Figure 4

Standardized Clustering Variables by Cluster Membership

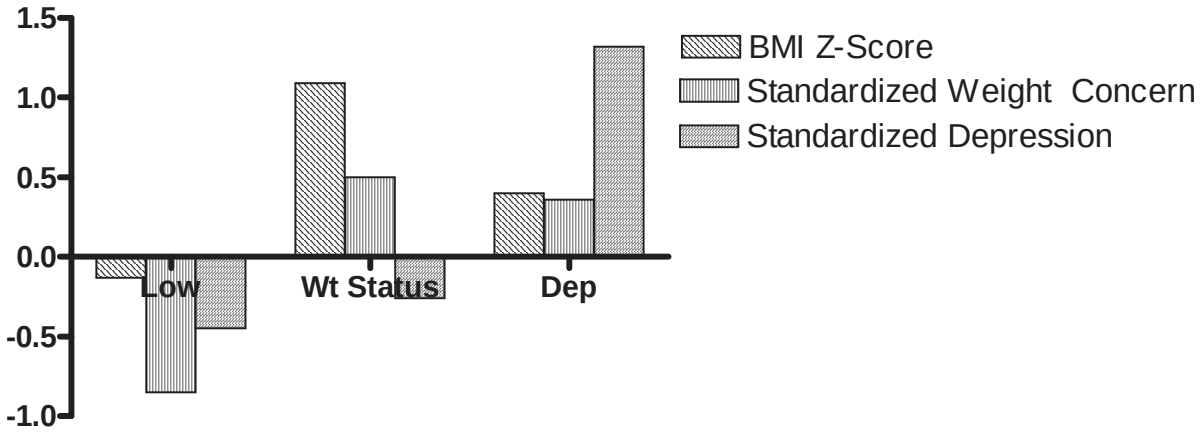

Figure 4. Mean differences on BMI z-score, standardized weight concerns, and standardized depression scores (age 9 clustering variables). Low = Lower Risk cluster (*n* = 60), Wt Status = Higher Weight status cluster (*n* = 68), Dep = Higher Depression cluster (*n* = 35).

Appendix B

Table 17

Parent Education and Family Income by age 9 Cluster

		Age 9 Cluster		
	Total Sample (*N* = 163)	**LR cluster (*n* = 60)**	**HW cluster (*n* = 68)**	**HD cluster (*n* = 35)**
Dad Education	14.99 (2.70)	15.00 (2.28)	14.30 (2.53)	14.50 (2.64)
Mom Education	14.82 (2.33)	14.95 (2.29)	14.56 (2.30)	14.53 (2.10)
Income	$35,000-$51,000	$35,000-$51,000	$35,000-$51,000	$35,000-$51,000

Note. Clusters did not significantly differ on paternal or maternal education (years) or on family income as assessed at age 9.

Appendix C

Figure 5

Age 11and 13 Dietary Restraint and Body Dissatisfaction by age 9 Cluster Membership

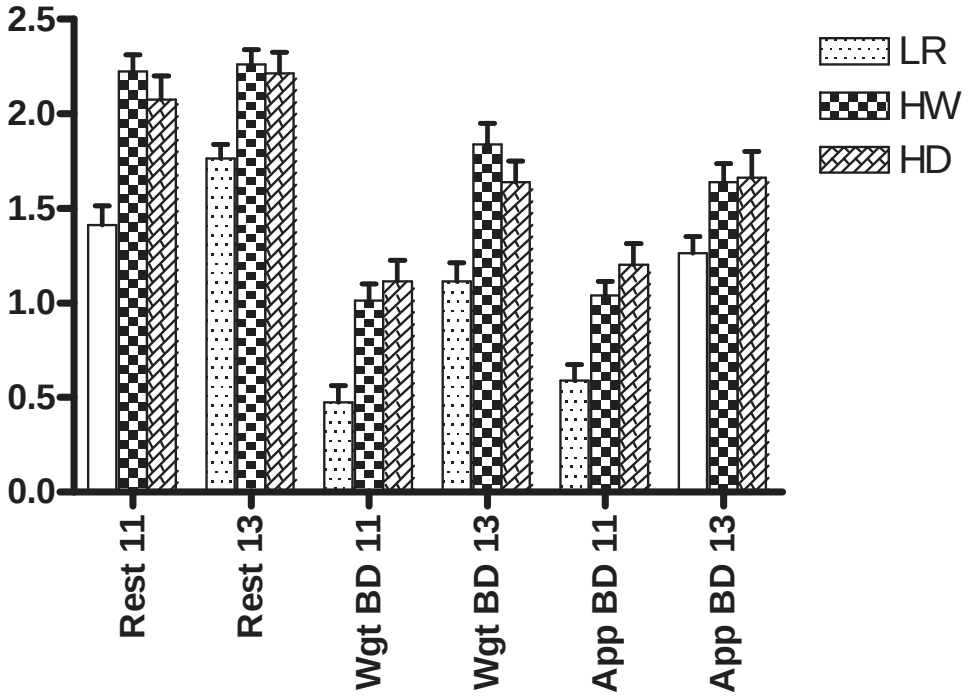

Figure 5. Means and standard errors for age 11 and 13 dietary restraint, weight-related body dissatisfaction, and appearance-related body dissatisfaction for LR cluster (lower risk cluster, *n* = 60), the HW (higher weight status, *n* = 68), and HD (higher depression, *n* = 35). Rest= Dietary Restraint Wgt BD = Weight-Related Body Dissatisfaction App BD= Appearance-Related Body Dissatisfaction.

Appendix D

Figure 6

Age 11 and 13 Binge Eating Scores by age 9 Cluster Membership

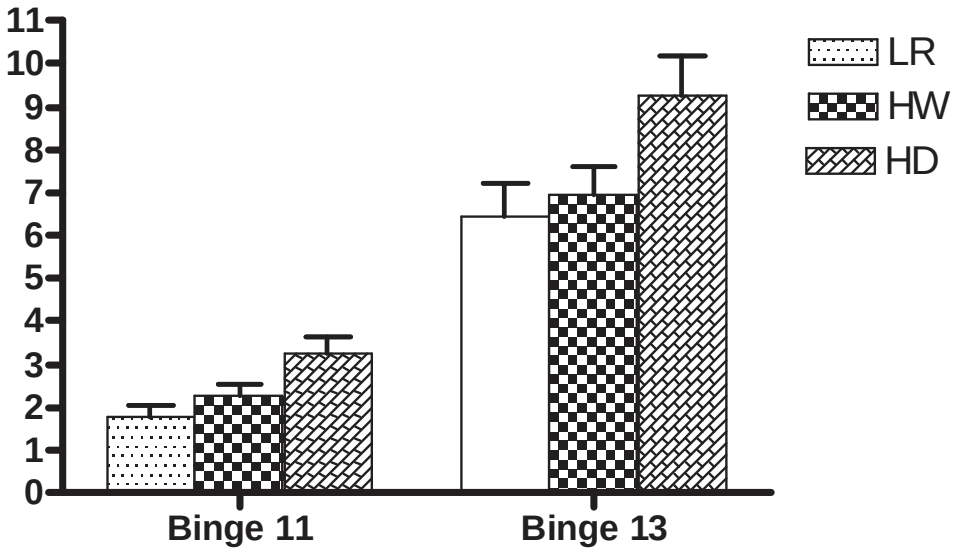

Figure 6. Means and standard errors for age 11 and 13 binge eating. LR cluster (lower risk cluster, *n* = 60), the HW (higher weight status, *n* = 68), and HD (higher depression, *n* = 35). Binge = Binge Eating.

Appendix E

Figure 7

Age 11 and 13 Emotional Eating Scores by age 9 Cluster Membership

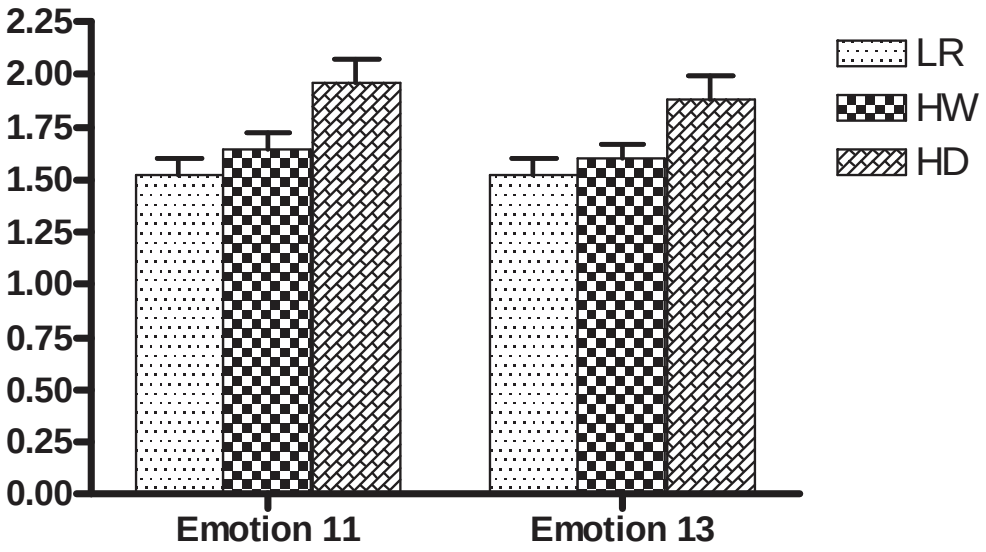

Figure 6. Means and standard errors for age 11 and 13 emotional eating. LR cluster (lower risk cluster, *n* = 60), the HW (higher weight status, *n* = 68), and HD (higher depression, *n* = 35). Emotion = Emotional Eating.

Appendix F

Table 18

Parent Education and Family Income for Early and Later Maturing Girls (age 11)

		Age 11 Pubertal Development	
	Total Sample (*N* = 163)	**Early Maturing (*n*= 50)**	**Later Maturing (*n* = 113)**
Dad Education	14.84 (2.76)	14.65	15.11
Mom Education	14.76 (2.32)	14.71	14.86
Income	$35,000-$51,000	$35,000-$51,000	$35,000-$51,000

Note. Early maturing girls were classified as Tanner stage 3 or higher; all other girls were classified as later maturing girls. There were no significant differences on paternal or maternal education (years) or on family income between early and later maturing girls (age 11).

Appendix G

Table 19

Frequency of Maturational Status by Age 9 Cluster

	Age 9 Cluster		
	LR (***n*= 60**)	**HW** (***n*= 68**)	**HDH** (***n*= 35**)
Early Maturing (***n*= 50**)	15	21	8
Later Maturing (***n*= 113**)	45	47	27

Note. Chi-Square results were not significant (p>.10). Girls in the weight status and/or HD cluster were not more likely to be classified as an early developer at age 11.

Appendix H

Table 20

Summary of Included Measures.

Measure (construct)	Description of Measure	Alpha			
		Age 7	Age 9	Age 11	Age 1
Cluster Variables					
Weight Status (BMI)	Weight for height (age and gender)	-	-	-	-
Weight Status (BMI z-score)	Standardized weight for height	-	-	-	-
Weight Concerns Scale (overweight concerns)	Concerns about weight gain and importance of weight to individual	-	.65	.78	.83
Children's Depression Inventory (depression)	Range and severity of symptoms of depression	-	.80	.78	.83
Disordered Eating Behaviors					
Dutch Eating Behavior Questionnaire (dietary restraint subscale)	Cognitive control over eating	-	-	.93	.94
Dutch Eating Behavior Questionnaire (emotional eating subscale)	Eating in response to emotions	-	-	.95	.95
Binge Eating Scale (Binge Eating)	Behaviors and cognitions associated with loss of control when eating (bingeing)	-	-	.60	.88
Dieting Checklist	Use of unhealthy dieting behaviors	-	-	-	-

Table 20 *(continued).*

Summary of Included Measures.

Measure (construct)	Description of Measure	Alpha			
		Age 7	Age 9	Age 11	Age 1
Weight/Body Concerns					
Body Esteem Scale (general body dissatisfaction)	Assesses girls' level of satisfaction and acceptance of their body		.87	-	-
Adolescent Body Esteem Scale (appearance-related body dissatisfaction)	Assesses girls' level of satisfaction and acceptance of their general appearance	-	-	.93	.92
Adolescent Body Esteem Scale (weight-Related Body Dissatisfaction)	Assesses girls' level of satisfaction and acceptance of their current weight	-	-	.91	.93
Harter's Self-Perception Profile (Physical Appearance Self-Concept)	Assesses girls' feelings of appearance self-worth	-	.76		
Parenting					
Monitoring and Autonomy Granting (Maternal monitoring)[a]	Maternal knowledge and monitoring of child's behavior		.66	-	-
Report of Parental Behavior Inventory (Maternal Psychological Control) [a]	Maternal use of manipulative and coercive parenting		.82	-	-
Monitoring and Autonomy Granting (Paternal monitoring) [b]	Paternal knowledge and monitoring of child's behavior	-	.86	-	-
Report of Parental Behavior Inventory (Paternal Psychological Control)[b]	Paternal use of manipulative and coercive parenting	-	.82	-	-

Table 20 *(continued).*

Summary of Included Measures.

Measure (construct)	Description of Measure	Alpha			
		Age 7	**Age 9**	**Age 11**	**Age 1**
Monitoring and Autonomy Granting (Parental Monitoring)	Girls' perceptions of parent knowledge and monitoring of child's behavior		.82		
Parenting (continued)					
Children's Report of Parental Behavior Inventory (Psychological Control)	Girls' perceptions of parents' use of manipulative and coercive parenting	-	.82	-	-
Marital Conflict					
Relationships Scale (Marital Conflict)[a]	Feelings of conflict with and distance from husband	.82	.76	-	-
Relationships Scale (Marital Conflict) [b]	Feelings of conflict with and distance from wife	.71	.76		
Children's Perceptions of Interparental Conflict Frequency of Conflict	Girls' perceptions of frequency of parental marital conflict	.71	.80	-	-
Children's Perceptions of Interparental Conflict Intensity of Conflict	Girls' perceptions of intensity of parental marital conflict	.71	.78	-	-
Children's Perceptions of Interparental Conflict Conflict Resolution	Girls' perceptions of how often parents resolve conflict	.77	.85	-	-

Table 20 *(continued).*

Summary of Included Measures.

Measure (construct)	Description of Measure	Alpha			
		Age 7	Age 9	Age 11	Age
Children's Perceptions of Interparental Conflict	Girls' discomfort with and feelings of insecurity in response to parental conflict	.78	.87	-	-
Perceived Threat					
Marital Conflict (continued)					
Children's Perceptions of Interparental Conflict (Child-Centered Conflict)	Girls' report of how often and if parental conflict is related to her behaviors	-	.60	-	-
Children's Perceptions of Interparental Conflict (Self-Blame for Conflict)	Girls' report of how often they feel they are at fault for parental conflict	-	.78	-	-
Conflict over Food and Weight				-	-
Conflict over Food and Weight Scale (Mother Overweight Conflict)[a]	Conflict with husband about her overweight	.90	.92	-	-
Conflict over Food and Weight Scale (Mother Underweight Conflict)[a]	Conflict with husband about her underweight	.93	.90	-	-
Conflict over Food and Weight Scale (Daughter Overweight Conflict)[a]	Conflict with husband about daughter overweight	.91	.87	-	-
Conflict over Food and Weight Scale (Daughter Underweight Conflict)[a]	Conflict with husband about daughter underweight	.73	.68	-	-
Conflict over Food and Weight Scale (Mother Overweight Conflict)[b]	Conflict with wife about her overweight	.92	.92	-	-

Table 20 *(continued).*

Summary of Included Measures.

Measure (construct)	Description of Measure	Alpha			
		Age 7	Age 9	Age 11	Ag
Conflict over Food and Weight Scale (Mother Underweight Conflict)[b]	Conflict with wife about her underweight	.89	.84	-	-
Conflict over Food and Weight Scale (Daughter Overweight Conflict)[b]	Conflict with wife about daughter overweight	.87	.85	-	-
Conflict over Food and Weight					
Conflict over Food and Weight Scale (Daughter Underweight Conflict)2	Paternal report of conflict with wife about daughter underweight	.79	.73	-	-
Parental Conflict over Food and Weight	Girls' perceptions of parental conflict about family member's weight and eating	.73	.63	-	-
Encouragement of Weight Loss					
Encouragement of Daughter's Weight Loss[a]	General encouragement of daughter to engage in weight loss behaviors	-	.91	-	-
Encouragement of Daughter's Weight Loss[b]	General encouragement of daughter to engage in weight loss behaviors	-	.92	-	-
Maternal Characteristics					
Weight Status (BMI)[a]					
Center for Epidemiological Studies Depression Scale[a]	Maternal reports of depressive symptoms in the past two weeks	.90	.90	-	-
Stanford Weight Concerns Scale[a]	Maternal reports of how concerned she is about gaining weight	.77	.83	-	-

Table 20 *(continued).*

Summary of Included Measures.

Measure (construct)	Description of Measure	Alpha			
		Age 7	Age 9	Age 11	Age 1
Paternal Characteristics					
Weight Status (BMI)[b]					
Center for Epidemiological Studies Depression Scale[b]	Paternal reports of depressive symptoms in the past two weeks	.89	.85		
Stanford Weight Concerns Scale[b]	Paternal reports of how concerned he is about gaining weight	.73	.74		
Individual Characteristics					
Harter Self-Perception Profile (Global Self-Worth)	Girls' general feelings of self-worth or acceptance	.77	.78		
Harter Self-Perception Profile (Social Acceptance)	Girls' feelings of being accepted and supported by others	.71	.78		
Children's Manifest Anxiety Scale	Girls' symptoms of anxiety	.90	.90	-	-

Note. All measures are data provided by girls unless noted by [a] or [b].

[a] = maternal data [b] = paternal data.

VITA

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B.A. (Cum Laude) Psychology, May 2001
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RESEARCH INTERESTS

- Applying developmental theory and concepts to studies of the emergence of disordered eating and related body image concerns in both adolescent females and males
- Examining the reciprocal association between childhood/adolescent overweight and adolescent disordered eating
- Studying the association of disordered eating with other clinical and sub-clinical problems in adolescents, particularly depression, anxiety, and substance use and abuse
- Assessing how family (parent and sibling) and peer relationships, along with media and broader cultural values, impact and shape the development of disordered eating and overweight
- Studying how developmental transitions (i.e. puberty, college) impact risk for disordered eating and other forms of developmental psychopathology
- Longitudinal developmental methodology and measurement issues relevant to disordered eating
- Developing age appropriate and empirically based disordered eating prevention programs

HONORS AND AWARDS

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PUBLICATIONS

Sinton, M.M. & Birch, L.L. (2005). Weight status and psychosocial factors predict the emergence of dieting in preadolescent girls. *International Journal of Eating Disorders, 38*(4) 346-354.

Sinton, M.M. & Birch, L.L. (in press). Individual and sociocultural influences on pre-adolescent girls' appearance schemas and body dissatisfaction. *Journal of Youth and Adolescence, 35*(2) 165-175.