

**WEIGHING IN ON THE ISSUE: A LONGITUDINAL ANALYSIS OF THE
INDIVIDUAL AND CONTEXTUAL FACTORS THAT INFLUENCE THE
DEVELOPMENTAL TRAJECTORIES OF EATING DISORDERS AMONG
ADOLESCENTS**

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RUNNING HEAD: Developmental Trajectories of Adolescent Eating Disorders

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Abstract

Eating disorders, and variants of these disorders (e.g., body dissatisfaction, weight control behaviors), represent pressing and prevalent health problems that affect American adolescents with potentially chronic consequences (Commission on Adolescent Eating Disorders, 2005). Although the World Health Organization (2003) designated these issues as a global priority area for youth mental health, reaching a complete understanding of the developmental processes that increase and maintain risk and protection is complicated by several unique theoretical and empirical challenges.

In order to address these conceptually and empirically interrelated problems, the current study integrated existing theoretical frameworks derived from the eating disorder literature with relevant perspectives from the adolescent development field, and elaborated a systems-based theoretical framework and methodology for the study of associations among adolescents' experiences pertinent to eating pathology and body dissatisfaction, their patterns of sports participation, and the implications of these associations for their positive and problematic development. Sports participation was examined as the primary contextual factor because of its central role in affecting adolescent development.

Using data from Grades 9 to 11 of the 4-H Study of Positive Youth Development (PYD), this research first identified qualitatively distinct trajectories of adolescents' eating pathology and body dissatisfaction using group-based modeling, and then used multinomial logistic regression analyses to describe the individual and contextual correlates of these pathways. Next, multiple regression

analyses were used to examine whether trajectories of eating pathology and body dissatisfaction related to youth positive and problematic development, such as PYD and depression. The final phase of this study investigated whether sports participation moderated associations between specific trajectories of eating pathology and body dissatisfaction and adolescents' positive or problematic development.

Results from the group-based modeling and multinomial logistic analyses supported the presence of qualitatively distinct trajectories of eating pathology and body dissatisfaction that differed with respect to patterns of constancy and change across middle adolescence. In addition, several physical, psychological, and demographic factors were associated with adolescents' membership in specific trajectory groups. In general, the results suggested that boys, adolescents with perceptions of normal weight, and adolescents with higher levels of self-worth, were more likely to be in favorable trajectories of eating pathology and body dissatisfaction. Actual weight (BMI-z) at Grade 9 was related to membership in body dissatisfaction trajectories but not to membership in eating pathology trajectories. Maternal education and duration of sports participation were not associated with membership in any of the eating pathology and body dissatisfaction trajectories.

Findings from the multiple regression analyses demonstrated that diverse eating pathology and body dissatisfaction trajectories were significantly associated with youth positive and problematic functioning, after accounting for specific demographic, physical, and psychological factors. In general, eating

pathology and body dissatisfaction trajectories were associated more with adolescents' depression scores than with adolescents' PYD scores. In addition, results suggested that unique patterns of associations between trajectory group membership and psychosocial functioning existed for female and male adolescents. Among girls, experiencing unhealthy or problematic eating- and weight-related trajectories were not only significantly associated with lower levels of PYD, but were also associated with higher levels of depressive symptoms as well. Among males, membership in problematic eating pathology trajectories was associated with more depressive symptoms, although membership in any of the eating- and weight-related trajectories was unrelated with males' positive adjustment. Membership in either favorable or unfavorable eating- and weight-related trajectories was not associated with males' positive adjustment.

Finally, results of multiple regression analyses indicated that sports participation moderated (a) relations between adolescents' experiences in problematic eating- and weight-related trajectories, and (b) their self-reported depressive symptoms. Specifically, for adolescent boys and girls in more problematic trajectories of eating pathology and body dissatisfaction, more continuous sports participation was related to lower levels of depression. However, for adolescents who experienced pathways characterized by lower (although still chronic) levels of eating pathology and body dissatisfaction, more years of sports participation were associated with increased depressive symptoms.

These results suggest that the distinct and diverse pathways of eating pathology and body dissatisfaction that exist across middle adolescence have

important implications for the positive and problematic development of our youth.

In addition, the findings underscore the need to evaluate the interindividual differences that exist in regard to how sports participation may positively or negatively relate to developmental outcomes.

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I dedicate this dissertation to my family, and to Mark.

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CHAPTER 1

PROBLEM STATEMENT

Problematic health behaviors, such as drug and alcohol use, sexual risk-taking, and unhealthy weight management practices, become more prevalent in adolescence and carry short- and long-term implications for development. Specific psychological issues, for example eating disorders, represent prominent and pressing health problems that affect American adolescents, in particular, with alarming frequency (Commission on Adolescent Eating Disorders, 2005; Fisher et al., 1995). In fact, eating disorders have been designated as a global priority area for youth mental health, and increasing attention has been directed towards the identification of developmental risk factors for both disordered eating and body dissatisfaction (WHO, 2003). However, our understanding of the developmental processes of adolescent eating disorders is characterized by unique theoretical and empirical challenges.

Accordingly, the goal of this dissertation is to address some of these interrelated theoretical and methodological limitations. At the conceptual level, this aim will involve integrating currently parallel lines of research in the areas of eating disorders and developmental science in order to demonstrate the need for the application of cross-disciplinary, relational developmental perspectives to the study of adolescent eating disorders (e.g., Overton, 2010). Empirically, this study will identify the diverse developmental trajectories of eating disorders that exist across middle adolescence, a “high risk” period associated with the emergence of eating disorder symptoms (Klump, Burt, McGue, & Iacono, 2007; Lewinsohn, Striegel-Moore, & Seeley, 2000). If findings support the presence of intraindividual change in these developmental pathways, an

additional aim will be to describe the characteristics/factors that account for this potential variability (i.e., interindividual differences in intraindividual change).

Such work is theoretically and empirically timely and important. Eating disorders that occur during adolescence interfere with pubertal development and carry “developmental risks” that preclude a healthy progression into adulthood (see Golden et al., 2003 for review). In fact, substantial evidence exists to support that early occurring eating issues and preoccupation with weight are associated with concurrent and subsequent disordered eating among young children and adolescents (Attie & Brooks-Gunn, 1989; Sinton & Birch, 2005; Stice, Presnell, & Spangler, 2002). Because adolescence is a period marked by considerable growth in the brain and body, and because proper nutrition is integral to the success of these growth-related changes, consequences resulting from full, partial and subthreshold syndrome eating disorders have the potential for more lasting effects compared with adult disorders (Bravender et al., 2010). Therefore, identification of the factors that promote, maintain, and protect against eating problems has significant potential to enhance the physical and mental well-being of our nation’s adolescents.

One of the prevailing debates among eating disorder scholars is the diagnostic and definitional boundaries of these problems, particularly among adolescents (I will discuss this issue in greater depth in Chapter 2). The ambiguity and inconsistency in definition and in the measurement of eating disorders limits the early, comprehensive, and accurate identification and treatment of these disorders, and the ability for researchers and practitioners to target multiple (and, arguably, inter-related) weight-related issues simultaneously. Although the present work will assess *indicators* of disordered eating

attitudes and behaviors and levels of body dissatisfaction (e.g., dieting or restrictive behaviors, binge eating, purging, cognitively distorted weight and shape perception, preoccupation with weight and shape), rather than clinically recognized (full-syndrome) disorders, longitudinal support exists to suggest that these symptoms increase risk for (clinically diagnosed) eating disorders (Chamay-Weber, Narring, & Michaud, 2005). Researchers and clinicians have labeled this particular subgroup of individuals that meet some, but not all, diagnostic criteria as “eating disorder not otherwise specified” (EDNOS; Fairburn & Bohn, 2005).

EDNOS cases represent the majority of clinical and community-based instances of eating disorders (Kjelsås, Bjørstrøm, & Gøtestam, 2003; Machado, Machado, Goncalves, & Hoek, 2007). In addition, the results of a recent meta-analysis revealed that minimal differences in eating pathology, general psychopathology, and physical health exist among adolescents with EDNOS, compared with those individuals diagnosed with clinically recognized eating disorders (according to DSM-IV criteria; Thomas, Vartanian, & Brownell, 2009). From a developmental perspective, even those adolescents engaging in subclinical weight loss strategies are less likely than adolescents without any symptoms of eating pathology to occupy trajectories characterized by health-promotive behaviors (Bravender et al., 2010). In the current research, a shift away from the diagnostic classification for adolescent eating problems will better describe the full range of healthy and unhealthy eating attitudes and behaviors, and whether and how specific disordered eating attitudes and behaviors are differentially related to positive and problematic outcomes among adolescents. Presumably, a primary reliance on a categorical measurement approach, one that is based on clinical judgments and diagnostic

criteria alone, will also limit scholars' ability to assess developmental pre-cursors for risk and protection.

The diverse descriptive and diagnostic labels that have been applied to eating problems reflect, in part, the complex interaction between individual and contextual factors that perpetuate eating disorder risk (Striegel-Moore & Bulik, 2007). In general, developmental pathways associated with increased risk and resilience are not well understood because the majority of longitudinal studies have considered separately the effects of individual and contextual influences (Striegel-Moore & Bulik, 2007). The literature also does not adequately elucidate how these factors interact with adolescents' individual characteristics, across both proximal (e.g., sports, neighborhood, peers) and distal (e.g., culture) contexts.

Although existing evidence from prospective and experimental studies has demonstrated that no single factor accounts for increased risk or protection (Stice, 2002), few studies apply holistic developmental models to examine multiple levels of influence (i.e., person and context) and their dynamic interactions over time (e.g., Bronfenbrenner & Morris, 2006; Gottlieb, 1992; Lerner, 2002, 2006; Mahoney, Vandell, Simpkins, & Zarrett, 2009). In order to identify and describe individual differences and to assess developmental change, a shift away from theoretical and methodological models that explain and operationalize eating disorder risk and resilience according to conceptually "split" perspectives is necessary (Lerner, 2002; Overton, 1998). Accordingly, the current study will use a developmental systems model to describe, explain, and optimize the complex interplay between individual and contextual variables that influence eating problems (and resilience), as well as their moderating impact.

Relational perspectives will also more clearly elucidate the role of developmental timing, arguably an important contextual factor, in the onset and maintenance of these issues. Adolescence has been consistently labeled as a vulnerable period for the development of eating disorders (Striegel-Moore & Bulik, 2007), presumably because of challenges in coping with the physical and social changes associated with puberty (Jacobi et al., 2004; Stice, 2002; Striegel-Moore & Bulik, 2007). In fact, research suggests that eating disorder symptoms may emerge in middle adolescence (Lewinsohn et al., 2000), and that this period may be marked by notable changes in etiologic risk factors (Klump et al., 2007). For example, research has suggested that body dissatisfaction may peak at Grade 10 for both girls and boys (Jones, 2004). Therefore, it is critical to examine and follow individuals longitudinally from this period of optimal risk to address questions of etiology, and to understand how specific biological, psychological, and physical changes that occur during this developmental period interact with contextual factors to eventuate or protect against risk.

The question of how developmental timing influences the differential emergence and maintenance of eating problems among both males and females is an important one to pursue for a few reasons. First, although the trend may be changing within the current historical moment, no other psychiatric illness has shown more marked a gender imbalance than eating disorders (Andersen & Holman, 1997; Hudson, Hiripi, Pope, & Kessler, 2007; Woodside et al., 2001). Second, the issue of sex-based variation in the developmental trajectories of eating disorders represents a clear example of how individual factors influence and are influenced by contextual factors. For example, sex differences in fat and muscle mass exist (and become more pronounced during puberty),

increasing the divergence from the culturally valued thin ideal and potentially contributing to lower self-esteem, body dissatisfaction, and disordered eating (Attie & Brooks-Gunn, 1989; Garner, Garfinkel, Schwartz, & Thompson, 1980; Stice & Shaw, 1994; Striegel-Moore, Silberstein, & Rodin, 1986).

However, existing theories and empirical research have inconclusively described sex-based variation in risk, although research supports the presence of both shared (e.g., Cash, Morrow, Hrabosky, & Perry, 2004; Eisenberg, Neumark-Sztainer, & Paxton, 2006; Konstanski, Fisher, & Gullone, 2004) and unique (e.g., Ackard, Fedio, Neumark-Sztainer, & Britt, 2008; Babio, Arija, Sancho, & Canals, 2008; Kinningham & Gorenflow, 2001; Russell & Keel, 2002) risk correlates and symptom patterns among both males and females. In addition to sex, socioeconomic status (SES), perceived and actual weight, and self-worth are individual-level variables that have been associated with eating disorder risk and protection. Furthermore, and consistent with a developmental systems framework, these factors are inextricably linked to the developmental transitions occurring among youth. However, our understanding about the impact of these factors on the developmental trajectories of eating disorders among males and females is unclear.

Yet another major contribution of applying a contextually-sensitive developmental model to the study of adolescent eating disorders is the potential for a conceptual shift from risk protection to strength promotion. Currently, the field is driven largely by a deficit-based emphasis on risk factors for adverse outcomes, although recent recommendations for health care providers focus primarily on protective factors (Neumark-Sztainer, 2009). Although study findings suggest the need for further research to elucidate the factors that place such a large proportion of adolescents at risk for

disordered eating, they also raise interesting questions about the smaller percentage of youth who show a “healthy” relationship with food and their body: *What individual and contextual characteristics are related to positive and healthy developmental trends in the eating and weight attitudes and behaviors of this particular group?*

Although certainly it is important to identify and describe those factors that differentiate high versus low risk adolescents, it is equally important to elucidate protective factors within the adolescent and his/her ecology (Lerner, 2002). Research from the adolescent development literature suggests that promoting “the good” does not always result in a reduction in “the bad,” meaning that problematic and positive behaviors are not necessarily mutually exclusive (Phelps et al., 2007). Therefore, understanding a comprehensive picture of risk and protective factors is essential to designing meaningful and effective intervention and prevention programs that promote healthy development among diverse youth (Lerner, 2002).

One such context that has been shown to occupy a central role in impacting the development of youth is the sports context (Eccles, Barber, Stone, & Hunt, 2003; Fredricks & Eccles, 2006; Larson & Seepersad, 2003; Linver, Roth, & Brooks-Gunn, 2009; National Center for Education Statistics, 2005; Zarrett et al., 2009). Empirical evidence suggests that sports participation is associated with both risk promoting (e.g., increased substance use and delinquent behaviors; Barber, Eccles, & Stone, 2001; Fauth, Roth, & Brooks-Gunn, 2007; Zarrett et al., 2009) and risk protective (e.g., lower levels of alcohol and drug use and sexual promiscuity; Dishman et al., 2006; Fredericks & Eccles, 2006; Sabo, Miller, Farrell, Melnick, & Barnes, 1999) health-related outcomes among adolescents. In the case of eating disorders, studies that have examined clinical and

subclinical eating disorders among athletes (as compared to non-athletes or specific subtypes of athletes) have yielded inconsistent findings suggesting that, under some circumstances, sports participation may be either associated with increased (Holm-Denoma, Scaringi, Gordon, Van Orden, & Joiner, 2009; Johnson, Powers, & Dick, 1999; Milligan & Pritchard, 2006; Petrie, Greenleaf, Reel, & Carter, 2008; Smolak, Murnen, & Ruble, 2000; Sundgot-Borgen & Torstveit, 2004), decreased (DiBartolo & Shaffer, 2002; Sanford-Martens, et al., 2005), or no eating disorder risk (Hausenblaus & Mack, 1999; Reinking & Alexander, 2005).

Despite the vast research that has described the centrality of sports involvement (National Center for Education Statistics, 2005), the increasingly normative prevalence of disordered eating among adolescents (Commission on Adolescent Eating Disorders, 2005), and the speculation about the interrelation of these two features of contemporary adolescent development, their complex *developmental* interrelations remain unclear. Given its potential to promote healthy eating and weight-related attitudes and behaviors among youth, it is incumbent on scholars interested in the application of developmental science (i.e., social scientists who seek to optimize youth development) to elucidate the individual and contextual conditions that may explain potential variations in developmental trajectories of disordered eating.

In short, the current study addressed several issues. First, I evaluated the possibility of distinct developmental trajectories of eating pathology and body dissatisfaction within a sample of middle adolescents. Second, I identified and described the impact of selected individual and contextual factors on patterns of constancy and change in trajectories of eating disorders and body dissatisfaction across this

developmental period. Specifically, I examined if and whether developmental trends in eating pathology and body dissatisfaction varied in relation to particular individual characteristics—sex, SES, perceived and actual weight, and self-worth—and to the main contextual factor of interest, sports participation. Third, in addition to identifying and describing risk and protective markers associated with the development of eating pathology, I examined relations between trajectories of eating pathology and both positive and problematic outcomes among youth. Finally, I ascertained if and whether sports participation may moderate potential relations between trajectories of eating pathology and body dissatisfaction and adolescents' psychosocial adjustment. The method used to address these issues will be detailed in Chapter 3. However, I will discuss more fully in the next chapter the literature that rationalizes the four foci of the present research.

CHAPTER TWO

LITERATURE REVIEW

This chapter reviews the literature related to adolescent eating disorders and sports participation, and presents the theoretical and empirical bases for the present study. Ultimately, the present dissertation aims to bridge seemingly parallel lines of research in the areas of eating disorders and adolescent development in order to demonstrate the need for more cross-disciplinary integration of theory and empirical research.

I will begin my discussion with a brief overview of the developmental systems theoretical perspective in order to demonstrate the interactive role of individual- and contextual-level factors on adolescents' positive and problematic developmental trajectories. Next, using eating disorders as a specific case, I will give a general introduction to the prevalence, definition and classification, developmental trends, and risks of adolescent eating problems, and describe the major limitations of existing theories. As part of this overview, I will discuss how the developmental period of adolescence, in particular, presents unique challenges for risk and resilience.

In order to discuss this information, selected individual- and contextual-level factors will be explored, given their associations with eating disorders and their developmental salience. Sports participation will be the primary contextual factor discussed in my dissertation because of its central role in affecting adolescent development. Therefore, following an overview of the nature and importance of adolescents' sports participation, I will summarize findings from extant studies relating adolescents' sports involvement and eating disorder attitudes and behaviors, and will examine the major theoretical and methodological limitations of the existing research.

Discussion of these ideas will help rationalize the issues to be addressed in the current study.

Features of the Developmental Systems Perspective

Historically, the study of human development has been dominated (and, consequently, limited) by theoretical models that have either focused exclusively on purportedly innate (e.g., Freud, 1969; Hall, 1904) or environmental (e.g., McCandless, 1961) factors, or that have weakly “integrated” the two levels of influence (Lerner & Steinberg, 2009). In an effort to rectify these problematic “split” approaches to the study of human development, the current emphasis on the relational and contextual aspects of development can be seen through the lens of relational, developmental systems theories (Overton, 2006, 2010). These developmental systems theories are an example of relational models that describe human development as a synergistic, bidirectional, person↔context relational process (Bronfenbrenner, 2001; Lerner, 2002, 2006). The shift to a more relationally-focused frame has radically shaped the theoretical and methodological approaches used to study human development (Lerner, 2002; Overton, 2006, 2010).

According to this perspective, developmental processes unfold as a result of the interactions between individual characteristics and contextual factors over time (Bronfenbrenner & Morris, 2006; Lerner, 2002; Magnusson & Stattin, 1998). All levels of organization involved in human development (i.e., biological, psychological, physiological, social, cultural, and historical) are inextricably “fused” into an integrative system (Thelen & Smith, 2006). The changes that occur within one or more of these levels spur changes within and among other levels as well. Because the multiple levels of

the organism and his/her environment are embedded within a broader (and variable) historical context, the *potential* for systematic change (or plasticity) always exists. This notion of plasticity explains the intraindividual and interindividual diversity in developmental pathways and outcomes (Lerner, 2002, 2006).

However, although the possibility for change is ever-present throughout development, the degree of change exists *relative* to both prior developments as well as current contextual conditions (Baltes, Lindenberger, & Staudinger, 2006; Lerner, 2002). Although the potential for plasticity and its scale vary across one's life span (Baltes et al., 2006), the presence of plasticity in mutually influential person↔context relations, termed developmental regulations, "legitimizes an optimistic view of the potential for promoting positive changes in humans" (Lerner, 2004, p. 18). Therefore, the focus on plasticity has scientific and applied import among developmental scientists to understand the characteristics of individuals and of their contexts that, together, can influence policies and programs directed at enhancing positive and healthy youth development (Lerner, Fisher, & Weinberg, 2000).

Positive Youth Development

Although this new vocabulary and research agenda represents a shift from the "deficit-based" theoretical framework that dominated the field of adolescent development through the 1960s to the 1980s, extant research in this area, in addition to our knowledge about human plasticity, suggests that the assumed inverse relationship between healthy and problematic development may not apply to all youth (Benson, Mannes, Pittman, & Ferber, 2004). That is, promoting "the good" does not always result in a reduction of "the bad" (Phelps et al., 2007). Nonetheless, because one of the central goals of

developmental research is to optimize human development, an understanding of the comprehensive picture of risk and protection becomes essential to designing meaningful and effective intervention and prevention programs that promote healthy development (Baltes, Reese, & Nesselroade, 1977; Lerner, 2002).

The positive youth development perspective (PYD) advocates that policies and programs aimed at enhancing the well-being of youth should focus on the promotion of youth strengths and assets, not simply the prevention of risk (Damon, 2004). The principles of PYD assert that positive youth development may be optimized by aligning the strengths of individuals (operationalized as the potential for positive change) and the assets for positive growth in the contexts of youth (Lerner, 2005, 2009; Lerner, Phelps, Bowers, & Forman, 2009).

The primary objective of this dissertation will be to apply this developmental systems-based, PYD approach to the study of the scientifically and medically vexing health problem of eating disorders among adolescents. Although this dissertation cannot consider the full range of potential influential risk and protective factors (e.g., cultural effects) for reasons of conceptual and methodological parsimony, it will apply a developmental-systems perspective to examine selected, but nevertheless key, individual and contextual factors in order to elucidate potential risk and protective factors for these problems. However, in order to provide a richer theoretical context for the current research, this chapter will discuss the literature rationalizing the present research.

Adolescents and Eating Disorders

Weight concerns and unhealthy eating practices have emerged in girls as young as five years old (Abramovitz & Birch, 2000), and 62% of adolescent females are trying to

lose weight (Lowry, Galuska, Fulton, Burgeson, & Kann, 2005). Among researchers who have examined first incidence rates of anorexia nervosa (AN) and bulimia nervosa (BN) in community-based samples of adolescents, hazard rates peak for both disorders between 16-17 years old. However, slopes for the prevalence of both disorders begin to increase at 10 years of age (Lewinsohn et al., 2000). Although the prevalence of disordered eating and body dissatisfaction may be higher among females compared to males, (some degree of) eating and weight concerns are substantively significant phenomena among both sexes by middle childhood (Davison, Markey, & Birch, 2003; Lawler & Nixon, 2011). In fact, and as I will discuss later in this chapter, our understanding of the risk and protective factors and correlates of these issues among adolescent males is an under-developed, but important, area for future research.

Eating disorders, and in particular AN, are associated with the highest mortality rate of any functional psychiatric disorder (Crow, Praus, & Thuras, 1999; Herzog et al., 2000), and with risk of death three times higher than that of depression, schizophrenia, or alcoholism (Harris & Barraclough, 1998). Adolescents with AN are about ten times more likely to die relative to their same-aged peers (Bulik et al., 2006). Despite the striking statistics about the associated psychological and physical consequences of these disorders, few intervention and prevention strategies specifically tailored to the adolescent population exist to combat these debilitating problems. Evidence suggests that early recognition and intervention for vulnerable individuals has the potential to prevent the development of eating disorders (Rome et al., 2003), and may be associated with better long-term adjustment (le Grange & Loeb, 2007).

In general, these disorders follow a chronic course, are characterized by a high relapse rate, and an underutilization of mental health services that specifically target the eating disorder (Fichter, Quadflieg, & Hedlund, 2006; Keel, Dorer, Franko, Jackson, & Herzog, 2005; Mond, Hay, Rodgers, & Owen, 2007; Striegel-Moore et al., 2008). Adolescence is a period in the life span of optimal intervention, in part, because of the favorable recovery rate within this subgroup as compared to the adult population (approximately 70% versus 40-50%; Brown, 2005; Deter & Herzog, 1994; Herpertz-Dahlmann, Muller, Herpertz, Heussen, Hebebrand, & Remschmidt, 2001; Strober, Freeman, & Morrell, 1997). In addition, although adolescence is a developmental period marked by numerous biological, physical, and social transitions that may precipitate risk (see Chapter 1), the unique combination of internal and external resources may simultaneously facilitate recovery (le Grange & Loeb, 2007).

Although research has suggested developmentally-specific advantages and difficulties that may underlie the etiology (e.g., Crisp, 1995) and treatment of these disorders (le Grange & Loeb, 2007) during this period of life, past work has failed to treat adequately the developmental stage of adolescence. In the absence of a strong body of (developmental) literature related to adolescent eating disorders, adult-specific models have been applied or adapted to these populations without adequate rationalization (Gowers & Bryant-Waugh, 2004). As one clear example, diagnostic recommendations for revisions to the 4th edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR; American Psychiatric Association, 2000) specifically suggest that current cognitive criteria may lack sensitivity to the major cognitive transitions (e.g.,

development of abstract thought and self-regulatory behaviors) that occur during adolescence (Becker, Eddy, & Perloe, 2009; Bravender et al., 2010).

It is important to describe how eating disorder scholars broadly conceptualize risk so that we can better understand how the developmental period of adolescence itself is a particularly sensitive time, both in terms of eating disorder risk and protection.

Accordingly, in the next section, I will provide an overview of the existing theoretical models that frame research in the eating disorder field, explore some of the major limitations of these perspectives, and highlight the disconnection that exists between these models and those that characterize the adolescent development literature.

Existing Theoretical Models in the Eating Disorder Literature: Uses and Limitations

Sociocultural models (Becker & Fay, 2006) and biological perspectives (Kaye, 2008) represent the two dominant classes of theories that have been used to describe the etiology and maintenance of eating disorders and related issues (e.g., body dissatisfaction). Consistent with the early models that conceptualized development, theoretical models in the eating disorder field have been historically (and are still currently) largely characterized by conceptual “splits” (Lerner, 2002; Overton, 2006). In the majority of studies, these factors have been examined independently of one another, completely ignoring that biological and sociocultural factors function interactively to promote or protect against risk (Striegel-Moore & Bulik, 2007).

Sociocultural models have emphasized the role of cultural values and norms promoting thinness and appearance-based social comparisons as central to the pathogenesis of eating disorders. According to this perspective, the “chain of events”

from exposure to the thin ideal, internalization of this ideal, and the perception of a discrepancy between the self and ideal has the potential to precipitate body dissatisfaction and restrictive behaviors (Stice, 1994; Striegel-Moore & Bulik, 2007). Because not all individuals exposed to these environmental pressures develop eating disorders, these models have acknowledged the presence of additional variables, such as personality characteristics, social pressure to be thin (via media exposure, peer- or family-based teasing), high social class, elevated weight, and social anxiety, that may amplify or mitigate environmental risk (Striegel-Moore & Bulik, 2007). However, although sociocultural models provide a “neat” explanation, characterized by substantial face validity, for eating disorder risk and resilience, they alone are inadequate for providing a full understanding of these problems. For example, these models cannot explain why some individuals go on to develop binge eating symptoms rather than restrictive behaviors only (Striegel-Moore & Bulik, 2007).

Recent trends in eating disorder research, however, have focused on the genetic bases of these disorders, deemphasizing the role of culture and the environment (e.g., DeAngelis, 2002). The prime example here involves the heritability approach, using analyses derived from behavioral genetics research (Bulik, Sullivan, Wade, & Kendler, 2000; Klump, Kaye, & Strober, 2001; Klump, Miller, Keel, McGue, & Iacono, 2001; Klump, Perkins, Burt, McGue, & Iacono, 2007; Kortegaard, Hoerder, Joergensen, Gillberg, & Kyvik, 2001; Mazzeo, Slof-Op’t Landt, van Furth, & Bulik, 2006; Spanos, Burt, & Klump, 2009; Wade, Bulik, Neale, & Kendler, 2000). Other examples include research that has examined the genetic basis for the core phenotype of low body weight associated with anorexia (Grice et al., 2002). In addition, family studies of eating

disorders have documented familial clustering of anorexia, bulimia, and binge eating disorder (e.g., Strober, Freeman, Lampert, Diamond, & Kaye, 2000, 2001). Such research is conceptually and methodologically flawed in that, for instance, it fails to identify gene-to-behavior developmental pathways, address adequately gene-environment interactions, and misinterprets between group differences as representing intraindividual change (Lerner, 2002). Therefore, although recent behavioral genetics studies point to the shared influence of both environment and biology on adolescent eating disorder risk (e.g., Klump et al., 2007), such work fails to elucidate the developmental process through which genes in interactions with context eventuate in eating disorders (cf. Risch et al., 2009; Suomi, 2004, for instances of dynamic systems treatments of such processes).

Of course, research that has the goal of understanding the biological bases of eating disorders is not without import. Indeed, such research is essential when biology is viewed integratively, with the context of human development, and not as a level of analysis to which variables at other levels of organization should be reduced (e.g., Gottlieb, Wahlstein, & Lickliter, 2006). In fact, an understanding of the biological processes and structures that drive hunger, satiety, and weight regulation, and how these processes influence and are influenced by contextual factors, may be critical to effective intervention (Striegel-Moore & Bulik, 2007). For instance, Hebebrand, Casper, Treasure and Schweiger (2004) have argued that that maintenance of a “healthy” weight may be less related to *intention* and more to *biology* (i.e., deficient levels of the protein hormone, leptin, may contribute to heightened activity). Leptin is an important physiological factor that drives the pubertal process among adolescents, regulating body weight, metabolism and reproductive processes (Susman & Rogol, 2004). However, more prospective studies

are needed to examine biological factors and to tease apart “consequence” from “cause” because, to date, most biological symptoms associated with eating disorders seem to remit following treatment.

Another major criticism of the adequacy of relying only on biological models to explain eating disorder risk and resilience can be observed in the phenomenologic disparities in illness presentation. For example, a disturbance in the perception of body shape is considered essential for eating disorder diagnosis. However, the cultural adequacy of the current diagnostic criteria is not tenable given that patients in Hong Kong with anorexia, but without fat phobia, were misclassified as non-cases on the Eating Attitudes Test (EAT; Lee, Kwok, Liu, Leung, 2002). These findings, in combination with research conducted in Japan, Singapore, Malaysia, and India, suggest that fat phobia may not be intrinsic to patients from non-Western cultures (Lee, 1994; Lee, Lee, Ngai, & Wing, 2001; Lee & Lock, 2007). These examples support the idea that, although considerable symptom overlap may exist across cultures, researchers need to understand the role of local influences in non-Western cultures and how interactions among geographic, political, and economic factors produce culture-specific presentations of these problems (i.e., symptom manifestation and illness course; Becker, 2007; Jackson, Keel, & Lee, 2006).

Puberty, a normative developmental experience in adolescence, and one that has been associated (although inconsistently) with eating disorder risk, exemplifies how biological and environmental factors interactively shape developmental processes and outcomes (Brooks-Gunn & Graber, 1994). Researchers generally differentiate between two important aspects of pubertal development: pubertal timing (i.e., age of onset) and

pubertal status (i.e., which refers to an individual's subjective state relative to a referent group; Brooks-Gunn, Petersen, & Eichorn, 1985). Although the changes that are occurring are physical and biological in nature, they are embedded in social and historical contexts which shape their (individualized) meaning and impact.

Even those more “biological” models that described adolescent risk in terms of pubertal growth and timing, discussed the psychosocial and psychological implications of these physical changes. For example, the normative increase in body fat among adolescent girls that accompanied puberty was linked to a departure from the cultural ideal of thinness and, subsequently, to lower self-esteem, body dissatisfaction, and disordered eating (e.g., Attie & Brooks-Gunn, 1989). However, according to theories about gene-environment interactions, the potential for contextual factors (i.e., thin-ideal internalization) to affect the phenotypic expression of a particular disorder (i.e., eating disorders) depends on the presence of genetic risk factors (Moffitt, Caspi, & Rutter, 2005). In addition, although biological changes (e.g., fluctuations in ovarian hormones) have been directly associated with changes in eating disorder symptoms (e.g., Edler, Lipson, & Keel, 2007; Klump, Keel, Culbert, & Edler, 2008), the activation and regulation of these hormones depends, in large, on environmental factors (e.g., proper nutrition; Susman & Dorn, 2009).

Although some research has suggested that off-time pubertal development (and, specifically, early maturation among girls) may be associated with increased eating disorder risk and body dissatisfaction (Graber, Lewinsohn, Seeley, & Brooks-Gunn, 1997; Rierdan & Koff, 1991), prospective studies that have examined pubertal effects on eating pathology, using varied indicators of pubertal timing, have found little support for

pubertal development as a risk factor for the onset of these issues (see Jacobi et al., 2004, for review). Some plausible explanations for these null effects include the possibility of localized developmental effects, or the idea that the negative effects of puberty on adolescents' body image and eating behaviors occur during the time when the adolescent is developmentally off-time relative to his/her peers (i.e., during early adolescence; Stice, 2002). This hypothesis is consistent with earlier research that has shown that the effects of pubertal timing dissipate by later adolescence (Tobin-Richards, Boxer, Kavrell, & Petersen, 1984). In addition to this explanation, there is also evidence to support the idea that the adverse effects of early puberty on adolescents' eating pathology and body dissatisfaction may be amplified by additional stressors (i.e., the social and psychological "context" of pubertal development; Stice, 2002). Accordingly, given the extant research that has shown little support for the long-term (direct) effects of pubertal timing on adolescents' eating- and weight related outcomes (i.e., beyond the early adolescent years), the current study will not examine the effects of pubertal timing on relations between adolescents' experiences with eating pathology and body dissatisfaction, broad psychosocial functioning, and sports participation experiences.

Applying Developmental Systems Theories to the Study of Adolescent Eating Disorders

In general, the study of adolescent development (Lerner & Steinberg, 2009), as well as research specific to eating disorders (Striegel-Moore & Bulik, 2007), have been based on reductionist models that assume linear "developmental" pathways and outcomes. Researchers continue to frame questions about the development of these problems according to these same split-based conceptions; that is, *how much variance can be*

attributed to environmental or to biological factors? In order to understand the development of adolescent eating disorders, including those factors that both promote and protect against these adverse outcomes, existing models need to be supplemented with relational models that have been used to study human development. Developmental research aimed at the description and explanation of risk and protective factors at both the individual and contextual levels of the adolescents' ecologies will optimize the potential for positive and healthy eating- and weight-related outcomes (Lerner, 2002).

Research suggests that weight-related problems, such as unhealthy weight control methods and binge eating, can co-occur, increase in severity over time, and perpetuate the onset of different weight-related issues (Neumark-Sztainer, Wall, Eisenberg, Story, & Hannan, 2006; Neumark-Sztainer, Wall, Haines, Story, & Eisenberg, 2007). Therefore, targeting risk and protective factors simultaneously likely has the most potential to reduce problems of disordered eating without simultaneously triggering additional (related) weight-based issues (e.g., obesity; Neumark-Sztainer et al., 2007). Furthermore, given the interrelatedness of the multiple levels of the individual and the social contexts in which he/she exists, the application of systems-based models to the study of adolescent eating disorders will likely alter (for better or for worse) health-related attitudes and behaviors into adulthood.

This shift in theoretical perspectives will not only influence eating disorder research and practice, but is particularly important with respect to the prevention of adolescent eating disorders. A critical need exists within the area of eating disorder prevention for models that are strength-based, developmentally specific, and contextually sensitive. For example, in a recent prospective study of approximately 7,000 girls and

6,000 boys aged 9-15 years, Field et al. (2008) found that the development of binge eating and purging was related to different factors for both boys and girls and that these differences varied, as well, according to participants' age. The field of eating disorder prevention has made notable strides in the past 20 years considering that, prior to 1994, only six evaluated programs were published (Levine & Piran, 2004; Levine & Smolak, 2006). However, eating disorder prevention is still largely characterized by a part-to-whole perspective. Researchers interested in environmental approaches to eating disorder prevention typically ask questions such as, "How can we reach *beyond the individual* to increase our impact?" (Neumark-Sztainer, Levine, Paxton, Smolak, & Piran, 2006, p. 267). These questions remove the individual from his/her context and treat him/her as a reactive agent of the environment, rather than a proactive shaper of his/her own development. In addition to the necessary emphasis on the role of circular processes (i.e., the person↔context relational process) in the development and maintenance of eating disorders, the findings by Field and colleagues (2008) very clearly emphasize that theoretical models in this area need to be guided by a "goodness-of-fit" perspective (Eccles, Lord, & Buchanan, 1996).

According to the "goodness-of-fit" framework, the issue of "match" between individual and contextual characteristics is important at the descriptive and explanatory levels. In addition, prevention and intervention strategies to optimize the positive and healthy development of adolescents depend on a perspective that is sensitive to how adolescents' differentially "fit" with the context, and how this "match" (or lack thereof) contributes to positive or problematic development. Consideration to the setting (e.g., school, clinic, community, after-school program) in which prevention programs occur is

vital to the success of the program, given that risk factors for these issues cannot be uniformly addressed and targeted across these unique settings (Rosen & Neumark-Sztainer, 1998). Although eating disorder scholars have certainly acknowledged the need for more holistic models, the process of generating and applying relational perspectives to the study of adolescent eating disorders is itself complicated given the complex nature of both eating disorders and of adolescent development.

As such, the present dissertation focuses on one specific (central) context in the adolescent ecology, sports participation, as a sample case for the integrative, developmental study of eating disorders. Before reviewing the literature related specifically to adolescent sports participation and eating disorders, it is important to provide a brief overview of the defining features, nature, and prevalence of eating disorders among adolescents. This overview will describe the ways that biology and context collectively shape sex- and culturally-based variations in the nature and prevalence of eating disorder risk.

Eating Disorders: Nature, Definitions, and Prevalence

Eating and weight-related problems exist along a continuum, ranging from weight and shape concerns to full syndrome eating disorders, such as anorexia and bulimia nervosa (Levine & Smolak, 2006; Neumark-Sztainer, Levine, Paxton, Smolak, Piran, & Wertheim, 2006). This spectrum of disordered eating affects approximately 10 to 15% of adolescent females aged 9 to 19 years, and likely more when unhealthy weight control behaviors, such as meal skipping and smoking, are included (Levine & Smolak, 2006). Although eating disorders have been consistently labeled as a “female issue,” eating and weight concerns are increasing among adolescent males as well. In fact, in a recent study

of adolescent boys aged 16-20 years old, researchers found that one-half of boys reported a body or weight-related concern or unhealthy eating behavior (Domine´, Berchtold, Akre´, Michaud, & Sirus, 2009). A second study that examined predictors of body dissatisfaction among middle adolescent boys and girls found that boys' weight-related concerns were not inconsequential; in fact, more than one-half of the males in this study reported a desire to alter their shape or weight (Lawler & Nixon, 2011). In particular, research has shown that weight concerns for boys tend to be more common among those adolescents who have a higher body mass index (BMI) in relation to their peers (Field et al., 2001).

As I discussed in Chapter 1, the current dissertation will operationalize and examine eating disorders according to a spectrum-based perspective in order to capture the full range of eating- and weight-related issues that exist in a community-based sample of adolescents. According to the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV; American Psychiatric Association, 2000), three qualitatively distinct subgroups have been clinically recognized: anorexia nervosa; AN, divided into restricting and binge/purge types; bulimia nervosa (BN), divided into purge and non-purge types; and a third group characterized by atypical presentations of anorexia or bulimia ("eating disorder not otherwise specified;" EDNOS). Despite these diagnostic distinctions, all three types of eating disorders share some cognitive and behavioral features. Among adolescents, partial or subthreshold forms represent 35% to 50% of eating disorder cases. Longitudinal research does exist to support EDNOS as a potential risk factor for AN and BN (Chamay-Weber et al., 2005).

According to the DSM-IV (APA, 2000), Binge Eating Disorder (BED) is classified as a provisional diagnosis in need of further because it shares some diagnostic features associated with bulimia (e.g., uncontrollable binge eating episodes), but not all criteria (e.g., episodes are not followed by compensatory behaviors). Obesity, which has shown a rapid increase in the past three decades among children and adolescents, has been traditionally classified as a general medical condition because it is not consistently associated with a behavioral or psychological pattern (Ogden, Flegal, Carroll, & Johnson, 2002). Nonetheless, youth overweight and obesity have been associated with increased risk of eating disordered symptoms (e.g., weight and shape concerns, dieting, binge eating, or extreme weight control behaviors). Similarly, disordered eating behaviors perpetuate the problem of weight gain as well (Field et al., 2003; Goldschmidt, Aspen, Sinton, Tanofsky-Kraff, & Wilfley, 2008; Lock, Reisel, & Steiner, 2001).

In line with the spectrum-based approach to the study of eating pathology, the current research will also examine the independent contribution of body dissatisfaction because of its association with eating disorder risk as well as other comorbid mental health issues, such as depression (Stice, 2002). In addition, body dissatisfaction, as a variant of eating pathology, is a clear example of the developmental nature of these issues. As previously noted in Chapter 1, both normative and non-normative developmental factors shape adolescents' experiences with body dissatisfaction and eating pathology (Markey, 2010).

In addition to research that suggests these diagnostic models may be too simplistic and that they fail to capture the full range of healthy and unhealthy eating attitudes and behaviors, there are additional criticisms of the current DSM-IV-TR that are especially

relevant to defining and assessing risk and resilience among adolescents. The validity of the DSM-IV-TR classification schema has been called into question for its clinical utility, particularly in distinguishing between full, subthreshold, and partial syndrome disorders (Ackard, Fulkerson, Neumark-Sztainer, 2007; Walsh, 2007). For example, research suggests that the current criteria that distinguishes partial syndrome from full syndrome cases of AN and BED may not reflect meaningful differences (Crow, Agras, Halmi, Mitchell, & Kraemer, 2002). In addition, discussions about revising the diagnostic criteria for AN, and potentially eliminating amenorrhea (i.e., absence of three consecutive menstrual periods) as a core diagnostic feature of the disorder, may have important implications for clinical recognition and treatment of these disorders among youth (Attia & Roberto, 2009). Among children and adolescents younger than 20 years old, specifying a BMI cut-off (e.g., equal to 17.5) may not be useful because these norms are both age and sex specific (Gowers & Bryant-Waugh, 2004; Thomas, Roberto, & Brownell, 2009). Although the majority of adolescents seeking treatment for an eating problem are classified as EDNOS cases, this diagnosis has been criticized as relatively uninformative because of its heterogeneity (Eddy et al., 2008; Nicholls, Chater, & Lask, 2000).

An additional problem with the current classification system is the high rates of diagnostic “crossover” between anorexia and bulimia nervosa (Eddy et al, 2008). Although estimates of crossover from BN to AN are lower, an estimated 20% to 50% of individuals with anorexia will develop bulimia over time (Bulik, Sullivan, Fear, & Peakering, 1997; Strober et al., 1997; Tozzi et al, 2005). Approximately 40% of individuals with EDNOS go on to develop either AN or BN within one to two years of symptom onset (Milos, Spindler, Schnyder, & Fairburn, 2005). However, it is unclear

whether diagnostic crossover is a one-time occurrence. Such variation is important to understand: symptoms may continually be in flux or they may tend to stabilize after diagnostic crossover (Eddy et al., 2008). Although these diagnostic and classification issues are beyond the scope of the present review, it is important to recognize the limitations of current diagnostic schemas as they apply to adolescents (see Bravender et al., 2010, for review).

Prevalence Among Adolescents: What We Know (or Think We Know)

The issue of eating disorder prevalence among adolescents is a challenging one that has yielded inconclusive results. Although the symptoms of eating disorders typically begin in adolescence, epidemiological studies have focused primarily on adult populations. Even among adults, prevalence data for the development of AN, BN, BED or variants of these syndromes are not widespread (see Striegel-Moore & Cachelin, 2001). Few studies have examined the prevalence of these disorders among minority adolescents in the United States (Commission on Adolescent Eating Disorders, 2005). Inconsistencies in the definition, diagnoses, and the lack of uniform measurement of eating disorders complicate specific estimates of the incidence and prevalence of these problems among adolescents. Methodological limitations, in addition to these diagnostic issues, also perpetuate a lack of clarity. In population-based studies, adolescents over the age of 16 are typically grouped with adults (Gowers & Bryant-Waugh, 2004). In addition to the developmental distinctions between adolescence and both childhood and adulthood, variation *within* this “second decade of life” is as notable but likely underestimated.

Estimates of the point prevalence rates of AN range from 0.48-0.70% (Ackard et al., 2007; Hoek, 2006; Hoek & van Hoeken, 2003) compared to BN which occurs in 1-

2% of the adolescent population (Hoek & van Hoeken, 2003). Although *clinical* eating disorders are likely to occur among fewer than 3-5% of adolescents, dieting and other unhealthy weight control behaviors, which have been longitudinally associated with disordered eating (e.g., Field et al., 2003), are more common weight loss strategies among both males and females. In one nationally representative sample of adolescent females aged 11-19 years, 85% of non-overweight girls engaged in weight control behaviors (Liechty, 2010). In a sample of over 4,000 middle and high school students, 16.0% of girls and 15.4% of boys endorsed binge eating, self-induced vomiting, laxative use, and/or excessive exercise (Ackard et al., 2007). According to the National Youth Risk Behavior Survey (2009), 10.6% of 9th through 12th graders reported fasting for at least 24 hours to lose weight (Centers for Disease Control and Prevention, 2009). Longitudinal evidence supports that there is an increase in the frequency of the use of extreme weight control behaviors (e.g., taking diet pills, vomiting, or laxative use for weight loss) throughout the adolescent years among both males and females (Neumark-Sztainer et al., 2006).

Sex-Based Variation in Eating Disorders

Although eating disorders have been labeled as a “women’s disorder,” an estimated 10-20% of cases of anorexia and bulimia nervosa and 40% of cases of binge eating disorder occur among males (Hudson, Hiripi, Pope, & Kessler, 2007; Muise, Stein, & Arbess, 2003). Recent research suggests, too, that the sex imbalance in prevalence of eating disorders may be changing (Hudson et al., 2007; Woodside et al., 2001). Typically, sociocultural theories have been used to explain sex differences in the prevalence and risk factors associated with these disorders, but biological factors also play a role (Culbert,

Breedlove, Burt, & Klump, 2008; Klump, Gobrogge, Perkins, Thorne, Sisk, & Breedlove, 2006; Miller & Pumariega, 2001). Although fewer studies have examined risk factors and correlates of eating disorders among males, the extant research seems to suggest that males and females share common risk factors (Lock, 2009).

In one large-scale study, 50% of adolescent boys reported some unhealthy eating- or weight-related concern and 20% reported some disordered-eating behavior (Domine´ et al., 2009). In fact, striking similarities in developmental risk factors exist, such as the onset of body dissatisfaction in early adolescence for both males and females (Eisenberg et al., 2006; Konstanski et al., 2004) as well as significant rates of dieting, bingeing and purging behaviors, and body dissatisfaction reported by both genders (Cash et al., 2004; Neumark-Sztainer & Hannan, 2000). Trauma, early puberty, low self-esteem, history of overweight, and impulsive behaviors also are associated with increased risk, irrespective of gender (Lock, 2009; Neumark-Sztainer, Story, Dixon, & Murray, 1998; van den Berg, Mond, Eisenberg, Ackard, & Neumark-Sztainer, 2010).

The degree of gender differences depends on the particular eating disorder symptoms under investigation. Adolescent girls are more likely than boys to report weight dissatisfaction, dieting for weight control, and purging behaviors; however, girls are equally as likely and, in some cases, less likely than adolescent boys to report excessive exercise or binge eating for weight control purposes (Anderson & Bulik, 2004; Lewinsohn, Seeley, Moerk, & Striegel-Moore, 2002). Although studies have shown that strong identification with the female role is a reliable and potent predictor of AN and BN (Jacobi et al, 2004), it is not as powerfully associated with binge eating disorder (Hudson et al., 2007; Striegel-Moore & Bulik, 2007). Estimates that include partial syndrome

eating disorders may be more reliable indicators of these problems among adolescent males (Woodside et al., 2001). One of the prevailing challenges to our knowledge about these issues among males, and the pathways by which they develop and are maintained, is that current diagnostic criteria assess types of weight and shape concerns endorsed by women (Lock, 2009). However, distinctions in the weight and body shape ideals (including the pathways to and consequences from pursuit of these ideals) exist between males and females. In general, girls tend to prefer thin body types compared to males where the emphasis is on muscularity and strength (Cafri & Thompson, 2004; Cafri, Thompson, Ricciardelli, McCabe, Smolak, Yesalis, 2005; Frisco, Houle, & Martin, 2010; Labre, 2005; McCabe & Ricciardelli, 2004). Additional support for girls' preference for a thinner ideal has been demonstrated in a recent study of adolescent boys and girls, ages 11-18 years. These researchers found that girls who were underweight, compared to those who were average weight, overweight, or obese, reported lower levels of body dissatisfaction and higher levels of self-esteem (van den Berg et al., 2010). In addition, girls may be more invested in their body image compared to boys which means the strength of the effects of even moderate body dissatisfaction may be stronger among females (Smolak, 2004).

Research has also identified some risk factors that are specific to males (e.g., body building, wrestling, homosexuality; Ackard et al., 2008; Kinningham & Gorenflow, 2001; Russell & Keel, 2002). Despite these common risk factors and overlap in symptom presentation, our understanding about the development of eating disorders and its variants (e.g., body dissatisfaction) among adolescent males is inaccurately based on theoretical and clinical frameworks developed for and focused on adolescent females (Fingeret &

Gleaves, 2004; Lock, 2009). Notably, few studies have examined the mental and physical health consequences of these disorders for adolescent boys (Lock, 2009).

Because existing theories and empirical research have inconclusively described sex-based variation in eating disorder risk and resilience, a comparison of developmental models of eating disorder risk among male and female adolescents would address an important gap in the literature. In addition, adolescence as a developmental period offers an important context within which to study how sex-based variations in the timing and nature of biological and psychosocial changes potentially influence differential risk and resilience for eating problems among males and females. Accordingly, a central aim of the current dissertation will be to describe any potential sex-based variation in the patterns of eating disorder risk and resilience, and to elucidate the impact of individual- and contextual-level factors on the differentiation among these trajectories.

Cultural and Socio-Economic Variations in Eating Disorder Prevalence and Incidence

In addition to sex-based variation, an increasing number of studies are suggesting that eating disorders vary in relation to individual differences in ethnic, racial socioeconomic, and cultural background (e.g., Alegria, et al., 2007; Becker & Fay, 2006; Cummins, Simmons, & Zane, 2005; Eddy, Hennessey, Thompson-Brenner, 2007; Franko, 2007; Rubin, Gluck, Knoll, Lorence, & Geliebter, 2008; Striegel-Moore & Bulik, 2007; Walcott, Pratt, & Patel, 2003). Although within- and cross-group ethnic/racial and socioeconomic comparisons of associations between individual and contextual factors that potentially impact eating disorder risk and resilience are beyond the scope of this dissertation, the impact of these factors on the development and maintenance of eating disorders cannot be ignored. For example, a recent study that assessed body weight ideals

and body dissatisfaction across 26 countries found cultural variation in ideals and perceptions across the world; results suggested that the largest differences were found between contexts that vary in SES. That is, women from higher SES groups preferred a thinner ideal than those from less socioeconomically developed countries (Swami et al., 2010). Other research has suggested that acculturation and Westernization are related to elevated risk, particularly among vulnerable populations (e.g., Bhugra & Bhui, 2003; Cachelin, Phinney, Schug, & Striegel-Moore, 2006; Chamorro & Flores-Ortiz, 2000). Cultural, ethnic, racial, and socioeconomic differences in eating disorder prevalence, incidence, and symptom presentation are evidence for the diversity that exists with respect to the nature and development of eating disorders. In the eating disorder literature, these variations have been investigated largely from a sociocultural perspective—that is, how do variations in the social environment (e.g., body ideals, cultural values and norms) either increase or decrease risk (Becker & Fay, 2006; Becker, Fay, Agnew-Blais, Guarnaccia, Striegel-Moore, & Gilman, 2010).

Early models relating social context to disordered eating emphasized cultural valuation of thinness and its potential promotion of body dissatisfaction and disordered eating (Garner et al., 1980; Stice & Shaw, 1994; Striegel-Moore et al., 1986). More recent refinements of this model include the Dual-Pathway Model of Bulimic Pathology (Stice, 2001, 2002) and the Tripartite Influence Model of body image and eating disturbance (van den Berg, Thompson, Obremski-Brandon, & Coovert, 2002).

The Dual-Pathway Model of Bulimic Pathology is a synthesis of the sociocultural (Striegel-Moore et al., 1986), dietary (Polivy & Herman, 1985), and affect regulation (McCarthy, 1990) models of eating disorders. According to the dual-pathway model, the

internalization of the thin ideal, and messages from the family, peers, and the media, may all contribute to increased body dissatisfaction; in turn, body dissatisfaction fosters dieting and depressive affect (Stice, 2001). These factors consequently increase the risk for bulimic symptoms. The Tripartite Influence Model tests the direct factors (peers, family, media) and indirect factors (internalization of the thin ideal and appearance comparison processes) that may potentially lead to body dissatisfaction and eating problems (Thompson, Heinberg, Altabe, & Dunn, 1999; van den Berg et al, 2002).

According to these theories, there are multiple points at which both proximal (e.g., peer, school, or family networks) and distal (e.g., culture) sociocultural environments interact to potentially buffer or exacerbate elements of the etiologic pathways to an eating disorder. This perspective inaccurately assumes individuals are passive recipients of environmental influences. In order to understand the variations in, and etiologic pathways for, eating disorder risk, it is not sufficient to simply consider the convergence of proximal and global social contexts. Although the social environment is of special importance in human development, individuals' functioning and development results from the dynamic (and bidirectionally, mutually influential) interaction between the individual and his/her context (Brandtstädter, 2006; Lerner, 2002). As such, it is useful to consider the role of individual characteristics to address questions about why some subgroups of adolescents may be at particularly higher risk for these problems.

The prevailing stereotype that eating disorders primarily affect affluent European-American females has been contradicted by numerous scholars (e.g., Cachelin, Veisel, Striegel-Moore, & Barzegarnazari, 2000; Cachelin, Weiss, & Garbanati, 2003; DeLeel, Hughes, Miller, Hipwell, & Theodore, 2009; Striegel-Moore & Bulik, 2007). In fact,

some ethnic minority girls and women may be at a heightened risk for eating problems (Bisaga et al., 2005; Smolak & Striegel-Moore, 2001). On the basis of the preliminary evidence, European-American race/ethnicity may be a marker for eating disorders characterized by restrictive or compensatory behaviors but not for binge eating (e.g., Striegel-Moore et al., 2005; Striegel-Moore & Bulik, 2007).

In addition to cultural disparities in eating disorder prevalence and incidence, cross-cultural diversity can be observed in symptom presentation (e.g., Lee et al., 2001), and in the values and perceptions relating to self and body image that are believed to be pertinent to disordered eating (e.g., different body ideals, Perez & Joiner, 2003; social pressures for thinness, White, Kohlmaier, Varnado-Sullivan, & Williamson, 2003). Findings from a review of the extant literature suggest that BN, not AN, is a culture-bound syndrome because, in the transcultural literature, no reported cases of BN occurred in the absence of exposure to Western culture, although this is not the case with AN (Keel & Klump, 2003). Some researchers have suggested that prevalence rates across different racial and ethnic groups may be converging due to the homogenization of cultural influences on body image and eating disturbances, but it is unclear whether actual incidence is changing or whether previous estimates have been biased (Shaw, Ramirez, Trost, Randall, & Stice, 2004).

The significant gap in our understanding of the prevalence of these disorders among various ethnic, racial, and socioeconomic status groups in the United States is most salient because European-American women are overrepresented in all psychiatric study samples (Kessler et al, 2005). In addition, race and socioeconomic status are historically confounded in health disparities research. In this brief overview of the

literature, it is clear that both race and socioeconomic status are related to variations in eating disorder incidence, prevalence, risk, and resilience. Just *how* (i.e., through various social/environmental exposures) and *in what combination* are vexing questions (LaVeist, 2005; LaVeist, Thorpe, Mance, & Jackson, 2007). Ethnic minority adolescents, in particular, are negotiating multiple cultural and developmental transitions simultaneously—whether and how these unique changes influence both qualitative and quantitative variations in eating disorder risk and resilience is an important question.

Individual differences based on sex, racial, ethnic, and socioeconomic status factors have been observed to influence the prevalence of and pathways to adolescent eating disorders. These factors influence and are influenced by the developmental context of adolescence which, as described throughout this chapter, presents unique challenges that have the potential to both magnify and reduce eating problems among males and females. As an extension of this discussion, and the notable and specific impact of this developmental period on etiologic pathways to eating disorder risk and resilience, I will now discuss the importance of youth selection of, and involvement in, the sports context.

The sports milieu represents a proximal context that is central to adolescent development, and one that is specifically associated with adolescents' eating- and weight-related attitudes and behaviors. Brofenbrenner and Morris (2006) emphasize that the moment-to-moment exchanges that occur between the person and his/her proximal surroundings (i.e., *microsystems*) exert a central and direct influence on development. The largest amount of adolescents' free time is spent in the sports context (Larson & Seepersad, 2003). In a nationwide survey of US adolescents in Grades 9-12, 56% reported participating on one or more school- or community-based sports teams (Centers

for Disease Control, 2006). As a starting point, it is critical to understand the developmental context of sports participation and its broad relation to adolescent well-being.

Adolescent Sports Participation and Well-Being

Youth participation in organized sports has been linked to indicators of adolescents' physical, social, psychological, and achievement-related behavior and development. Sports has been viewed as an important training ground for adolescent development, one associated with psychological health, positive social development, higher self-esteem, lower levels of depression, and increased academic and occupational achievement through young adulthood (Barber et al., 2001; Brunelle, Danish, & Forneris, 2007; Dishman et al., 2006; Fredricks & Eccles, 2006; Theokas, 2009). In addition, research has demonstrated the positive effects of sports participation on adolescent health behaviors. For example, female high school and college athletes report less frequent and less risky sexual activity and reduced odds of teen pregnancy as compared to non-athletes (Miller, Sabo, Farrell, Barnes, & Melnick, 1998; Sabo et al., 1999). Participation in sports was also linked to lower use of cigarettes, marijuana, cocaine, and "other drugs" (Page, Hammermeister, Scanlan, & Gilbert, 1998), and to lower rates of depression (Gore, Farrell, & Gordon, 2001); however, these associations were not found with participation in art, community service, or school activities (e.g., Barber, et al., 2001).

Some evidence suggests that sports participation serves as a *protective* developmental context because it promotes healthy behaviors and deters adolescent risk through the teaching of values and skills associated with responsibility, initiative, persistence, and self-control (Larson, Hansen, & Moneta, 2006). However, sports

participation has not been universally associated with positive outcomes among adolescents. For example, intense sports participation has been linked to negative health-related consequences, including increased alcohol and smokeless tobacco use, binge drinking, frequent experiences of stress, truancy, and eating disorders during the adolescent years (Barber et al., 2001; Fauth, et al., 2007; Jackson, Keiper, Brown, Brown, & Manuel, 2002; Scanlan, Babkes, & Scanlan, 2005; Smolak et al., 2000). In addition, athletes may experience higher levels of stress compared to non-athletes, given simultaneous athletic and academic demands which can negatively impact athletes' physical and mental status (Kimball & Freysinger, 2003; Papanikolaou, Nikolaidis, Patsiaouras, & Alexopoulos, 2003). The effects of sports participation for adolescent males and females also vary (Gadbois & Bowker, 2007; Gore et al., 2001). These mixed findings may result, in part, from variations in the measurement of sports involvement both at the qualitative and quantitative levels. The developmental consequences of participation depend on qualities of the adolescent and the nature of his/her developmental trajectory; the processes happening within the sports context; and, the opportunities available to youth in more distal environments that facilitate and shape those experiences and processes happening within the sports context (Mahoney et al., 2009)

Variations in Sports Participation that Influence Adolescent Well-being

Participation is often associated with positive benefits among adolescents, but participation alone does not confer adaptive outcomes. Most research related to sports and adolescent well-being has examined the behavioral dimension (i.e., team membership or athletic participation) of sports participation (Miller, Melnick, Farrell, Sabo & Barnes,

2006). Sports participation as a multi-factorial *process* is further supported by evidence that physical activity, a correlate and (arguably) a benefit of sports participation, seems to be less influenced by social and cultural factors than is sports participation (Terzian & Moore, 2009). However, research suggests that sports involvement is comprised of multiple dimensions, one of which represents a psychosocial component associated with how athletes subjectively perceive themselves and how they are perceived by other athletes and athletic peers (Miller, Farrell, Barnes, Melnick, & Sabo, 2005; Miller et al., 2003). Adolescent athletes, particularly those who participate at a competitive level, have been described as having both school-based and sport-based identities that contribute differentially to self-concept (e.g., Mignano, Brewer, Winter, & Van Raalte, 2006; Miller & Kerr, 2003). In addition to adolescent athletic identity, few studies have investigated how multiple dimensions of adolescents' sport involvement (e.g., type of sport, duration, intensity, degree of competition, etc.) may differentially relate to indicators of positive or problematic functioning.

The majority of studies related to sports participation and adolescent well-being examine dichotomous participation or fail to distinguish separable dimensions of involvement, such as breadth (number and combination of activities), intensity, and duration (Rose-Krasnor, Busseri, Willoughby, & Chalmers, 2006; Zarrett, et al., 2009). Research indicates that these factors are, indeed, influential moderators in relations between sports participation and adolescent outcomes. For example, the amount of time youth spend participating in sports each week (intensity) (Simpkins, Ripke, Huston, & Eccles, 2005), their participation stability/duration across adolescence (continuity) (e.g., Zaff, Moore, Papillo, and Williams, 2003; Zarrett et al., 2009), and the time they spend in

other types of activities, in addition to their sports participation (Mahoney et al., 2009), all influence relations among sports participation and adolescent well-being. In addition to these influential characteristics of the sports context, the adolescent sport experience is part of a broader network of nested individual factors and ecologies.

That is, from the early elementary school years through high school, adolescents are participating in multiple activity contexts, in addition to their sports participation (Feldman & Matjasko, 2007; Nelson & Gastic, 2009; Theokas, Lerner, Lerner, & Phelps, 2006). In fact, two-thirds of American adolescents participate in at least two out-of-school time activities during the school year (National Institute of Out-of-School Time, 2008). Therefore, although the processes happening within the sports context have the potential to promote positive development, the actualization of this potential is not consistent across all activities among all youth. Cross-contextual relations affect and are affected by the processes within the sports context (Mahoney et al., 2009). The effects of sports participation on adolescent developmental outcomes may depend on the combination of these activities, such as sports alone or sports participation combined with other organized activities (e.g., performing arts; Nelson & Gastic, 2009). However, only a small number of studies have examined how development may vary for youth involved in different combinations of activities.

The few studies that have examined the influence of participating in multiple activities, in addition to sports activities, have yielded inconsistent findings. Among affluent European American adolescents, involvement in diverse activity experiences (compared to single activity involvement) was entirely unrelated to academic and behavioral outcomes (e.g., Luthar, Shoum, & Brown, 2006). By contrast, in a sample of

1,622 early adolescents (Grades 5-7), youth participating in both sports and in a youth development program (e.g., YMCA, Boys & Girls Clubs) reported higher levels of positive development (e.g., contribution, lower risk behaviors) compared to those youth who were only participating in sports (Zarrett et al., 2007). Another study reported similar findings among 10 to 18-year-old adolescents; that is, sports participation in combination with other activities is related to more positive outcomes (e.g., school connectedness and social well-being) than sports participation alone (Linver et al., 2009). In a longitudinal study of over 8,000 adolescents aged 12-18, those youth who participated only in sports showed steeper increases in problem alcohol use over a 3-year period compared to adolescents who combined sports participation with non-sport activities (e.g., academic activities; Mays, DePadilla, Thompson, Kushner, & Windle, 2010). Taken together, these findings suggest that qualitative differences in developmental outcomes do exist among adolescents who participate in sports only compared to those youth who participate simultaneously in multiple activities. However, more research needs to examine the nature of these associations, particularly from a developmental perspective.

Interindividual differences in the effects of sport participation on adolescent well-being may also have been incompletely estimated by a reliance primarily on variable-centered methods of data analysis. These methods compare mean level differences in relations among sports participation and indicators of adolescent well-being, which fails to account for variations across the individuals in the sample (Magnusson, 2003; von Eye & Bergman, 2003; von Eye, Bogat, & Rhodes, 2006). These measurement issues make it difficult to draw definitive conclusions about the variations that exist in the relationship

between sports participation and adolescent well-being; that is, under what types of conditions and for which youth is sports participation beneficial or problematic. Eating disorders is one specific area of adolescent well-being where these measurement (in addition to conceptual) issues observably influence the disparate research findings that characterize the literature. In fact, despite the heightened research attention related to athletes and eating disorders, study findings have yielded more questions than answers.

Sports Participation and Eating Disorder Risk

Several lines of evidence suggest that proximal social networks and “subcultures” transmit and reinforce social norms and values that perpetuate risk for body dissatisfaction and eating pathology (Becker, Fay, Agnew-Blais, Khan, Striegel-Moore, & Gilman, 2011; Lin & Kulik, 2002; Presnell, Bearman, & Stice, 2004). As already noted, adolescence marks a period of elevated vulnerability for eating disorder risk given the numerous biological, psychological, and social transitions that occur during this developmental period. Accordingly, it becomes critical to examine potential factors in the adolescent ecology that mitigate risk. The sports environment is one example of a prevalent and proximal context among adolescents that has been implicated as a risk factor in the development of eating disorders. To date, researchers have been interested in addressing two specific questions: 1. whether the prevalence of eating disorders is higher among athletes compared to the general population; and 2. whether specific subgroups of athletes show heightened risk.

Early interest in the role of the sports environment as a precipitator of problematic eating and weight-related attitudes and behaviors can be traced to the 1980s, when case studies, press accounts, and anecdotal reports alerted researchers to the potential for these

issues to exist among athletes (Byrne & McLean, 2001). Initial research in this area was generally risk-focused, arguing that characteristics of the sports environment, including an emphasis on weight and body ideals for athletic performance, created a subculture where objectifying societal messages and ideals were magnified and, thus, increased female athletes' risk for developing eating pathology (Striegel-Moore et al., 1986). Initial attempts to address the question of how prevalent these issues were among athletes, compared to non-athletes, yielded estimates that varied widely across studies due to methodological differences (Burckes-Miller & Black, 1988; Rosen & Hough, 1988).

The past three decades have seen an upsurge in research related to athletes and eating disorders, concomitant with the rise in women's participation in collegiate sports (NCAA, 2002). Some research has suggested that female athletes, in particular, may be at a heightened risk for eating pathology (Greenleaf, Petrie, Carter, & Reel, 2009; Kirk, Singh, & Getz, 2001; Petrie & Greenleaf, 2007; Thompson & Sherman, 2010). Currently, several theories seek to explain why adolescents participating in sports may potentially be more susceptible to eating pathology compared to the general population and, as well, why specific subgroups of these athletes may be particularly vulnerable given the nature of the particular sport(s). To explain these arguments, I will provide an overview of the major conceptual models that exist to account for the relations between sports participation and eating pathology risk among adolescents. Because these theories have been borrowed from the broad eating disorder literature that I have discussed earlier in this paper, the following sections will recapitulate these theories only insofar as they relate specifically to athletes and eating disorders. Empirical findings that both support and contradict these theories will be discussed to examine some of the theoretical and

methodological limitations that characterize the current state of the field and that justify the aims of this dissertation.

Major Theoretical Models Relating Sports Participation and Eating Disorders

Sociocultural models have been guiding the measurement models for researchers who are trying to understand associations between sports involvement and eating disorder risk among adolescents. That is, examining the specific aspects of the sports environment that relate to increased, decreased, or no risk has been the primary focus of researchers who, in turn, have not given sufficient attention to the dynamic interaction of the athlete and his/her context. Proponents of the sociocultural model for eating disorder risk have suggested that athletes may be particularly susceptible to adopting unhealthy eating and weight control behaviors and attitudes because of the social and task pressures that characterize the sports environment (Byrne & McLean, 2001; Hausenblas & Carron, 1999; Petrie & Sherman, 1999). Task pressures include maintaining or achieving an ideal weight or physique for athletic performance. Social pressures include pressures from coaches, peers, and parents to achieve or maintain an ideal weight or physique.

The nature (or type) of sport has been a documented risk factor, again because of the nature of the ecology and sports experience for the adolescent. Athletes competing in judged sports (e.g., gymnastics), endurance sports (e.g., cross-country running), and weight-dependent sports (e.g., wrestling) may be at an even higher risk for eating disorders compared to athletes in other non-weight focused sports (e.g., soccer, baseball, basketball), as well as compared with their non-sports involved peers (e.g., Davison, Earnest, & Birch, 2002; Reinking & Alexander, 2005; Sundgot-Burgen, 1994; Swami, Steadman, & Toveé 2009; Thompson & Digsby, 2004; Torstveit, Rosenvinge, &

Sundgot-Borgen, 2008). According to this perspective, engagement in unhealthy behaviors (e.g., dieting, purging, meal skipping) may be related more to sport-related pressures than to negative body image (De Bruin, Oudejans, & Bakker, 2007). For example, high school wrestlers, male jockeys, and ballet dancers have been described as high risk sport groups in terms of their use of extreme weight control behaviors to “make weight” (Kinningham & Gorenflo, 2001; Leydon & Wall, 2002; Pope, Phillips, & Olivardia, 2000; Ringham et al., 2006).

In addition to the lean versus non-lean sport type distinctions, classifications of “gender-stereotyped” sports and their influence on eating disorders and body dissatisfaction have also been made. For example, in a large-scale study of female adolescents ($n = 7,214$), athletes who participated in stereotypically feminine sports (e.g., cheerleading, dance, gymnastics) were more likely to report feeling overweight, to attempt to lose weight, and to use multiple weight-loss strategies compared to non-athletes. However, participation in stereotypically masculine sports (e.g., soccer, basketball) was not associated with more unhealthy eating- and weight-related concerns and behaviors (Crissey & Honea, 2006).

Some scholars have suggested that factors in the sports environment other than sport type may be more influential in terms of eating disorder risk (e.g., Berry & Howe, 2000; Milligan & Pritchard, 2006). For example, competitive level, participation frequency, and intensity of training have been suggested as potential moderators in the relationship between sports involvement and eating disorder risk, but these characteristics also have yielded mixed findings (e.g., Hausenblas & Carron, 1999; Picard, 1999; Pyle, McQuivey, Brassington, & Steiner, 2004; Smolak et al., 2000). Among vulnerable

individuals, the focus on physical activity and exercise in the sports environment may precipitate and normalize unhealthy patterns of behavior (Davis, Kennedy, Ravelski, & Dionne, 1994; Hausenblas & Carron, 1999). Certain behaviors that may be considered problematic or unhealthy in the general population may appear as “normal” or adaptive in the context of sports participation, particularly among those individuals in highly competitive environments. It is also possible that athletes may be less likely to disclose potentially risky weight control and eating behaviors because they fear exclusion from the team (Sundgot-Borgen, 1994).

Sociocultural theories also have been supplemented by some biobehavioral explanations to support an “activity-based model of anorexia” (Epling & Pierce, 1988). According to this perspective, excessive exercise and physical activity fuel subsequent dieting and eating disorder risk through the suppression of appetite and reinforcement of behaviors associated with weight loss (Blundell & King, 1999; Hillebrand, Koeners, de Rijke, Kas, & Adan, 2005). However, this theory may apply in cases of excessive rather than moderate activity, or in those sports contexts where endurance, high-level training, and competition dominate (e.g., elite cyclists; Blundell & King, 1999).

Intraindividual Characteristics as Moderators:

The Role of Individual-Level Factors

Although the sports environment has been emphasized as the locus for eating disorder risk among adolescents, specific intraindividual characteristics have been suggested to amplify or reduce risk within the sports context. The types of sports conditions wherein particular athletes may be at an especially high risk for disordered eating depends, as well, on the physical, psychological, and demographic marker

variables linked to risk. Accordingly, I will review selected individual-level characteristics from these domains that are relevant to the current dissertation.

Physical factors

BMI, an indicator of body fatness, has been found to be one of the most reliable and robust physical correlates of body dissatisfaction (Babio et al., 2008; Donovan, Spence, & Sheffield, 2006; Jones, Vigfusdottir, & Lee, 2004; Littleton & Ollendick, 2003; Ricciardelli, McCabe, Holt, & Finemore, 2003; Stice, 2002), dieting (Halpern, Udry, Campbell, & Suchindran, 1999; Ohring, Graber, & Brooks-Gunn, 2002), and disordered eating among adolescents (Lynch, Heil, Wagner, & Havens, 2008; Stice et al., 2002; Wichstrom, 2000). In addition, both short- and long-term follow-up studies have shown that increases in BMI are also associated with increased body dissatisfaction, and that these effects span multiple developmental phases of adolescence (Field et al., 2001; Ohring et al., 2002; Paxton, Eisenberg, & Neumark-Sztainer, 2006; Presnell et al., 2004). However, although theory suggests that physical factors may impact eating disorder pathways among athletes, perhaps above the effects of sport type (e.g., Swami et al., 2009), it is not clear how these factors interact with features of the sports context to shape pathways to risk and resilience. Those studies that have measured body mass and its relation to sports participation, generally included this variable as a covariate or as a descriptive outcome (e.g., Fulkerson, Keel, Leon, & Dorr, 1999; Hulley & Hill, 2001; Petrie et al., 2008).

Both socioenvironmental theories and biobehavioral theories emphasize the relationship between weight and eating disorder risk and resilience among adolescent athletes. According to socioenvironmental explanations, in a sports environment focused

on leanness and physical aesthetics, body mass, or adiposity, may be important to measure in order to explain both participation patterns and sports performance (Deforche, De Bourdeaudhuij, & Tanghe, 2006; Elkins, Cohen, Koralewicz, & Taylor, 2004). In a foundational study by Brooks-Gunn, Burrow, and Warren (1988) that compared adolescent female dancers, skaters, swimmers, and non-athletes, skaters and dancers were lighter and leaner than swimmers. In comparison to sports where leanness may be essential to performance and appearance, strength-based sports such as football and power lifting demand larger and heavier physiques. In fact, there is a higher prevalence of overweight individuals among high school football players compared to the general population (Choate, Forster, Almquist, Olsen, & Poth, 2007). For some athletes, achieving this particular body build may involve an increased likelihood for problematic weight control behaviors. For example, the use of performance-enhancing drugs (e.g., anabolic steroids and nutritional supplements) has been documented among adolescent males who participate in strength-based sports (e.g., Bahrke, Yesalis, & Brower, 1998; Baum, 2006).

However, the impact of BMI on eating disorder risk in the sports context may not be straightforward or linear. For example, lower BMI athletes are not immune to, nor do they consistently report lower levels of, body dissatisfaction compared to both their higher BMI athletic and non-athletic peers (Swami et al., 2009). Similarly, in a nationally representative study of over 9,000 adolescent boys and girls, males in the lowest BMI category were at the highest risk for steroid use, which suggests that these weight control methods may not be exclusive to participants in strength-based sports (e.g., football, weightlifting; Neumark-Sztainer, Story, Falkner, Beuhring, & Resnick, 1999). However,

the accuracy of BMI as an index of fatness may be misleading among athletes, given that BMI may misclassify normal weight athletes or athletes with a lot of muscle tissue as overweight (Ode, Pivarnik, Reeves, & Knous, 2007).

Regardless of the type of sport, however, higher body weight—and more specifically, obesity—has been negatively related to youth sports participation (Alfano, Klesges, Murray, Beech, & McClanahan, 2002; Elkins et al., 2004; Sallis, Alcaraz, McKenzie, & Hovell, 1999). As previously described, biobehavioral theories seem to suggest a link between high levels of activity and dietary restriction. However, studies in the eating disorder literature have not formally examined this theory specific to adolescent athletes.

Psychological characteristics

Specific personality characteristics that may in fact be beneficial in terms of athletic performance are also considered psychological risk factors for eating disorders (e.g., perfectionism, goal- and performance-oriented, competitive), suggesting that these characteristics may partially account for heightened risk among some athletes (Fulkerson et al., 1999; Hopkinson & Lock, 2004; Schwarz, Gairrett, Aruguete, & Gold, 2005; Sherman, Thompson, DeHass, & Wilfert, 2005; Thomas, Keel, & Heatherton, 2005; Tyrka, Waldron, Graber, & Brooks-Gunn, 2002). The issue of directionality is a complicated one; that is, participation in a highly intense and competitive sports environment has the potential to increase risk. However, it is also plausible that specific psychological characteristics can amplify an individuals' propensity to self-select into highly competitive sports environments that reinforce specific cultural values and norms

associated with increased eating disorder risk (Klump, Ringham, Marcus, & Kaye, 2001; Thomas, Keel, & Heatherton, 2005).

Low self-esteem is another psychological factor that has been associated with eating pathology among both males and females (e.g., Courtney, Gamboz, & Johnson, 2008; Ghaderi & Scott, 2001; Jacobi et al., 2004; Mayer, Muris, Meesters, Zimmermann-van Beuningen, 2009; Ricciardelli & McCabe, 2004; van den Berg et al., 2010; Vohs et al., 2001). However, whether and how self-esteem moderates relations between sports participation and eating pathology is unclear. In one study of Division I female athletes, low self-esteem was more strongly associated with increased eating pathology than was sport type (Milligan & Pritchard, 2006). Other researchers have suggested that low self-esteem may be a risk factor for eating pathology in European American female athletes, but not among African American female athletes (Johnson et al., 2004). Still other researchers reported no differences between athletes and non-athletes in terms of self-esteem (Hulley, Currie, Njenga, & Hill, 2007).

Several explanations exist to support the idea that self-esteem moderates associations between sports participation and eating pathology. For instance, sports participation has been related to increases in feelings of self-worth and self-efficacy among adolescents (Bowker, Gadbois, & Cornock, 2003; Dishman et al., 2006; Tiggeman, 2001). In fact, high perceived self-efficacy (which may be considered one facet of self-esteem; Fulkerson et al., 1999) and positive self-concept/ high self-esteem (e.g., Asci, Gökmen, Tiryaki, & Asci, 1997; Berry & Howe, 2000) may buffer athletes' vulnerability to eating issues. It is also plausible that adolescents with more positive self-conceptions are more likely to participate in sports compared to adolescents with lower

self-esteem (Shaffer & Wittes, 2006). Regardless of the directionality, sports-based prevention research has shown that there are positive effects of targeting adolescents' self-esteem to lower eating disorder and body dissatisfaction risk (DeBate & Thompson, 2005).

Accordingly, this dissertation will examine the developmental impact of self-esteem on trajectories of eating pathology and of body dissatisfaction in order to elucidate whether self-esteem is differentially related to specific eating-and weight-related trends in this sample of adolescents. In addition, to examine whether self-esteem is a key factor in potential relations among these variables, this research also will assess the potential influence of self-esteem on associations between sports participation and eating pathology.

Demographic marker variables

Differential patterns of risk and resilience for disordered eating and body dissatisfaction among sports participants may vary in relation to demographic marker variables, specifically sex, SES, race/ethnicity, and age. To date, however, gender- and age-based variations in eating disorder risk and resilience among sports participants have received the most research attention, compared to the focus of a small number of studies that have examined these issues among racially and socioeconomically diverse adolescent athletes (e.g., Crissey & Honea, 2006; Johnson et al., 2004; Pernick et al., 2006; Rhea, 1999; Walters, Barr-Anderson, Wall, & Neumark-Sztainer, 2009). Sex, in particular, has been a salient factor throughout the literature because, theoretically, the risks for female athletes are considered two-fold: those that stem from the general societal pressures as well as the sport-specific pressures that reflect localized sociocultural values and norms.

Sex. Consistent with the historically singular emphasis on females (and their relative risk) in the eating disorder literature, the focus of earlier research related to these issues among athletes has been on understanding the prevalence of eating problems among female athletes and the effects that participation confers on this particular subgroup (Petrie & Greenleaf, 2007). The only recent shift to examining prevalence and etiologic pathways of eating disorder risk among male athletes can be attributed to a few factors.

As previously noted, the purported elevated risk among female athletes may be perpetuated by societal stereotypes. Doctors and coaches have also become aware of the unique health concerns of women that arguably interfere with normative and healthy pubertal development. These concerns have included three interrelated conditions—disordered eating, amenorrhea, and osteoporosis—termed the *female athlete triad* (Golden, 2002; Yeager, Agostini, Nattiv, & Drinkwater, 1993). Each of these conditions, and their combination, adversely impact both performance and health (e.g., stress fractures, bone loss, depression, impaired concentration) among female athletes (Birch, 2005). Because early identification of the warning signs and symptoms increases the possibility for preventing this triad among at-risk females, researchers and practitioners have focused their attention on this particular syndrome. In addition to the prevention of problems associated with girls' athletic involvement, applied developmental psychologists also are interested in the promotion of girls' healthy involvement in physical activity, given the observed developmental decline that occurs in their participation across adolescence (Grunbaum et al., 2004; Kimm et al., 2000).

Although the emphasis in the extant literature has been on female athletes' risk, this trend is shifting because of the changing values and ideals regarding male attractiveness (Baghurst, Hollander, Nardella, & Haff, 2006; Garner, 1997; Grieve, Newton, Kelley, Miller, & Kerr, 2005; Labre, 2005). Although some research supports that disordered eating symptoms may occur in a sizeable proportion (20%) of male athletes (e.g., Petrie et al., 2008), other studies suggest that males' lack of sports involvement is related to higher levels of body dissatisfaction (e.g., Pritchard, Milligan, Elgin, Rush, & Shea, 2007).

Studies that have compared male and female athletes in terms of the prevalence of disordered eating and weight control behaviors are also inconclusive. Numerous scholars have suggested that female athletes are at a greater risk than males for disordered eating and body dissatisfaction (e.g., Burak & Burckes-Miller, 2000; Milligan & Pritchard, 2006; Stoutjesdyk & Jevne, 1993). However, methodological and theoretical issues (as previously discussed in the section "Sex-based Variations in Eating Disorders") complicate the issue of comparative prevalence. For example, clinical eating disorders may be less prevalent among male athletes as compared to their female counterparts, but pathogenic weight control behaviors were equally endorsed by both groups (Petrie et al., 2008). However, when researchers measure eating pathology using two subscales comprising the Eating Disorder Inventory (EDI; Garner, Olmstead, & Polivy, 1983), Drive for Thinness (i.e., an index of dietary restraint and pursuit of thinness) and Body Dissatisfaction, female track and field athletes reported significantly higher scores on both indices compared to male athletes (Hausenblas & McNally, 2004).

Additional studies report interactive effects of gender and athletic participation on disordered eating and body dissatisfaction. For instance, in a comparison study of collegiate athletes and non-athletes, all athletes displayed more disordered eating than did non-athletes; however, the gap was much greater between female athletes and non-athletes than between male athletes and non-athletes (Pritchard et al., 2007). Other researchers have suggested that, when athletes and non-athletes may differ in disordered eating attitudes and behaviors, effects exist irrespective of gender (e.g., Sanford-Martens et al., 2005).

From a developmental perspective, clarifying the psychosocial risk and protective factors that are shared and, as well, that are specific to adolescent female and male sports participants is integral to designing effective interventions. Arguably, given that one central goal of applied developmental psychologists is the optimization of positive and healthy development, this research agenda is more fruitful than comparing prevalence estimates. Comparisons of male and female athletes suggest that some shared risk factors exist (e.g., body dissatisfaction; Milligan & Pritchard, 2006), but that other factors associated with risk for female athletes, such as negative affect and perceptions of weight-related pressures, may not apply as strongly, or at all, to male athletes (Petrie, Greenleaf, Reel, and Carter, 2007). Theoretically, some female athletes may adopt less traditionally “feminine” behavioral scripts (i.e., emphasis on competition, strength, aggression, assertiveness) vis à vis their sports involvement, but whether and how the adoption of these gender scripts protects against or promotes risk among girls participating in “masculinized” sports contexts is unclear (Caron, Carter, & Brightman, 1985; Houseworth, Peplow, & Thirer, 1989). Thus, more longitudinal research is

necessary to examine relations between sports participation, sex, gender, and eating pathology, to ascertain if variations in patterns of these relations exist among males and females.

Age-related influences. The developmental period of adolescence, has been suggested as a peak risk period for the onset of eating disorders (Striegel-Moore & Bulik, 2007). Therefore, developmental timing is clearly an important (although not independent) factor in the eventuation of or protection from eating problems. As it relates to these issues among athletes, the majority of research is based on college-aged or elite sport participants, with fewer studies targeting younger adolescents and tracing the development of these problems over time (Smolak et al., 2000). Although one of the central foci of the current dissertation relates to examining developmental trends in eating disorder risk and resilience, including selected individual and contextual factors that may shape the diversity of these trajectories, this work will not investigate the level and rate of change in eating pathology and body dissatisfaction over the middle adolescent years. The emphasis on this developmental period in particular exists for theoretical reasons. Symptoms are most likely to emerge, fluctuate, and peak during this period, and this period is also aligned with the school-based transition to high school, when sports and extracurricular activities are both self-selected and occupy significant amounts of adolescents' time and energy. In addition, I emphasize this developmental period for data base-related reasons (i.e., availability of data related to eating pathology).

Some studies of eating pathology among high school athletes suggest a protective effect of high school sports participation on eating pathology (Pernick et al., 2006; Smolak et al., 2000), whereas others do not find support for this claim (Hausenblas &

Carron, 1999). However, these studies have generally made comparisons between high school, college-aged, and elite athlete individuals without consideration of developmentally-specific factors, in addition to sports participation, that may confound any observed mean level differences in eating pathology. Beyond the sampling of younger participants, research should track youth developmentally in order to elucidate how relations between sports participation and eating problems may be moderated by developmental processes. That is, it is critical that longitudinal research address questions about what characteristics of the adolescent, in combination with what specific sports, historical, and developmental contexts are related to what instances of increased risk (and protection).

SES. Because I have previously reviewed research related to socioeconomic and racial variations in eating disorder prevalence and risk (see the section on “Cultural and Socio-Economic Variations in Eating Disorder Prevalence and Incidence”), this section will focus on whether and how adolescent sports participation varies as a function of socioeconomic status. The developmental literature has shown that ethnic minority adolescents are more likely than their European American peers to live in impoverished and urban settings where access to resources is compromised (Leventhal, Dupéré, & Brooks-Gunn, 2009; Urban, Lewin-Bizan, & Lerner, 2010). Although the extant research has supported a linear relationship between SES and sports participation (and, in particular, organized sports participation) among both adolescent boys and girls, out-of-school time activities, such as sports, have been shown to be particularly beneficial to minority youth (e.g., Johnston, Delva, & O’Malley, 2007; Walters et al., 2009). These activities buffer low-income youth from the negative effects of poverty by exposing them

to safe, adult-supervised environments that foster new skills (e.g., Eccles & Gootman, 2002). Guest and Schneider (2003) found that high sports involvement was significantly related to academic achievement among low- and middle-income youth, but was unrelated to achievement among high income youth. Conversely, some research suggests that, compared to their higher SES peers, sports participation among lower SES adolescent boys may be related to a steeper decline in physical activity in the transition into young adulthood (Walters et al., 2009). Low SES youth face financial barriers (e.g., athletic fees, lack of transportation) and socially-related barriers (e.g., familial modeling) to participation that uniquely shape their participation patterns. These findings lend further support to the literature that suggests that sports participation varies across context (e.g., Eccles, 2005; Fredricks & Eccles, 2006).

Although existing developmental research has shown that SES influences adolescents' decisions to become involved in sports (e.g., Goldsmith, 2003; Seabra, Mendonca, Thomis, Peters, & Maia, 2008), as well as the differential effects sports participation will have on development, the *process* of how SES specifically relates to eating disorder risk and resilience in the sports context has not yet been explored. For example, the "organized sports participation gap" may reflect less access to opportunities for lower SES youth compared to their higher SES peers, but it may also be that these youth take advantage of these opportunities less frequently.

Race/ethnicity. As previously described, increasing evidence exists to support the idea that the cultural milieu impacts the nature and prevalence of eating disorders via the promulgation of specific physical appearance values and norms (Striegel-Moore & Bulik, 2007). In addition, sports participation is another embedded microcosm through which

the transmission of specific ideals and norms may potentially shape adolescents' weight- and eating-related trajectories. However, because the majority of research examining associations between sports participation and disordered eating and body dissatisfaction has been based on European American samples, cultural pathways to eating disorder risk and resilience among adolescents participating in sports (or not) remain empirically under-investigated.

The direct impact of race/ethnicity on eating attitudes and behaviors among young athletes has been largely outside the scope of the extant research. In two studies relevant to this issue, comparisons were made among European American, Latina, and African American female high school athletes (Pernick et al., 2006; Rhea, 1999). These researchers found that European American and Latina high school female athletes were more dissatisfied with their weight and desired to be thinner than African American athletes, despite their lower BMI. Pernick et al. (2006) suggested that Latina female athletes may be at a particularly high risk for BED. In addition, Rhea (1999) found that European American and Latina athletes were equally dissatisfied with their weight compared to their higher BMI African American peers, who were more satisfied with their weight and less preoccupied with thinness. Finally, the third study compared European American and non-European American athletes participating in stereotypically feminine (e.g., dance, gymnastics) and masculine (e.g., soccer) sports (Crissey & Honea, 2006). Participation in stereotypically feminine sports may intensify eating and weight-related problems, particularly for European American girls.

Although legitimate conclusions about the role of race/ethnicity in explaining relations among sports participation and disordered eating cannot be made, findings from

existing research suggest that the transmission of global cultural values and ideals may be magnified within the sports context for adolescents' from varying racial/ethnic backgrounds. As previously noted, although an examination of how adolescents' racial and ethnic backgrounds potentially interacts with the sports context to create variations in eating- and weight-related trajectories is beyond the scope of the current dissertation, race/ethnicity is a key factor in the diversity of these developmental outcomes and an important area for future research.

In sum, then, these findings taken together suggest that no single factor at the contextual or individual level (e.g., physical, psychological, or demographic) alone exerts a direct influence on developmental trajectories of eating pathology and protection among adolescent sports participants. It is only through an understanding of how these factors interact to direct and shape the development of and variations in these trajectories that applied developmental scientists can optimize the positive and healthy development of diverse adolescent males and females. Although the current dissertation will examine a conceptual model that encompasses only selected factors from these multiple levels, one central aim of this work is to address some of the major theoretical and methodological limitations that characterize the extant literature, and that limit the utilization of a holistic perspective about the developmental processes of eating disorder risk and resilience in the sports context.

Theoretical and Methodological Limitations

Some scholars suggest that the inconclusive nature of findings related to athletes and eating disorders are the result of several theoretical and methodological limitations that characterize existing research (e.g., Byrne & McLean, 2001; Petrie & Rogers, 2001).

I will review some of the most prominent of these issues, i.e, ones that specifically challenge a systems-based, developmental perspective and that are most relevant to the current dissertation. Because methodological decisions are predicated on theory, I will first introduce some of the conceptual shortcomings I perceive to exist in the literature.

Theoretical Limitations

As previously described, sociocultural models have framed the theories that researchers use in investigating links between sports participation and eating disorders. These models are relevant because sports represent a localized subculture among adolescents through which global and sports-specific values and norms are transmitted, and because contextual factors within the sports context certainly have the potential to elevate or reduce risk among particular types of youth. However, a reliance on these theories to the exclusion of relational metamodels (e.g., developmental systems conceptions) may limit the empirical and ecological validity of research findings.

Limits of existing theoretical models

The fundamental unit of analysis (i.e., the person↔context relationship) that characterizes developmental systems models is underdeveloped in, if not largely absent from, the eating disorder literature, particularly as this research relates to adolescents' sports participation and youth eating disorder risk and resilience. The tendency for specific subgroups of athletes (e.g., wrestlers or dancers) to engage in unhealthy weight control behaviors has been primarily described from a context-based perspective that obscures individual characteristics that may mitigate sports-related pressures and factors associated with risk and protection. In addition, the extant research seems to suggest a rather static and "one-size-fits-all perspective to understanding contextual influences.

For example, the sports environment is not the exclusive context within which adolescents are embedded, but existing research fails to examine the multiple layers within the adolescent's ecology (and within himself/herself), and interactions among and within these levels, that influence these adolescents' eating and weight outcomes.

As noted, sociocultural models that describe eating disorder risk (in a general sense and not specific to the case of sports participation) underscore the context-specificity of etiologic pathways. Accordingly, multi-level studies that examine the proximal settings, such as family, peers, schools, out-of-school time activities, and neighborhoods, that influence and are influenced by adolescents' sports participation will add more validity to whether and how sports-related effects are either amplified or diminished by specific contexts, as well as by certain individual characteristics.

Essentially, research questions have been framed according to split-based conceptions (e.g., comparisons according to athletic status, sport type, competitive levels, etc.), which are limited in their ability to identify the diversity of within- and across-group characteristics that are related to risk and resilience. In particular, identification of high versus low risk subgroups obscures important interindividual distinctions among athletes and fails to describe characteristics that are associated with protection from the development of eating and weight problems. Furthermore, scholars appear to be constrained by questions about comparative prevalence among athletes (and particular subgroups of athletes) and non-athletes, in terms of their disordered eating attitudes and behaviors. These are questions about mean level differences, and they fail to address issues related to developmental processes and pathways of risk and resilience.

Scholars conducting extensive research in the area of athletes and eating disorders have suggested that the current perspective needs to shift from questions of risk status to research intended to address questions about psychosocial risk factors in particular (Petrie & Greenleaf, 2007). Although I agree with broadening the theoretical lens, this approach is still focused almost entirely on risk and lacks a recognition of process, or the bidirectional, integrative relations that characterize and shape development. As I described earlier in this chapter, such a process-oriented, integrated perspective exists, including the positive youth development (PYD) perspective.

According to the PYD perspective, the resources in youth social ecologies (e.g., families, communities, schools) that support and promote healthy development have been termed, “developmental assets” (Benson, 2003; Benson, Scales, Hamilton, & Sesma, 2006). Sports may be considered one such developmental asset. If researchers adopted the developmental systems-based perspective, the focus of future empirical inquiry and prevention efforts would be on identifying and fostering components of the adolescents’ ecology that are related to positive and healthy eating attitudes and behaviors. The current dissertation is intended to provide an example of how the PYD perspective may be applied to the case of eating problems among adolescent athletes.

Developmental specificity of existing models

One of the major theoretical drawbacks of the existing literature may be the paucity of models with a developmental systems focus. Because few studies have truly addressed questions about person↔context relations, even fewer scholars have discussed the developmental specificity of sports participation and how adolescents’ involvement (or non-involvement) may have differential effects related to eating disorder risk and

resilience depending on the specific needs of a particular adolescent and how these needs are supported by the sports environment. For example, researchers need to consider that one of the fundamental developmental tasks and needs for adolescents, compared to children and adults, is achieving and securing autonomy (McElhaney, Allen, Stephenson, & Hare, 2009). Sports participation has the potential to impact on healthy versus unhealthy development, depending on its role in supporting such key developmental tasks as autonomy and identity development (Barber, Abbott, Blomfield, & Eccles, 2009).

The differential needs of adolescents, as well as the recognition that these developmental needs may also be individually and culturally specific, have the potential to influence how athletic participation and non-participation are uniquely related to pathways of eating disorder risk and resilience. Consistent with a developmental systems perspective, the likelihood for positive developmental outcomes is enhanced when individual characteristics and developmental needs closely match with contextual resources (Brandtstädter, 2006; Eccles, 2004). That is, when a dynamic, goodness-of-fit exists between an individual and environmental resources, adaptive development results (Lerner, 1984).

Adolescence, as a distinct developmental period, within which an individual himself/herself is constantly changing, is one such portion of the ontogenetic sequence of person↔context relations that is further embedded in historical and cultural contexts. Such interconnections may influence the adaptive development of adolescent participants in sports, insofar as eating- and weight-related outcomes are concerned. For example, both the quantitative (e.g., weight- and height-related) changes and the qualitative (e.g., emergence of the sex drive) changes that distinguish adolescence from childhood and, in

turn, from adulthood, may influence how adolescents' experience the sports context. In addition, these quantitative and qualitative changes happen in cultural and historical contexts that further impact the nature of their influence on developmental outcomes (Elder, 1998; Elder & Shanahan, 2006; Mistry & Wu, 2010). Certainly, examination of these macro-level effects is a more complicated undertaking, and beyond the scope of the current dissertation, but scholars should address questions of developmental specificity in their theoretical models to determine whether adolescent athletes are at a particular risk and, as well, to understand how to improve these contexts in a manner that will be directly relevant to their unique development.

Defining athletes and non-athletes

In addition to these aforementioned limitations of existing theoretical models that have guided the field, and a primary reliance on context-focused pathways to eating disorder risk, the conceptualization of the sports "context" (and of athletes and non-athletes) is also problematic. Scholars have inconsistently defined and operationalized sports participation, subgroups of athletes (e.g., elite, recreational, high- versus low-active, competitive, lean, weight-related, team-oriented, stereotypically feminine and masculine), and non-athletes (e.g, non-exercisers, no team affiliation). These disparities introduce additional theoretical heterogeneity that, in turn, have methodological implications that include challenges to replicability and cross-study comparison.

As discussed in an earlier section (i.e., "Variations in sports participation"), the majority of researchers define athletes based on their involvement in a single sport (e.g., Hausenblas & McNally, 2004; Hulley & Hill, 2001; see Hausenblas & Carron, 1999 for review), which is an ecologically invalid approach given that youth participate in

multiple activity contexts, characterized by unique exposures and experiences, throughout the academic year (e.g., Balsano, Phelps, Theokas, Lerner, & Lerner, 2009; Zarrett et al., 2009). As previously discussed, sports participation is comprised of multiple components (Miller et al., 2005). Some scholars argue that these dimensions include behavioral factors (e.g., team membership, frequency, duration and intensity of involvement) and psychosocial factors (e.g., athletic identity, both by self and others). However, the majority of studies that have examined associations between athletes and eating disorders define athletes and sports participation according to these behavioral characteristics only. Because adolescents are especially sensitive to and influenced by the perceptions of others (and, in particular, peers; e.g., Brown & Larson, 2009), the psychosocial components of their sports participation may be particularly influential factors in how sports involvement is related to eating attitudes and behaviors.

In addition, the description of athletes as “elite” may be very subjective and, in the current literature, this definition shows variability in terms of the characteristics and levels that qualify for this distinction. Are “elite” athletes the same as “highly competitive” athletes? What characteristics define an athlete as “elite?” Are these labels imposed by the researchers? Do athletes and non-athletes exhibit self perceptions congruent with the same distinguishing characteristics in their sports that scholars describe? In addition, depending on the “criteria” by which “elite” athletes are defined, scholars may be confounding potentially unique dimensions of sports participation (e.g., activity level, degree of competition, intensity, performance outcomes) and their plausibly variable relations to eating- and weight- related outcomes.

Answers to these questions depend partially on context and may change over the course of development (i.e., elite high school athletes involved in, say, football will look very different from professional athletes, but for reasons unrelated to the sport context). Therefore, the assignment of these labels without consideration of what athletic status means in context may be meaningless. In addition, to allow for the generalizability of findings through replication of existing studies, future research may need to define athletes and these particular subgroups according to specific behavioral and attitudinal characteristics, instead of relying on terms (e.g., elite, competitive, lean, weight-related) that have yet to be consistently defined. Moreover, the non-athlete comparison group is also not consistently defined by specific criteria across the majority of studies in the literature. In the absence of defining criteria for these groups, and because of a lack of a consensus across studies on what these labels mean in terms of group membership, the labels are essentially meaningless. However, where scholars are using these labels, clarity about how these labels are generated and which context- and individual-level characteristics define these categories is critical.

Omission of Key Variables: Implications for Endogeneity

As noted, theoretical models relating adolescent sports participation to eating disorder risk have primarily emphasized the impact of context. As is often the case with social science research, the literature related to adolescent sports participation and eating disorders is also characterized by gaps with respect to key variables, at both the individual and contextual level, that may moderate developmental relations among sports participation and eating disorders. According to developmental systems theories, development is a transactional process wherein adolescents are active agents in the

selection of specific contexts and in how they experience these contexts. The effects of sports participation on adolescents' broad development are limited by the issue of endogeneity—third variable(s) effects— which has the potential to produce a biased impression about the role of context. The selection process for an adolescent into a sport is multi-determined by reciprocal interactions between individual assets and contextual resources, as well as by constraints to participation (e.g., community-based barriers). I will discuss some of these variables that influence adolescents' selection into sports and those that are also most relevant to the current dissertation.

The issue of endogeneity

Endogeneity, a technical term developed by econometricians, describes the problem of “third variable” effects. That is, associations between specific developmental outcomes (in this case, eating disorders) and contextual variables (i.e., sports context) may be the result of unmeasured characteristics of the individual (Duncan, Magnuson, & Ludwig, 2004). Most empirical studies in development assume that the processes through which individuals select or are selected into specific contexts can be fully explained by observable characteristics, but developmental theorists have underscored the central role of individual agency in developmental processes (e.g., Brandtstädter, 1998; Elder, 1998; Lerner, 2002). Therefore, even with the use of longitudinal designs and the inclusion of covariates as predictors of the context in developmental research, specific unmeasured individual characteristics (“omitted variable bias”) may be upwardly biasing or overestimating the effects of the sport context on adolescents' eating- and weight-related attitudes and behaviors. That is, the causal question about the role of sports participation

in protecting against or promoting eating disorder risk cannot be fully addressed unless the issue of selection is treated.

Thus, in the absence of random assignment, the question of the generalizability of developmental research findings is raised. Duncan et al. (2004) recommend “natural” experiments as the ideal, or “gold standard,” to avoid problems with endogeneity, but a more practical approach to addressing this issue may be the use of multivariate models that control for covariates across multiple developmental ecologies. For example, in studies of adolescent sports participation and eating disorder risk, unmeasured covariates at the level of the individual (e.g., BMI, perceived weight, race/ethnicity, SES) as well as at multiple levels of the adolescents’ ecology (e.g., peers, family, school, and neighborhoods) can all be thought of as potential unmeasured variables that may introduce selection bias. Researchers should use theory to guide decisions about the inclusion of specific covariates to address selection effects but, as well, to avoid overcontrolling problems in regression models that may characterize complex, multivariate designs (Duncan et al., 2004). In addition, the inclusion of specific unmeasured variables is a complicated decision because covariates may be determined by, not determinants of, the particular context (Duncan et al., 2004).

Nonetheless, the current dissertation aims to address the issue of endogeneity by building a theoretical model that includes some key variables that potentially influence adolescents’ selection into and continued engagement in sports and that are, arguably, developmentally meaningful factors relevant to both sports involvement and the specific developmental outcome of eating disorders. These variables include perceived weight

status, self-esteem, SES, and youth goal orientation. Some of these variables, for example self-esteem, have already been discussed in previous sections of this chapter.

Actual and perceived weight

Actual body weight or mass (BMI) and perceived weight (i.e., “feeling overweight”) are reportedly associated with concurrent and subsequent eating disorders and body dissatisfaction among adolescents (e.g., Blond, Feldman, Lorenz, & Whitaker, 2008; Stice, 2002; van den Berg et al., 2010). However, when considering the main effect of weight perceptions on disordered eating and mental health, perceived weight status may matter more than actual weight (e.g., Bardone-Cone, Abramson, Vohs, Heatherton, & Joiner, 2006; Frisco, Houle, & Martin, 2009; Mamun et al, 2007; Pesa, Syre, & Jones, 2000; Wilson, Tripp, & Boland, 2005). Perceived obesity, compared to actual obesity, repeatedly emerges as a potent predictor of dieting behaviors among female adolescents (Wichstrom, 1995). The argument has also been made that the propensity to engage in unhealthy weight control methods, such as dieting and meal-skipping, is reflected in perceived overweight, not actual overweight (e.g., Videon & Manning, 2003). In addition, these two factors influence adolescents’ involvement in sports (e.g., Alfano et al., 2002; Elkins et al., 2004).

As noted, it is also plausible that these factors partially explain adolescents’ selection into and continued involvement in *specific types* of sports, but the exact mechanisms—whether direct or moderated by factors such as self-esteem—by which actual and perceived weight exert their influence are not entirely clear. In addition, few studies have formally examined the simultaneous influence of these two factors, actual (BMI) and perceived weight, on relations between sports participation and eating

disorders among adolescents. In the case of adolescent depressive symptoms, researchers suggest that these two factors cannot be considered as competing influences because this is an ecologically invalid assumption (Frisco et al., 2010). Adolescents are simultaneously dealing with their actual weight (i.e., the number on the scale) as well as with their body image (i.e., the image they see in the mirror).

Examination of these factors, particularly in combination with one another, is important given the prevalence and adverse consequences of weight-related concerns among adolescents, irrespective of their weight (e.g., Neumark-Sztainer, Story, Hannan, Perry, & Irving, 2002). For example, in one study of 1,207 adolescent girls aged 12-14 years old (Grades 8-10), 40.8% of underweight Grade 9 girls wished to lose weight and 30.6% of them had dieted at some point. Similarly, 68.3% of healthy weight Grade 9 girls wished to lose weight (Donovan et al., 2006). One-third of adolescents have been estimated to inaccurately perceive their weight, with more individuals under- versus over-estimating it (Martin, Frisco, & May, 2009).

Misperception of overweight even among normal weight adolescents is reason for concern (Field et al., 2003; Neumark-Sztainer et al., 2006). There are notable sex-based variations in weight perceptions, with adolescent girls more likely to perceive themselves as overweight even when they are at the same BMI percentile as their male peers (Perrin, Boone-Heinonen, Field, Coyne-Beasley, & Gordon-Larsen, 2010; Pritchard, King, Czajka-Narins, 1997; Ter Bogt et al., 2006). Furthermore, girls tend to be influenced by thinness ideals compared to boys who are influenced more by muscularity ideals (Smolak, 2004). In a recent study, using data from the National Study of Adolescent Health and Development (*AddHealth*) that involved 12,814 adolescent boys and girls (ages 11-20

years), perceptions of overweight were associated with increasing depressive symptoms and decreasing self-esteem among girls, whereas weight perceptions did not influence changes in boys' depressive symptoms or levels of self-esteem over a one-year period (Yuan, 2010).

Given that self-perceived weight is generally not an accurate assessment of actual weight, and that associations between perceived weight and disordered eating attitudes and habits have been documented (e.g., Joiner, Heatherton, Rudd, & Schmidt, 1997; Wichstorm, 1995), perceived weight becomes an integral factor in the pathogenesis of eating disorders. In fact, the American Psychiatric Association (2000) describes weight and shape preoccupations as central diagnostic criteria for both AN and BN. In addition, among athletes, it is reasonable to assume that weight-related concerns and the role of perceived weight on eating and weight outcomes may exceed the prevalence found among non-athletes given, as one example, the sports-related pressures that endorse and value thinness as central to performance. Therefore, it is arguably important to disentangle the effects of these factors in explaining relations among sports participation and adolescent eating disorders.

Youth goal orientation

As previously discussed, variations in racial/ethnic and socioeconomic backgrounds are associated with adolescents' decisions to become and remain involved in sports. One of the key intraindividual attributes that may partially explain the process through which sports participation and socioeconomic status interactively influence eating disorder risk relates to adolescents' goal orientation. In addition, benefits received from involvement in sports influence such decisions. Furthermore, a major determinant

of the participation process involves the adolescents' own motivation. In fact, high goal (achievement) orientation likely will be associated with more positive developmental outcomes and, in this case, healthier eating and weight-related behaviors and attitudes. In addition, because high goal orientation likely will be associated with adolescents' selection into sports that specifically optimize their strengths, adolescents who are more goal-oriented may tend to exhibit higher levels of behavioral engagement (e.g., frequency and intensity of involvement) and psychosocial engagement (e.g., athletic identity) in sports participation. These adolescents may perceive the sports environment as a positive and reinforcing context for their skills. Thus, high versus low goal-oriented adolescents may experience the sports context very differently and, as such, this process may be differentially related to specific developmental outcomes, such as eating- and weight-related attitudes and behaviors.

In turn, the eating disorder literature describes deficits in self-regulatory processes and, in particular, emotional and behavioral regulation ("ego strength") that characterize adolescents with disordered eating behaviors and attitudes (e.g., Gupta, Rosenthal, Mancini, Cheavens & Lynch, 2008; Kahan, Polivy, & Herman, 2003; Karwautz et al., 2001; Villejo, Humphrey, & Kirschenbaum, 1997). However, these scholars define self-regulation inconsistently and such variation may complicate the ability to identify the protective effects of high goal orientation on athletes in terms of eating disorder risk. One example of a measure of youth goal orientation that is influential within the developmental literature is the Selection, Optimization, and Compensation (SOC) model of intentional self-regulation (Freund & Baltes, 2002). Intentional self-regulation as indexed by SOC represents the individual's contribution to the individual-contextual

bidirectional relations that shape adaptive developmental regulations. Elective selection represents the development of preferences or goals, the construction of a goal hierarchy, and the commitment to a set of goals. Optimization refers to acquisition and investment of goal-relevant means to achieve one's goals. Compensation refers to the use of alternative means to maintain a given level of functioning when specific goal-relevant means are no longer available. Examining the role of intentional self-regulation, as measured by the SOC scale (Gestsdottir, Bowers, von Eye, Napolitano, & Lerner, 2010; Gestsdottir, Lewin-Bizan, von Eye, Lerner, & Lerner, 2009), in relations between sports participation and adolescent eating disorders is consistent with the developmental systems theory approach to understanding the mutually beneficial relations that exist between adolescents' and their sports environments.

Access to resources

Even for those adolescents who may have a high goal orientation, the process of maintaining adolescents' involvement in sports is a multi-factorial process that is particularly influenced by social, cultural, and economic factors (Terzian & Moore, 2009). Activity choices involve reciprocal processes between the contextual constraints and opportunities for participation within the family, the school, and the neighborhood, and involve also adolescents' own motivations to participate (Elder & Conger, 2000; Furstenberg, Cook, Eccles, Elder, & Sameroff, 1999; Zarrett, 2007). Therefore, in addition to the intraindividual assets that I have described—such as high self-esteem, falling within a healthy weight range, having healthy weight perceptions, and high goal orientation—protective factors (or social resources) may exist in the context and may function interactively with these individual assets to influence development (Rajaratnam,

Burke, & O'Campo, 2006). These social resources have been labeled by some researchers as *neighborhood resources* and refer to safety, proximity to parks and recreation, and low residential density (Bell, Wilson, & Liu, 2008).

With respect to sports participation, in the absence of these protective resources community-based barriers to participation (e.g., social disorder or high crime, limited resources) exist; these barriers may complicate participation, especially among adolescents from lower SES families and among those living in low SES neighborhoods (e.g., Molnar, Gortmaker, Bull, & Buka, 2004). Family SES and neighborhood SES are distinct. Family SES describes a narrower context, and generally includes measures of family income or savings. Neighborhood SES describes an aggregate measure of a group of individuals living in a neighborhood and is typically based upon census-tract data (Chen & Paterson, 2006).

The pathways through which neighborhood SES may be linked to positive and problematic development include neighborhood stressors (e.g., exposure to violence), degree of shared social values and norms among neighbors (i.e., collective efficacy), and neighborhood resources, including quality of health care facilities and physical conditions of the neighborhood itself (Chen & Paterson, 2006; Sampson, Raudenbush, & Earls, 1997). By contrast, family SES may exert its influence on development through pathway such as the degree of parental responsiveness, the presence of positive relationships that may buffer the effects of stress, the presence of role models, and financial and material resources (Cohen & Willis, 1985; Repetti, Taylor, & Seeman, 2002). Research suggests that these two indices of SES may simultaneously exert independent effects on health

outcomes (e.g., Chen & Paterson, 2006; Jones & Duncan, 1995; Malmstrom, Johansson, & Sundquist, 2001).

The different opportunity structures in the neighborhoods and schools are reflected in the major participation discrepancies found between low-income urban youth and their wealthier suburban peers (Elder & Conger, 2000; Furstenberg et al., 1999). Economically disadvantaged communities have fewer resources (i.e., less public support and funding), and, as a result, fewer youth organizations, sport leagues, summer camps, and out-of-school programs than more affluent communities (Hirsch et al., 2000). Even in lower income communities with available resources, issues of safety and access often complicate adolescents' participation. Although lower income urban youth are at a disadvantage in terms of having supportive contextual resources that promote their sustained sports participation, barriers among affluent youth may be more family- than neighborhood-based (e.g., lack of parental transportation due to parental employment obligations), but should not be overlooked. Even among those youth from disadvantaged neighborhoods, access to resources alone may not entirely account for the benefits associated with activity participation. For instance, research supports the idea that the more positive individual factors (e.g., intentional self-regulation) exist among adolescents in disadvantaged settings, the greater the benefits associated with their activity involvement (Urban et al., 2010).

To date, the majority of research related to athletes and eating disorders has focused on collegiate or elite sports contexts, where access to resources would not necessarily deter participation. One study that examined these relations among ethnically diverse, urban high school athletes and non-athletes provided no comparison group

(suburban or rural) of high schoolers to clarify the role of urban context (Rhea, 1999). Therefore, in order to elucidate how sports participation may influence eating disorder risk and resilience, and how these relations change across contexts, scholars need to broaden their focus to include community-based factors, such as adolescents' access to resources that facilitate or complicate involvement. Examination of these contextual factors will enhance the external validity of existing research and approximate more sophisticated, relational perspectives of human development.

In sum, the theoretical limitations that have been discussed in this review suggest that researchers need to transition from split-based conceptual models that are focused on identifying high versus low risk adolescents in the context of their sports participation, to integrative and multi-level perspectives that examine the developmental pathways and processes related to both eating disorder risk and protection, e.g., the PYD perspective. Research derived from such refinements of existing theoretical models may remediate some of the inconclusive findings that characterize the literature about how and for whom sports participation is related to eating disorder risk. However, researchers also need to address some fundamental measurement issues that challenge the validity and representativeness of current findings, complicate cross-study comparisons, and fail to describe developmental relations.

Methodological Limitations

In addition to the aforementioned weaknesses that characterize the conceptual models used to frame questions about the development of adolescent athletes' eating pathology, some scholars have suggested that the inconsistent findings across studies may reflect methodological heterogeneity (e.g., Smolak et al., 2000). Examples of these

methodological issues include a reliance on variable-centered data analytic methods, using measures of questionable psychometric properties, inadequate sampling size and diversity, introducing potential selection bias, and relying on cross-sectional research designs. Although a thorough review of all of these methodological problems is beyond the substantive goals of this dissertation, it is useful to briefly discuss these problems in so far as such a review may inform the methods of the present work.

Limits of variable-centered methods

Because researchers in this area have generally predicated their theoretical models on split conceptions (i.e., comparative prevalence rates between athletes and non-athletes), it is not surprising that their statistical methodologies parallel these context-independent models. Using variable-centered methods of data analysis, sample means of groups of adolescent sports participants, youth from different types of sports, or youth at different competitive levels are compared in regard to indicators of disordered eating and body dissatisfaction. This aggregate-level approach to data analysis does not account for differences across individuals with respect to these relations, but rather considers such differences random and negligible (Bergman & Magnusson, 1997; von Eye & Bergman, 2003). Pattern- or person-centered analyses examine differences within individuals in the sample and attempt to create subgroups based on shared profiles of characteristics. By contrast, variable-centered approaches assess differences across individuals in the sample, making comparisons to the average participant in the sample (Roeser & Peck, 2003).

Person- or pattern-centered data analytic techniques have been particularly useful in health research (e.g., Schulenberg, O'Malley, Bachman, Wadsworth, & Johnston, 1996) and in studies of youth activity participation. For example, with respect to sports

participation, scholars have begun to examine the influence of participation intensity across different combinations of activities to understand how youth who participate in multiple activity contexts, including sports, vary on indicators of functioning (e.g., Bartko & Eccles, 2003; Zarrett et al., 2007; Zarrett et al., 2009). In general, findings indicate that a diverse activity profile (i.e., multiple activities) and participation in specific combinations of activities (e.g., sports and YD programs) are associated with more positive development than involvement in only sports.

Thus, applying a combination of variable- and person-centered approaches to research related to adolescents, sports participation, and eating disorders will allow scholars to disentangle the effects of multiple dimensions of sports participation (e.g., sport type, competitive level, intensity, breadth, duration) on eating disorder risk and resilience. Furthermore, a person-centered approach is particularly useful to researchers interested in representing the heterogeneity of developmental trajectories (Muthén & Muthén, 2000). As existing theories about the development of eating disorders among adolescents suggest, multiple pathways exist with respect to eating disorder risk (e.g., Smolak, Levine, & Striegel-Moore, 1996).

Psychometric properties of existing measures

Applying the appropriate statistical methodology will only yield valid and replicable findings when the measures themselves are conceptually valid and internally reliable. One of the major methodological criticisms of existing research relates to the diversity of (mainly self-report) indices used to assess eating problems among athletes (Petrie & Greenleaf, 2007; Smolak et al., 2000). For example, studies have used subscales from the Eating Disorder Inventory (EDI), the Eating Attitudes Test (EAT;

Garner, Olmstead, Bohr, & Garfinkel, 1982), the Eating Disorder Examination (EDE; Cooper & Fairburn, 1987) and its adapted questionnaire version (EDE-Q; Fairburn & Beglin, 1994), the Questionnaire for Eating Disorder Diagnosis (QEDD; Mintz, O'Halloran, Mulholland, & Schneider, 1997), and measures of eating problems, weight control behaviors, or body dissatisfaction designed for a particular study. Psychometric data related specifically to athletes are sparse. In addition, the validity of these measures for specific subgroups of athletes, such as males, ethnic minority groups, and low income adolescents is even less clear (Petrie et al., 2007).

Assessments generally examine symptoms of eating disorders as opposed to specific diagnostic criteria, complicating cross-study conclusions about prevalence (Hausenblas & Carron, 1999; Sherman & Thompson, 2001). A considerable number of athletes have reported clinically significant problems with restriction of food, binge eating, and purging behavior, but the prevalence rates of participants who meet full criteria for a clinical diagnosis were relatively low (e.g., Johnson et al., 1999). Among participants in aesthetic sports (e.g., ballet), the prevalence of EDNOS is reportedly high (Ringham et al., 2006). For example, all athletes, but male athletes in particular, may be especially susceptible to engaging in excessive exercise (Lewinsohn et al., 2002). However, measures that have been applied to assess disordered eating and body dissatisfaction in these populations do not consistently index exercise behaviors because it is not included as a DSM-IV diagnostic criteria (Cook & Hausenblas, 2008). Measures such as the EDI and EAT assess eating disorder symptoms and often use cut-off values to differentiate participants as symptomatic versus asymptomatic.

However, there is an increased need for measures that are sensitive to the spectrum of eating disorder symptoms and, as well, to the context of the sport. Because these measures have not been developed specifically for use with athletes, certain weight control behaviors that may be considered atypical in the general population may be more normative within a particular sports context. For example, some athletes (e.g., dancers, wrestlers) may be more motivated to lose weight and body fat in environments where weight requirements are emphasized; thus, these athletes may employ risky weight loss methods but attribute these behaviors to performance-related demands of the specific sport. Therefore, there may be a tendency for athletes' underreporting certain attitudes and behaviors that may place them at risk because of the context-specificity of these behaviors (Torstveit et al., 2008). Again, then, the issue of endogeneity is raised, but here in the context of methodological challenges.

Sampling issues

In addition to these measurement issues, the representativeness of the samples on which existing studies are based is a major limitation of extant research. In general, small samples characterized by limited diversity with respect to characteristics related to both sports involvement and eating disorders (e.g., gender, age, race/ethnicity, SES, residential context) characterize the literature. In those studies that have employed larger samples, athletes from a variety of sports have been aggregated together, a procedure that makes it difficult to disentangle features of the sports context that may be linked to specific effects (Byrne & McLean, 2001).

Reliance on cross-sectional research designs

Although the literature related to sports participation and eating disorders is vast, none of these existing studies are based on longitudinal designs. Cross-sectional research is useful when researchers are interested in examining mean differences in attitudes and behaviors between athletes and non-athletes, or between specific subgroups of athletes, at a given point in time (i.e., interindividual differences). Furthermore, as noted throughout this chapter, development is characterized by the potential for systematic change that can only be described and explained by time-sensitive models. In addition, developmental processes, such as the development of eating disorders, may not show constant change across ontogeny and existing variation may reflect qualitative change (i.e., “the emergence of symptoms;” Lerner, 2002; Werner, 1957) and/or quantitative change (i.e., the slope of change may be faster, slower, or non-changing at different points in time; Werner, 1957).

The element of time becomes critical when considering the applied implications for prevention of disordered eating, as well as the optimization of the healthy development of youth in sports. In the absence of longitudinal designs, our understanding of the diverse developmental trajectories of eating pathology that may exist, and whether these trajectories are similar across all portions of adolescence, is constrained. In order for scholars to promote changes that are individually, contextually, and time sensitive, longitudinal models that examine intraindividual variations in relations between sports participation and eating pathology are essential. For over three decades, scholars in this field have been studying and writing about the eating- and weight-related risks and

benefits associated with adolescent sports participation; yet, no existing studies can answer the core question of potentially causal links across development.

In sum, methodological limitations are partially responsible for the heterogeneity of research findings that characterize the literature in the area of sports and eating disorders. As previously discussed, conceptual issues also influence the problem of heterogeneity in findings and, as well, the presence of gaps in the extant literature. The extant statistical methodologies that are used, the paucity of valid and reliable measures, the use of non-representative samples (both in composition and size), the failure to account for selection bias, and non-developmental approaches to research designs are the major methodological problems that limit understanding of associations between sports participation and adolescent eating disorder risk and resilience. Given these methodological limitations and the previously discussed theoretical gaps in the literature, the over-arching goal of this dissertation is the application of a developmental systems framework that integrates theories and methods from adolescent development with the existing eating disorder knowledge base. Ideally, this marriage of methods and theory will result in a model that is individually, developmentally, and contextually sensitive and, subsequently, that may be used to inform community- and school-based programs and policies that promote positive and healthy development among adolescent athletes.

Towards a New Conceptual and Methodological Framework:

Aims of the Current Study

Researchers are interested in the role of sports participation as a protective context for deterring specific health risk behaviors, as well as its impact on the promotion of positive and healthy attitudes and behaviors. Chief among these health risk behaviors

are eating problems and weight dissatisfaction because of their prevalence and potentially devastating consequences for adolescents. However, as just discussed, the literature relating the sports context, eating pathology, and adolescents' problematic and positive functioning is limited in a number of ways.

Accordingly, the current dissertation aimed to contribute to the eating disorder and adolescent development literature in a number of ways. Central to the limitations of past literature are the inconsistent findings about whether, how, when, and for whom sports participation may be related to distinct developmental patterns of eating disorder risk and resilience. In addition, most studies in this area have addressed questions of comparative prevalence (i.e., mean-level differences), whereas fewer have exploited the richness of longitudinal data sets or applied person-centered analytic techniques (to assess intraindividual differences). That is, we know little about whether sports participation impacts the constancy or change in adolescents' eating- and weight-related trajectories, and if the potential influence of sports depends on additional individual factors (specifically, whether a particular "profile" of individual characteristics in combination with sports participation explains variations in eating pathology).

Relations among sports participation and eating pathology have been investigated in the literature, but without consensus and certainly not developmentally (e.g., DiBartolo & Shaffer, 2002; Holm-Denoma et al., 2009; Johnson et al., 1999; Milligan & Pritchard, 2006; Petrie et al., 2008; Reinking & Alexander, 2005; Sanford-Martens, et al., 2005; Smolak, Murnen, & Ruble, 2000; Sundgot-Borgen & Torstveit, 2004). Sociocultural models that have been used to theorize about eating disorder risk in the sports context suggest that the sports milieu acts as a subculture in the adolescents' ecology that

transmits and reinforces unhealthy social norms and values related to thinness and physical attractiveness (Striegel-Moore et al., 1986). However, the role of context has been emphasized to the exclusion of intraindividual characteristics that may potentially explain why not all adolescent athletes develop eating problems. Using holistic, relational, and systems-based theories that account for the multiple levels of influence (i.e., physical, psychological, social, cultural, and historical) on trends of adolescents' eating pathology would be an important step towards overcoming this theoretical limitation, and to advancing our understanding of what impact variations in these trends, in combination with individual and contextual factors, may have on adolescents' positive and problematic functioning.

Whether relations among activity participation and diverse domains of development vary according to such factors as race, sex, and SES has been under-researched (Mahoney, Larson, & Eccles, 2005). In particular, the associations among developmental trajectories of eating pathology (as well as of resilience), sports involvement, and selected individual factors (e.g., sex, SES, perceived and actual weight, and self-worth) has been largely assumed without appropriate testing. That is, is sports participation related to patterns of constancy and change in adolescents' eating pathology? If so, how might its effect relate to associations between trends of eating pathology and adolescents' healthy or problematic functioning (i.e., depressive symptoms)? This issue is at least partially because most of the extant research has failed to apply more process- and person-centered approaches that would be useful in identifying variation in the development of eating pathology (Bergman & Trost, 2006). For instance, group-based mixture models lend themselves to identifying the various trajectories of eating pathology

(and of resilience) that may be qualitatively different among subpopulations of adolescents (Nagin, 2005). In the absence of empirical evidence, whether sports participation mitigates risk or facilitates protection in the development of eating pathology is speculation at best.

Research Questions

As described in the previous section, the current study is aimed at addressing several developmental issues. Using data from Grades 9 to 11 of the longitudinal, 4-H Study of Positive Youth Development (PYD; Lerner et al., 2005; Phelps, Zimmerman, Warren, Jelicic, von Eye, & Lerner, 2009), I asked four research questions.

Specifically, I asked the following research questions:

1. Do diverse trajectories of eating pathology and body dissatisfaction exist throughout middle adolescence (Grades 9-11)? If, as we anticipate that they do, are these pathways distinct with regard to their mean levels of eating pathology and body dissatisfaction, as well as with regard to their patterns of change (shapes) across the three-year period?
2. How do selected intraindividual characteristics (i.e., sex, SES, perceived and actual weight, and self-esteem) and contextual factors (i.e., sports participation) covary with positive or problematic pathways of eating behaviors and attitudes, and body dissatisfaction?
3. To what extent do trajectories of eating pathology and body dissatisfaction matter for both positive and problematic functioning (at Grade 11)? That is, are distinct pathways of eating pathology and body dissatisfaction (across Grades 9-11)

differentially associated with positive (i.e., PYD) and problematic (i.e., depressive symptoms) outcomes in Grade 11, as assessed in the current dissertation?

4. Does sports participation moderate potential relations between distinct trajectories of eating pathology and body dissatisfaction across Grades 9-11 and adolescents' psychosocial adjustment at Grade 11?

Hypotheses

Related to Question 1, and based on one study that applied the group-based modeling technique to study patterns of eating disorders from middle to late adolescence in both males and females, I expected that distinct pathways of eating pathology and body dissatisfaction do exist (Aimé, Craig, Pepler, Jiang, & Connolly, 2008). Findings from this study suggest that there may be groups of adolescents who will manifest problematic trajectories of eating pathology, characterized by increasing or stable-high levels of behaviors reflective of these issues, although most adolescents will follow fairly stable trajectories (Aimé et al., 2008). Accordingly, then, I hypothesized that the majority of adolescents in the 4-H study would report relatively low and stable levels of eating pathology, whereas I expected levels of body dissatisfaction to be higher (on average) and less stable among participants, given that body dissatisfaction and weight concerns are fairly normative and tend to increase during adolescence (e.g., Field et al., 2001; Jones, 2004; van den Berg et al., 2010). Due to the scarcity of empirical evidence on the differential developmental trajectories of eating pathology, I did not make predictions on the specific number of trajectory sub-groups that might exist.

In order to potentially elucidate markers of risk and protection associated with the development of eating problems and body dissatisfaction, the second goal of the present

research was to examine whether intraindividual characteristics, such as sex, SES, perceived and actual weight, and self-esteem, and contextual factors, specifically sports participation, covary with positive or problematic pathways of eating- and weight-related behaviors and attitudes. Given my review of the existing literature in this chapter, and in regard to Question 2, I expected that an adolescent's likelihood of experiencing membership in a particular trajectory group would vary according to these characteristics. In particular, I predicted the following variations in intraindividual factors to be associated with higher levels of eating pathology: being female, having a high SES background, having perceptions of being overweight, high and very low actual weight, and low self-esteem. In terms of the specific impact of sports participation, I expected that sports participation would be associated with membership in more positive and healthy eating- and weight-related trajectories among the majority of adolescents.

With regard to Question 3, I hypothesized that positive development (i.e., less depressive symptoms and higher levels of PYD) would be associated with lower levels of, and with less pronounced increases in, eating pathology and body dissatisfaction over time. Similarly, I predicted that youth reporting chronically high and more pronounced increases in eating pathology and body dissatisfaction would experience more problematic development (i.e., more depressive symptoms and lower PYD scores). The extant research has suggested that depression may be an etiological risk factor for or correlate of eating pathology and body dissatisfaction (e.g., Mayer et al., 2009; Stice, 2002; Stice, Hayward, Cameron, Killen, & Taylor, 2000), although mainly among adolescent females. In fact, few studies have examined the mental and physical health consequences of these disorders for adolescent boys (Lock, 2009). In addition, there is

mixed support for the prospective role of negative affect and depression on increases in eating pathology and body dissatisfaction (e.g., Holsen, Kraft, & Roysamb, 2001; Stice & Whitenton, 2002). Therefore, these analyses were aimed at validating the grouping structure of the eating pathology and body dissatisfaction trajectories, and elucidating how distinct subgroups may be related to adolescents' positive and negative adjustment.

In regard to Question 4, the question of whether sports participation can moderate negative outcomes associated with increased or chronic levels of eating pathology and body dissatisfaction, or promote positive adjustment, remains largely unanswered empirically. However, I predicted that sports participation would moderate associations between trajectories of eating pathology and body dissatisfaction and problematic outcomes, but only among those youth reporting above-average, increasing, or chronic levels of eating pathology and body dissatisfaction. I expected that more continuous involvement (duration) would be related to more positive adjustment, even among those adolescents whose eating pathology and body dissatisfaction trajectories may be considered problematic. By contrast, when sports participation was discontinuous, I hypothesized that involvement would not moderate relations between adolescents' eating pathology and body dissatisfaction trajectories and problematic or positive outcomes.

Although the majority of extant literature has suggested that sport type (lean vs. non-lean) may represent a key factor associated with eating disorder risk (e.g., Davison et al., 2002; Reinking & Alexander, 2005; Swami et al., 2009; Thompson & Digsby, 2004; Torstveit et al., 2008), a comparison of sports which emphasize leanness to non-lean sports was not possible because many adolescents simultaneously participate in lean and non-lean types of sports and, as well, the sports are not uniform in their emphasis on

leanness. Whereas sports participation is associated with adolescents' positive and problematic development, duration of sports involvement has not been examined specifically as it relates to adolescent eating pathology (e.g., Simpkins et al., 2005; Zaff et al., 2003; Zarrett et al., 2009).

To test these hypotheses, I applied a person-centered and group-based approach to analyzing developmental trajectories that is a type of finite mixture modeling (Jones & Nagin, 2007; Nagin, 2005). This methodology identifies groups of individuals following approximately the same developmental trajectory over a specified interval of time for the outcome(s) of interest (i.e., in this case, eating pathology and body dissatisfaction). Another advantage to applying this person-centered technique is the ability to assess patterns of intraindividual change that may not be reduced to those forms characterizing variable-centered methods (Jones, Nagin, & Roeder, 2001; Nagin, 2005).

Standard growth curve modeling techniques, which are also used to examine developmental processes, suggest factors that account for individual variation about a population mean (McArdle & Epstein, 1987; Raudenbush & Bryk, 2002). These methodologies are appropriate to analyzing developmental trajectories when the assumption is that most individuals follow a *common* process of growth or decline (e.g., time spent with peers from childhood through adolescence), although the rate of change may vary. However, there are a number of examples of developmental phenomena for which a common process of growth, decline, or constancy does not make sense. Raudenbush (2001) uses depression as one example of a phenomenon that violates this assumption of a common developmental progression because not all individuals are increasing or decreasing in depression. Eating pathology and body dissatisfaction are

additional examples of these experiences that represent the “developmental exception,” not the “developmental rule” (Nagin, 2005). Therefore, taking advantage of the flexibility and comprehensiveness of this statistical methodology, as well as applying multinomial logistic regression analyses, this dissertation ascertained whether qualitatively distinct subgroups of eating pathology and body dissatisfaction existed across middle adolescence, described their shape, and how the shape (i.e., pattern of change) related to specific individual and contextual characteristics.

The current dissertation aimed to identify and describe potentially discrete patterns of change in eating pathology and body dissatisfaction among middle adolescent males and females, and to elucidate individual and contextual factors associated with variations in these trends, by employing longitudinal group-based modeling, using a three points-in-time design. Of particular import is the moderating effect of sports participation on associations between distinct patterns of change in eating pathology and youth problematic or positive functioning. In sum, the goals of this dissertation were to: 1. Examine whether distinct developmental trajectories of eating pathology and body dissatisfaction existed in middle adolescence, 2. Assess whether adolescents’ membership in eating pathology and body dissatisfaction trajectories varied according to selected individual factors (i.e., sex, SES, perceived and actual weight status, and self-worth) and a central contextual variable of interest (i.e., sports participation), 3. Determine whether different pathways of eating pathology and body dissatisfaction were related to adolescents’ positive development and problematic functioning (indexed as depressive symptomatology), and 4. Elucidate whether sports participation (indexed by intensity and continuity of involvement) moderates associations between youth

membership in eating pathology and body dissatisfaction trajectories and their positive and problematic adjustment.

CHAPTER 3

METHOD

Data for this dissertation were derived from the most recent three waves (Grades 9 to 11) of the 4-H Study of Positive Youth Development (e.g., Lerner et al., 2005; Phelps, et al., 2009). The 4-H Study is an ongoing longitudinal investigation that focuses on defining and measuring key features of PYD, and on understanding the effects of developmental assets in the promotion of PYD and the reduction of problem and risk behaviors during adolescence (Lerner et al., 2005). PYD is conceptualized by the “Five Cs” of competence, confidence, connection, character, and caring, and by the “sixth C” of contribution (Lerner, 2004). More details of the methodology of the 4-H Study have been presented in prior reports (Lerner, et al., 2005). I present here the features of the methodology pertinent to the focus of this study, including design, participants, procedures, measures, and analysis.

Design

The 4-H Study uses a form of longitudinal cohort sequential design (Baltes, Reese, & Nesselroade, 1988). Data from fifth graders were gathered in Wave 1 of the study during the 2002-2003 school year, and these fifth graders were the initial and only cohort (Cohort 1) assessed at this time. In order to maintain at least initial levels of power for within-time analyses and to assess the effects of retesting, each subsequent wave of the study involved the addition of a “retest control” cohort of youth. The newly added retest control cohort was recruited from youth in the current grade level of the initial cohort, and the additional cohorts were then followed longitudinally. For example, in Wave 2 of the 4-H Study, the current grade level of the initial cohort was Grade 6. As such, a retest

control group of sixth graders were added to the study, and these youth became members of the second longitudinal cohort, Cohort 2. At this writing, seven waves of data have been collected (Grades 5-11). Overall, across all seven waves of the study, 6,120 youth (59% female) in 41 states have been surveyed, along with 3,084 of their parents.

Participants

The sample for the current study was derived from participants in the Grades 9, 10, and 11 waves of data collection. During Grade 9, data were collected from a total of 1,189 participants (60.6% were girls). These participants came from 40 schools and 24 4-H program sites located in 19 states. In Grade 10, data were collected from 2,344 youth (63.6% were girls) from 18 schools and 82 4-H sites that were in 32 states. Data were collected from 1,127 youth (68.1 % were girls) who were from 14 schools and 75 4-H sites in a total of 30 states in Grade 11. The longitudinal sample consisted of 1,050 adolescents (68.0% girls) who participated in at least two of the Grades 9, 10, and 11 assessments.

The mean age of participants in the longitudinal sample at Grade 9 was 14.90 years ($SD = 1.00$ years). The participants were from diverse racial/ethnic backgrounds: 72.2% were European Americans, 4.3% were Latino/a, 7.6% were African American, 2.6% were Asian American, 1.0% identified themselves as multiracial or multiethnic, and 11.3% either self-identified as Other race/ethnicity or were inconsistent in reporting their race/ethnicity across waves. In addition, 10.7% of youth either reported their race/ethnicity inconsistently or did not report it at all. In terms of family SES, the mean number of years of maternal education was 14.46 ($SD = 2.32$).

Table 1 summarizes the demographic characteristics of the Grades 9, 10, and 11 cross-sectional samples as well as of the longitudinal sample. As noted in Table 1, the longitudinal sample and the three cross-sectional samples (i.e., Grades 9 to 11) were overrepresented by girls and European American students. The students who self-identified themselves as European American were more than 70% in almost all of the samples, except for the Grade 9 cross-sectional and longitudinal samples. In addition, participants from the current sample were from more socioeconomically-advantaged families (operationalized as the levels of mothers' education) than are students from a nationally representative sample. Furthermore, the small numbers of students who resided in urban areas distinguished the current sample from a more nationally representative sample.

Insert Table 1 about here

Procedures

For the first three waves of data collection (Grades 5-7), teachers or program staff gave each child an envelope to take home to the parent or guardian. The envelope contained a letter explaining the study, two consent forms (one that was returned to the school and one that could be kept for the records of the parent or guardian), a parent questionnaire, and a self-addressed, stamped manila envelope for returning the parent questionnaire and consent form. Data collection was conducted by trained study staff or assistants hired at more distant locations. A detailed protocol was used to ensure that data collection was administered uniformly and to ensure the return of all study materials.

The procedure began with reading the instructions for the student questionnaire to the youth. Participants were instructed that they could skip any questions they did not wish to answer. A two-hour block of time was allotted for data collection, which included one or two short rest periods. During the Grades 6 and 7 data collections, students who were unable to be surveyed at their school or 4-H site, in that they were either absent during the day of testing or the school superintendent did not allow testing to occur in the school, received a survey in the mail.

Beginning at the Grade 8 wave, youth who were absent on the day of the survey or were from schools whose administrators did not allow on-site testing and their parents were contacted by e-mail, mail, or phone and were asked to complete and return the surveys to the research team. They were provided on-line survey website address, login and key word, if they chose to complete the survey online. Alternatively, a hard copy of the student and parent questionnaires would be mailed on request. Youth who were surveyed in their schools or youth programs followed the same procedure as in the first three waves. Parent questionnaires continued to be taken home to parents to fill out.

From Grade 9 to 11, there were school or program-site based as well as online data collection. For the school or program-site based data collection, teachers or program staff gave each adolescent an envelope to take home to their parent or guardian. The envelope contains a letter explaining the study, a sent form, a parent questionnaire, and a self-addressed envelope for the parent to return parent questionnaire and consent form. For those youth who received parental consent, data collection was conducted either in the school or after-school program (e.g., 4-H) sites, by trained study staff or hired assistants for distant locations. The procedure began with reading the instructions for the

student questionnaire (SQ) to the participants. Participants were instructed that they could skip any questions they did not wish to answer. Data collection took approximately two hours, which included one or two short breaks. During each wave, students who were unable to be surveyed at their school or program site, in that they were either absent during the data of testing or the school principle did not allow testing to occur in the school, received a survey in the mail or received a letter that contains information for them to continue to participate in the study on internet.

Measures

In the present study, we assessed several indicators of positive and problematic adolescent development (at Grade 11), eating pathology and body dissatisfaction (Grades 9-11), self-worth (Grade 9), and participation in sports (Grades 9-11). In addition, there were many standard demographic questions about youth and their families, including sex, self-reported height and weight (Grade 9), and markers of socioeconomic status. The measures used in this dissertation were part of a student questionnaire administered to the participants, with the exception of the selected marker of family SES (i.e., maternal education) that was from the parent questionnaire. Descriptive statistics for all measures based on the longitudinal sample are presented in Table 2.

Insert Table 2 about here

Positive Youth Development (PYD). Full details about this measure, its construction, and validity/ reliability are described in other publications (Bowers, Li, Kiely, Brittan, Lerner, & Lerner, 2010; Lerner et al., 2005; Phelps et al., 2009). A brief

summary of the features of this measure is described below. At each grade, a PYD score for each participant was computed as the mean of participants' self-report on the Five Cs. PYD scores could range from 0 to 100, with higher scores representing higher levels of PYD. In the present study, the Cronbach's alphas for Grades 9 to 11 were .95, .95, and .95, respectively. The Five Cs comprising the PYD construct were operationalized in the following ways:

Competence involves a positive view of one's action in domain-specific areas including social, academic, cognitive, and vocational domains (21 items; Cronbach's alphas for Grades 9, 10, and 11 were .89, .88, and .88, respectively).

Confidence involves an internal sense of overall positive self-regard and self-efficacy, i.e., one's global self-regard, as opposed to domain-specific beliefs (11 items; Cronbach's alphas for Grades 9, 10, and 11 were .89, .88, and .88, respectively).

Character involves respect for societal and cultural rules, possession of standards for correct behaviors, a sense of right and wrong, and integrity are dimensions characterizing character (20 items; Cronbach's alphas for Grades 9, 10, and 11 were .89, .90, and .90, respectively).

Connection involves a positive bond with people and institutions that are reflected in healthy, bidirectional exchanges between the individual and peers, family, school, and community in which both parties contribute to the relationship (22 items; Cronbach's alphas for Grades 9, 10, and 11 were .91, .91, and .91, respectively).

Caring involves the degree shown of sympathy and empathy, i.e., the degree to which participants feel sorry for the distress of others (14 items; Cronbach's alphas for Grades 9, 10, and 11 were .84, .82, and .83, respectively).

Depressive symptoms. Depressive symptoms at Grade 11 were measured by the 20-item Center for Epidemiological Studies Depression Scale (CES-D; Radloff 1977). Participants reported how often they felt a particular way during the past week (e.g., ‘‘I was bothered by things that usually don’t bother me’’), and items were summed to create a composite score. Scores could range from 0 to 60, with higher scores indicative of more depressive symptomatology. In the present study, the Cronbach’s alpha for Grades 9 to 11 were .90, .88, and .88, respectively.

Eating Pathology and Body Dissatisfaction. Eating pathology and body dissatisfaction at Grades 9 to 11 were assessed with the Eating Disorder Inventory (EDI; Garner et al., 1983), a widely used 64-item self-report measure of eating-related attitudes and traits. The EDI has eight subscales, three of which deal with attitudes and behaviors concerning eating, weight, and body shape [Drive for Thinness (DT), Bulimia (BN), and Body Dissatisfaction (BD)] and five that measure psychological correlates often associated with, but not exclusive to, eating disorders [Interpersonal Distrust (ID), Perfectionism (P), Ineffectiveness (IE), Interoceptive Awareness (IA), and Maturity Fears (MF)]. The eight subscales have shown adequate internal consistency (Cronbach’s alphas range from .65 for MF to .91 for BD; Garner, et al., 1983) and factor structure (Eberenz & Gleaves, 1994; Garner et al., 1983), stable test-retest correlations (DT, BN, and BD ranged from .90 to .97; Wear & Pratz, 1987), and have been extensively validated among clinical and non-clinical samples (Garner, 1991; Garner, et al., 1983).

The current study focused on the Drive for Thinness and Bulimia subscales to index eating pathology, as well as on the Body Dissatisfaction subscale. The DT subscale consists of seven items that measure a preoccupation with dieting and a desire to

be thinner (e.g., “I am terrified of gaining weight” and “I feel extremely guilty after overeating”). The BN subscale includes seven items that assess bingeing and purging tendencies (e.g., “I stuff myself with food” and “I have the thought of trying to vomit to lose weight”). Five of the original 9-item BD subscale items were used in the present study. BD items are designed to assess negative beliefs about one’s body (e.g., “I think that my stomach is too big”). The DT, BN, and BD subscales demonstrated good internal consistency in the current sample. Cronbach’s alphas (α) ranged from .73-.87 for all three subscales across Grades 9 to 11 (α ranged from .64 to .81 and .74 to .87 for males and females, respectively). Participants were asked to rate all items according to a 6-point Likert scale (1 = *never* to 6 = *always*), with higher scores indicative of greater eating pathology and body dissatisfaction. Linear transformations were performed on individual items so that each subscale would have a range beginning with zero. Possible scores on the DT and BN subscales ranged from 0-35 and from 0-25 for BD.

Actual weight status (BMI-z). BMI was calculated by dividing participants’ self-reported weight by their height (both at Grade 9) and converting the result of this division to z -scores as recommended by the U.S. Centers for Disease Control and Prevention (Kuczmarski et al., 2000). In accordance with expert committee guidelines (Barlow, 2007), respondents were classified as underweight (BMI- z < 5th percentile; $n=5$; 40% female), healthy weight (BMI- z 5th to less than 85th percentile; $n=323$; 66.6% female), overweight (BMI- z 85th to less than 95th percentile; $n=69$; 65.2% female), or obese (BMI- z equal to or greater than 95th percentile; $n=45$; 55.6% female).

Perceived weight. Using an approach that has been validated in previous studies (Joiner, Heatherton, & Keel, 1997; Vohs, Bardone, Joiner, Abramson, & Heatherton,

1999), participants were asked to categorize their current weight (Grade 9) according to a 5-point Likert scale (1 = *very underweight* to 5 = *very overweight*). This measure was then dichotomized such that participants who considered themselves overweight (i.e., *slightly overweight* or *very overweight*) formed one category ($n = 152$; 75% female), and participants who did not consider themselves to be overweight (i.e., *very underweight*, *slightly underweight*, *about the right weight*,) formed another ($n = 369$; 62.1 % female). An analysis of participants' BMI z-scores confirmed that individuals who classified themselves as “slightly overweight” or “very overweight” had significantly higher BMI-z scores compared to participants who did not consider themselves overweight [$F(4, 437) = 51.30, p < .05$].

Global self-esteem. Self-esteem at Grade 9 was measured using items from the Global Self-Worth subscale of the Self-Perception Profile for Children (SPPC; Harter, 1982, 1985). The SPPC has five subscales to assess perceived domain-specific competence (scholastic competence, social acceptance, athletic competence, physical appearance, and behavioral conduct) and one scale to assess overall self-worth (global self-worth). The global self-worth scale consists of six items, half of which are reversed with respect to whether the first part of the statement reflects high or low competency/self-worth. To avoid socially desirable responses, Harter (1985) developed a structured alternative format that first asked respondents to decide which part of a two-part statement describes them best (e.g., “some kids *don't* like the way they are leading their life” or “some kids *do* like the way they are leading their life”). After a respondent chooses the person he or she is most like, the participant must decide if the statement is “really true” or “sort of true” for him or her. Items are scored from 1 to 4 with higher

scores indicating higher levels of self-worth. An overall global self-worth scale score was computed for Grade 9 by taking the mean of the six items.

Each of the six subscales of the SPPC has demonstrated adequate to good reliability and validity (East & Rook, 1992; Harter, 1982, 1985; Talwar, Schwab, & Lerner, 1986). Furthermore, moderate and significant correlations exist between self and other ratings and scores on standardized assessments (East & Rook, 1992; Harter, 1982, 1983; Talwar et al., 1986; Windle et al., 1986). In the present study, scale reliability was good at all three times of testing, with Cronbach's alphas ranging from .79 to .85 across Grades 9 to 11.

Sports participation. An index of sports participation that combines both youth duration and intensity of involvement across Grades 9-11 was created based on youth reports of whether they participated in community- or (after-) school-based sports programs during the current school year or upcoming summer across the 9th, 10th, and 11th grades. At each grade, youth were asked to indicate the amount of time they spent participating in non-school and school-based sports (0 = *Never*; 1 = *Once a month or less*; 2 = *A couple times a month*; 3 = *Once a week*; 4 = *A few times a week*; 5 = *Every day*). Two of these items measured community and other non-school related sports participation during the current school year or upcoming summer. These items asked youth to indicate "how often they were involved in community sports/physical activities: organized team sports outside of school" and "how often they were involved in other organized sports/athletics outside of school, specifically gymnastics, martial arts, skating" The second item also allowed youth to indicate the amount of time they spent participating in "other" organized sports/athletic outside of school that were not

gymnastics, martial arts, and skating. Finally, the third item asked youth to list the school sports teams that they have participated in over the past year, including the amount of time they spent participating on each sports team. Youth were coded as participating in a sport if they reported participating at *least a couple times a month or more* (i.e., ≥ 2). Youth who reported *never* participating in a sport or who reported involvement *only once a month or less* were coded as non-participants. A composite dummy variable (0/1=*no/yes*) was created to reflect dichotomous participation at each grade. Duration of participation was then coded from these composite indices.

No involvement in sports across the three years was coded as 0 ($n = 96$; 74% female), one year of participation was coded as 1 ($n = 250$; 74% female), and sports participation in two or all three years was coded as 2 ($n = 704$; 65.1% female). I wanted to ensure that I captured persistent sports participants who may have enrolled later (10th instead of 9th grade, and persisted in 11th grade; $n = 355$; 69% female), and those youth who only had two waves of data collection, but also reported persistent participation ($n = 346$; 69.1% female). Among youth who had three waves of data collection, sixty-five participants (46.2% female) were involved in sports at all three waves.

Sex. Participants' sex was indexed using a dichotomous variable 0 = *male* and 1 = *female*.

Socioeconomic status. Maternal education was used as an indicator of family SES, given that a rich body of research has found that maternal education is a powerful predictor of a child's development (Sirin & Rogers-Sirin, 2005). Maternal education ranged from eight years (eighth grade or less) to 20 years (doctoral degree). As mother's education reported at different points of assessment was highly correlated (r s ranged

from .89 to .98, $ps < .01$), the composite of maternal education score was calculated for every participant by choosing the highest scores reported among all time points. The reason for choosing the highest reported education instead of calculating the mean of all scores is to capture any possible continuing education a parent may pursue.

Youth goal orientation. The present study used a short version of the original Selection (S), Optimization (O), and Compensation (C) Questionnaire (SOC) to measure goal orientation at Grade 9 among participants (Freund & Baltes, 2002). In the current research, three subscales from the shortened version of the SOC Questionnaire version (elective selection, optimization, and compensation) were used. Each subscale has six items with a forced-choice format. Each item consists of two statements, one describing behavior reflecting S, O, or C and the other describing a non-SOC related behavior. Participants are asked to decide which of the statements is more similar to how they would behave. An item from the elective selection subscale is “I concentrate all my energy on a few things [SOC action]” or “I divide my energy among many things [non-SOC action].” An Optimization subscale item is “I keep trying as many different possibilities as are necessary to succeed at my goal [SOC action]” and “When I do not succeed right away at what I want to do, I don't try other possibilities for very long [non-SOC action].” An item from the Compensation subscale is “For important things, I pay attention to whether I need to devote more time or effort [SOC action]” or “Even if something is important to me, it can happen that I don't invest the necessary time or effort [non-SOC action].” A SOC score for each participant was computed as the mean of responses on each subscale, which could range from 0 to 1. In the current study, all 18

items of the short version of the SOC measure were used. For the three grades, Cronbach's alphas were .57, .56, and .58, respectively.

Attrition analysis

The problem of missing data is inevitable in longitudinal research, particularly in developmental studies that incorporate participant responses from multiple assessment occasions and across transitions in school. The best method of handling missing data is to not have any (Allison, 2002). Careful research design and sample maintenance prevent missing data from happening. However, where missing data exist, the priority is to understand the origins of these missing values and to choose an appropriate method to handle missing data.

As with most longitudinal studies, the major two types of missing data in the present study include attrition and wave non-response (Jeličić, Phelps, & Lerner, 2009, 2010). Attrition occurs when participants drop out after the first few occasions. Wave non-response is the result of participation in some but not all waves, resulting in entire waves of missing data. In addition to participant-initiated "missingness," missing data may be due to design. For example, and is the case with the present study, a subgroup of participants may be added into the overall sample in a later wave of assessment (e.g., Grade 10), in order to retain statistical power and sample size. This subgroup of latecomers does not have valid data in earlier waves because they were not given the opportunity to participate.

Attrition in the 4-H Study sample is not randomly distributed across schools or youth program sites, the two settings from which participants were recruited. For example, in Wave 2 and Wave 3, some principals withdrew consent for their school to

participate and, thus, these students “dropped out” without having had the opportunity to remain in the study. The withdrawal of principal or superintendent permission to continue testing resulted in the loss of 561 participants in Wave 2. However, attrition from Wave 1 to Wave 2 for students who were allowed to be asked to remain in the study was only 10%. Of the 1,954 participants tested in Wave 2, 21.5% individually withdrew their participation from Wave 3, whereas 337 (17.5%) dropped out because of school/site attrition. In subsequent waves (4, 5, and 6), many of the same schools did not allow us to conduct on-site data collection. Youth in these schools were contacted through mail or phone and were asked to complete the survey and mail it back to us or to go online to complete it.

Comparison of the longitudinal and “dropout” participants –i.e., those who participated in the study twice or more and those who were one-time participants– was conducted and resulted in a few statistically significant differences. Youth who reported participation in only one of the three waves of data collection (i.e., Grade 9, 10, or 11) were excluded from the present analyses ($n = 2,441$). As shown in Table 3, youth who participated in the 4-H Study twice or more came from wealthier families, were more likely to be Asian American, and were less likely to be Latino or multiracial American. A series of *t*- tests indicated that the longitudinal adolescents and those who dropped out after one wave of participation were not significantly different with respect to many of the primary variables of interest, specifically the majority of eating pathology measures, BMI-z, global self-esteem, depression, and PYD. However, longitudinal youth reported higher average Drive for Thinness scores at Grade 11 ($M = 6.75$, $SD = 6.80$) and more

continuous sports participation across Grades 9 to 11 than one-time participants ($M = 1.58, SD = .65$).

Insert Table 3 about here

CHAPTER 4

RESULTS

The purposes of the current study were fourfold: (1) to identify developmental trends in eating pathology and body dissatisfaction that exist across middle adolescence (Grades 9-11), (2) to determine whether the membership of trajectory groups differed by selected individual and contextual factors, specifically sex, socioeconomic status (SES), perceived and actual weight, and self-worth—and the main contextual factor of interest, sports participation, (3) to examine how different trajectories of eating pathology and body dissatisfaction are related to both positive and problematic outcomes, such as PYD and depressive symptoms, among youth, and (4) to elucidate whether sports participation may moderate potential relations between trajectories of eating pathology and body dissatisfaction and adolescents' psychosocial adjustment. I addressed the four research questions using a combination of group-based modeling techniques, multinomial logistic regression, and hierarchical multiple regression analyses. However, exploratory data analysis proceeded all other analytic steps.

Preliminary Analyses

Several steps of preliminary data analysis were undertaken. First, the distribution and shape of each variable was visually and numerically inspected (Hartwig & Dearing, 1979). More specifically, I screened the data for the presence of outliers and problems of skew or kurtosis (Behrens, 1997). Second, the relationships between pairs of variables were examined in a bivariate analysis. I used scatter plots to display the bivariate relationships among eating pathology, depression, PYD, sports participation, global self-esteem, perceived and actual weight (BMI-z), and SES. Outliers and

nonlinearity were examined visually (Hartwig & Dearing, 1979). Because none of the study variables showed notably non-normal or bivariate associations, I did not perform transformations on any of the variables.

Descriptive means comparisons

Following these preliminary data analyses, I conducted descriptive means comparisons on indices of eating pathology, body dissatisfaction, weight status (i.e., perceived and actual weight), global self-esteem, depression, and PYD between boys and girls and at different points in time. These comparisons were intended as a preliminary assessment of the developmental variations in eating pathology, weight status, self-esteem, and youth problematic and positive functioning, followed by more rigorous group-based modeling techniques and multinomial logit regression analyses. These analyses involved three primary steps: descriptions of the mean levels of studied variables, comparisons of means and frequencies of study variables using *t*-tests and χ^2 analyses, and computation of the Pearson product-moment correlations for associations between continuous variables and point biserial correlations for relations between dichotomous and continuous variables.

Table 2 summarizes the means and standard deviations of studied variables among longitudinal participants. Inter-item correlations among all study variables are presented in Table 4. Correlations among EDI subscales across all three grades were associated with Grade 11 outcome measures, PYD and depression, in the expected directions. DT, BN, and BD scores across all three grades were positively associated with depression (*rs* ranged from .26 to .38, $p < .001$). With regard to PYD scores at Grade 11, BN and BD scores across all three grades were inversely related to PYD, with *rs* ranging

from $-.13, p < .01$ to $-.28, p < .001$. DT scores at Grade 11 were negatively related to PYD scores at Grade 11, $r(697) = -.14, p < .001$. However, DT scores at Grades 9 and 10 were unrelated to PYD scores, $r(206) = -.11, p > .05$ and $r(592) = -.06, p > .05$, respectively. The majority of EDI subscale scores across all three waves were associated with higher BMI-z scores (r s ranging from $.11, p < .05$ to $.36, p < .001$) and perceived overweight (r s ranging from $.16, p < .01$ to $.43, p < .001$) at Grade 9.

Sports participation was negatively associated with all three Grade 9 EDI subscales (r s ranging from $-.11, p < .05$ to $-.16, p < .001$) and with Grade 10 BD scores, $r(936) = -.08, p < .05$. Sports participation was negatively related to perceptions of overweight, $r(519) = -.10, p < .05$, but unrelated to BMI-z scores, $r(440) = -.07, p > .05$. Correlations between sports participation across Grades 9 through 11 and depression and PYD scores at Grade 11 were in the expected directions, $r(683) = -.17, p < .001$ and $r(697) = .12, p < .01$, respectively. Global self-esteem at Grade 9 was negatively related to DT, BN, and BD scores across all three grades (r s ranging from $-.25, p < .01$ to $-.40, p < .001$). In addition, Grade 9 self-esteem was associated with higher PYD scores, $r(152) = .52, p < .001$, and lower levels of depressive symptoms at Grade 11, $r(149) = -.45, p < .001$. Higher BMI-z scores and perceptions of overweight were correlated with lower levels of global self-worth, $r(303) = -.15$ and $r(359) = -.22, p < .01$, respectively. Higher levels of global self-esteem were associated with more continuous sports participation across all three grades, $r(361) = .23, p < .001$.

Insert Tables 4 and 5 about here.

Table 5 shows the results of χ^2 and *t*-tests analyses, using sex as a grouping variable, that were conducted to examine whether sex differences existed among study variables. Bivariate relations between sex and perceived weight status are depicted in the first row of Table 5. A significant chi-square for sex on perceived weight status, $\chi^2(1, N = 521) = 8.02, p < .01$, indicated that more girls, and fewer boys, than expected perceived themselves as overweight (Adjusted Standardized Residual = ± 2.8).

In addition, independent *t*-tests were conducted for all continuous study variables. As Table 5 shows, boys did not differ from girls with regard to demographic characteristics such as age and maternal education, or in terms of actual weight (BMI-z) or SOC scores. However, there were several significant sex differences with regard to mean levels of eating pathology and body dissatisfaction and sports participation across Grades 9 through 11, as well as in regard to depression and PYD at Grade 11. Girls reported significantly higher average levels of drive-for-thinness, bulimic attitudes and behaviors, and body dissatisfaction than did boys at each grades. Relative to boys, girls reported lower average levels of sports participation across Grades 9 to 11. With regard to outcome variables, girls reported higher levels of depressive symptoms and PYD at Grade 11 as compared to boys. These results are consistent with findings from the extant research that has shown sex-based variation with respect to the prevalence and risk factors for eating disorders (e.g., Striegel-Moore & Bulik, 2007), depression (e.g., Kessler et al., 1994), and PYD (e.g., Phelps et al., 2007). Accordingly, then, multiple regression analyses were conducted separately for males ($n = 336$) and females ($n = 714$).

Treatment of missing data

Missing values that resulted from within-wave item non-response were assumed to be missing at random (MAR). In other words, I assumed that missing values on variables of interest were related to other factors measured in the current study (such as sex and mothers' education) but not to the underlying values of the variable in question (Jeličić et al., 2009, 2010).

With regard to missing data on those items from the EDI used to assess eating pathology and body dissatisfaction, the PROC TRAJ procedure in SAS 9.1 was used. The procedure estimates parameters with a maximum likelihood approach (Dodge, Shen, & Ganguli, 2008). Missing data were estimated through the use of full information maximum likelihood (FIML) estimation, which allows cases with only two time points for a measure to be accommodated in the models (Zimmerman, Phelps, & Lerner, 2008). FIML has been recognized as an appropriate method of estimation for longitudinal incomplete data because of several advantages (Allison, 2002; Little & Rubin, 1987). For instance, one does not have to deal with missing data prior to running the planned analyses of the data. However, one potential drawback of the FIML estimation is that it can be tedious to include auxiliary variables in the models, in this case including variables of interest other than eating pathology and body dissatisfaction variables (Jelicic et al., 2009). The problem of not being able to easily include auxiliary variables motivated me to apply the other commonly used multiple imputation (MI) method for handling missing data.

I used the PROC MI and PROC MIANALYZE components of SAS 9.1 to conduct MI using information from study variables as well as from auxiliary variables

not included in analyses for the current study, but nonetheless highly correlated with variables of interest (e.g., scores of self-worth, perceived weight, and PYD from other grades; Collins, Schafer, & Kam, 2001). Ten imputed data sets were created, each of which contained imputed values that were randomly drawn from a distribution of plausible missing values (Rubin, 1987; Schafer, 1997). After the 10 complete data sets were generated, data analysis was conducted on each imputed data set. Finally, the resulting 10 sets of parameters were then combined by an iteration procedure for MI inference (Rubin, 1987). Table 6 shows the means and standard deviations for study variables based on the multiple-imputed data sets for the longitudinal sample. As previously described, missing data on EDI subscales were accommodated separately through the PROC TRAJ procedure in SAS 9.1. Accordingly, then, these items and scales were not included in the MI analyses. Multinomial logistic regression and multiple regression analyses were conducted using imputed data; however, descriptive and psychometric analyses were based on non-imputed data.

Identification of the Developmental Trajectories of Eating Pathology and Body Dissatisfaction

Analysis of the four research questions described earlier in this chapter proceeded according to four major phases. First, I estimated trajectory models of eating pathology and body dissatisfaction across middle adolescence using a finite mixture model approach (Nagin, 2005; Nagin & Tremblay, 1999). I used the PROC TRAJ program in SAS 9.1 to generate these trajectory models and to evaluate correlates of these pathways. Two models of eating pathology and one model of body dissatisfaction were estimated separately based on the three EDI subscales (DT, BN, and BD). The

censored normal distribution was used to model trajectories of drive-for-thinness (DT) and body dissatisfaction (BD), and the Poisson distribution was used to model bulimic thoughts and behaviors (BN).

Model selection involved the identification of an optimal number of groups for each developmental trajectory, as well as estimates of the shape (e.g., linear, quadratic, cubic) of the trajectory. Each participant was assigned membership in one of the identified groups based on his or her eating pathology (DT and BN) and body dissatisfaction (BD) scores in each grade. Determination of the number of groups that best described the data was made primarily based on Bayesian Information Criteria (BIC) scores. In addition, Akaike Information Criteria (AIC) scores were also examined, and are quite similar to BIC scores, although less variable with sample size. I estimated up to seven groups for both indices of eating pathology and for the single index of body dissatisfaction. Table 7 presents the BIC and AIC scores for each model of eating pathology (indexed as both dietary restraint and bulimic thoughts and behaviors) and body dissatisfaction, along with the changes in BIC and the estimated percentage of participants in the smallest group.

Insert Table 7 about here

As recommended by Nagin (2005), other criteria that were used to estimate those models that best fit the data included examination of the Jeffrey Bayes Factor and standard error values. The size of the smallest trajectory group was also considered in selection of the optimal number of trajectories. The shape of each trajectory was

estimated according to the same process used to identify the number of trajectory models. Specifications for constant, linear, or quadratic shapes of the eating pathology and body dissatisfaction trajectory groups were estimated. Decisions about the number and shape of trajectories within a longitudinal data set need to be adequately rationalized by theory and supported by well-replicated findings (Lerner et al., 2009; Li & Lerner, in press; Phelps et al., 2007). I will now describe each of the three final trajectory models, including the number and shape of the distinct clusters of eating pathology and body dissatisfaction.

Trajectories of Drive-for-Thinness

As shown in Table 7, the BIC score worsened with the addition of a seventh group to the six-group model, and the smallest group size in the seven-group model is less than four percent of the total sample (3.64%). As a consequence, a six-group model was selected. This model is defined by three constant trajectories at different levels of drive-for-thinness, two trajectories following inverse patterns of linear change, and one trajectory reflecting a slight quadratic trend.

Figure 1 graphically depicts six developmental trajectories for Drive for Thinness scores in middle adolescence. A small group of adolescents (5.46%), identified as the *high stable group*, showed high, but constant, levels of drive-for-thinness. A second group, labeled as the *increasing/decreasing group*, distinguished itself from other trajectories in that youth in this group showed an initial increase in drive-for-thinness levels from Grades 9 to 10 but then started to decrease again. Approximately thirteen percent (13.5%) of participants were in this particular group. The two trajectory groups that showed linear patterns of change were labeled as the *increasing* and *decreasing*

trajectory groups. The *increasing group* included 9.64% of participants compared to the 21.45% of participants that were in the *decreasing group*. The remaining two trajectories both showed constant levels of drive-for-thinness. However, the smaller group (13.31%) that was labeled as the *very low stable group* included students with the lowest levels of drive-for-thinness. The second constant trajectory group, named *low stable*, was characterized by a similar profile but these youth reported distinctly higher, although low, levels of drive-for-thinness. This trajectory group contained the highest percentage of adolescents (36.63%) among all six trajectory models.

Insert Figure 1 about here

Trajectories of Bulimic Thoughts and Behaviors

Selection of a six-group model for youth BN scores was determined according to similar criteria and was based on the statistical indices previously described. Figure 2 presents these six trajectories. Two of these trajectories showed constant levels of bulimic thoughts and behaviors, two trajectories showed linear patterns of change—one increasing and the second decreasing, and the remaining two trajectories were characterized by slightly curvilinear trends.

Only a small percentage of youth (5.15%) showed the highest constant levels of bulimic thoughts and behaviors (*the high stable group*). In addition, only slightly more youth (5.33%) showed initial high moderate levels of bulimic thoughts and behaviors that decreased from Grades 9 to 10, but then began to increase from Grades 10 to 11. This group was labeled as the *decreasing/increasing group*. The other youth that showed a

curvilinear pattern of change reported moderate levels of bulimic thoughts and behaviors that increased from Grades 9 to 10 and then decreased thereafter. Nearly one-quarter of youth (23.55%) were considered part of this trajectory, named the *increasing/decreasing group*. With regard to trajectories of linear change, the first of these groups that included the highest percentage of youth (34.27%) was labeled as the *increasing trajectory group* because it was characterized by low BN scores that increased across the three-year period. By contrast, the second group that showed a similar linear profile, started with more moderate levels of bulimic thoughts and behaviors that decreased over time. Fewer than fifteen percent of adolescents (12.87%) were in this trajectory group labeled as the *decreasing group*. The final trajectory group, that comprised nearly twenty percent of adolescents (18.83%), could be distinguished by the very low but constant levels of bulimic thoughts and behaviors reported by participants. Accordingly, this group was labeled as the *very low stable group*.

Insert Figure 2 about here

Trajectories of body dissatisfaction

The five-group model was the best-fitting model for trajectories of body dissatisfaction. Table 7 shows that the BIC increased with the addition of a sixth group, and that the smallest percentage of youth in the six-group model was slightly greater than one percent (1.13%). Accordingly, the six-group model did not necessarily support the presence of a qualitatively distinct cluster of individuals. Figure 3 visually presents the shape of the five trajectories in this model. Overall, all the five trajectories followed

constant trends that were mainly differentiated by levels of body dissatisfaction. The group that was comprised of the smallest percentage of adolescents (4.32%) was also the trajectory characterized by the highest levels of body dissatisfaction. This group was labeled as the *high stable group*. A second group that was only slightly larger than the *high stable group* (4.57%) was comprised of adolescents who endorsed having no body dissatisfaction throughout this three-year time period. This group was labeled as the *none stable group*. The remaining three groups were labeled as *very low stable*, *low stable*, and *moderate stable* to reflect the constant, but differentiated, mean levels of body dissatisfaction that characterized each of these groups. The *very low stable group* was the largest among all of the five BD trajectory groups. This group included 36.58% of the adolescents, compared to 33.37% of the adolescents included in the *low stable group* who endorsed slightly higher levels of body dissatisfaction. Finally, 21.15% of adolescents were included in the *moderate stable group*.

Insert Figure 3 about here

Following selection of the final trajectory models, each participant was assigned to a specific group for each of the three trajectory models (i.e., drive-for-thinness, bulimic thoughts and behaviors, and body dissatisfaction) based on the highest posterior probability of group membership. Columns 1 and 2 in Table 8 indicate the percentage of participants assigned to each trajectory group and the average posterior probability for membership in these groups, respectively. In sum, the majority of youth exhibited relatively stable patterns of change in trajectories of drive-for-thinness (55.40%) and

body dissatisfaction (100%), but showed more variability in how levels of bulimic thoughts and behaviors changed from Grades 9 to 11 (see Column 1). Nonetheless, many adolescents experienced unstable trajectories that featured significant increases and nonlinear change. Column 2 of Table 8 shows that the average posterior probabilities for members of each group are all above 0.70, a criterion suggested by Nagin (2005).

Insert Table 8 about here

Individual and Contextual Predictors of Eating Pathology and Body Dissatisfaction

Group Membership

In the second phase of data analysis, multinomial logit analyses were conducted separately for the three trajectories of eating pathology and body dissatisfaction to examine the nature of relations between trajectory group membership and individual factors, such as sex, SES (indexed by mother's education), perceived and actual weight, and global self-esteem/self-worth, and the main contextual factor of interest—sports participation (assessed in terms of duration of involvement), with each of the 10 imputed data sets. The aim of this analysis was to establish whether selected individual factors and the contextual variable of sports participation could be linked to distinct clusters of eating pathology and body dissatisfaction trajectories.

The multinomial logit analyses were conducted with all individual-level and contextual factors as joint predictors of eating pathology and body dissatisfaction group membership. For BN and BD trajectories, the reference category was the highest group (*high stable*). For trajectories of DT subscale scores, the reference category was the

increasing/decreasing group. With regard to trajectories of drive-for-thinness, the *high stable group* was comprised of all females. Therefore, attempts to conduct multinomial logistic regression analyses using all six levels of this trajectory model resulted in convergence and estimation errors because of this “empty cell” problem (Allison, 2004). One recommended solution to this problem would be the combination of two categories—in this case, the *increasing/decreasing* and *high stable groups*—because statistical corrections for this problem have not yet been addressed by SAS for multinomial models (at this time, these corrections are only available for binary logit models). However, given the qualitatively distinct nature of these two groups, multinomial logit analyses for this particular trajectory model included five of the six groups.

Table 9 shows the significant predictors for each trajectory group of eating pathology and for body dissatisfaction, when compared against the reference group, in regard to sex, SES, perceived and actual weight, self-worth, and sports participation. The significant average odds ratios for these comparisons are also shown in Table 9.

 Insert Table 9 about here

Factors predicting Drive-for-Thinness group membership

The combined results of the 10 imputed data sets indicated that membership in the Drive-for-Thinness trajectories was significantly related to a number of individual and contextual factors. More specifically, membership in the DT trajectories was associated with sex, average $\chi^2(4, N = 1,003) = 89.04$ (range: 85.04-93.27); perceived weight,

average χ^2 (4, $N = 1,033$) = 60.28 (range: 36.69-75.84); and self-esteem, average χ^2 (4, $N = 1,033$) = 30.97 (range: 14.51-48.45), all the p values were lower than 0.05. Factors unrelated to membership in trajectories of eating pathology were BMI-z, average χ^2 (4, $N = 1,033$) = 31.96 (16.61-45.55); maternal education, average χ^2 (4, $N = 1,033$) = 9.80 (2.16-18.98); and sports, average χ^2 (4, $N = 1,033$) = 1.70 (0.97-2.93), all p values were non-significant (i.e., greater than .05). Girls were more likely than boys to be in the *increasing/decreasing* trajectory than they were to be in the *very low stable and low stable groups*. Wald tests also suggested that girls were more likely than boys to be in the *increasing* group than they were to be in the *very low stable and low stable* trajectories. Youth who perceived themselves to be overweight were more likely than those who did not to be in the *increasing/decreasing group* compared to the *very low stable, low stable, and increasing groups*.

Wald tests also indicated that self-perceived overweight adolescents were significantly less likely to be in the *very low stable and low stable* groups than they were to be in the *decreasing* trajectory. With regard to self-esteem, adolescents with higher self-esteem were more likely than those with lower levels of self-esteem to be in the *very low stable* trajectory than they were to be in the *increasing/decreasing trajectory* (Table 9). Wald tests also showed that higher self-esteem adolescents were more likely to be in the *very low stable* trajectory than in the *decreasing* group. There were no significant differences between any of the trajectory groups in regard to maternal education and sports participation.

Factors predicting bulimic thoughts and behaviors group membership

Membership in the bulimic thoughts and behaviors trajectory was significantly related to sex, average $\chi^2(5, N = 1,050) = 21.24$ (range: 19.32-24.60); SES, average $\chi^2(5, N = 1,050) = 28.65$ (7.96-42.12); BMI-z, average $\chi^2(5, N = 1,050) = 22.46$ (11.35-47.56); perceived weight, average $\chi^2(5, N = 1,050) = 26.11$ (11.97-40.99); and global self-esteem, average $\chi^2(5, N = 1,050) = 95.20$ (75.50-116.36), all the p values were lower than 0.05. However, membership in the bulimic thoughts and behaviors trajectories was not associated with duration of sports participation, average $\chi^2(5, N = 1,050) = 7.81$ (5.81-10.45), *ns*.

As shown in Table 9, girls were more likely than boys to be in the *high stable* group than to be in any of the other five trajectories. Wald test results indicated that girls were more likely than boys to be in the *increasing* and *decreasing* groups than to be in the *very low stable* trajectory. In addition, girls were more likely to be in the *decreasing* trajectory than in the *decreasing/increasing* group. Adolescents who perceived themselves to be overweight were more likely to be in the *high stable* group than in the *very low stable*, *decreasing/increasing*, or *increasing/decreasing* groups (odds ratios are shown in Table 9). Higher self-esteem adolescents were more likely than lower self-esteem youth to be in the *very low stable* or *increasing* trajectories than to be in the *high stable* group. Wald test results showed that higher self-esteem adolescents were more likely to be in the *very low stable* group than in the *decreasing/increasing* or *increasing/decreasing* groups, and were more likely to be in the *decreasing* trajectory than in the *increasing/decreasing* group. There were no significant differences between

any of the six trajectory groups in regard to maternal education, BMI-z, and sports participation.

Factors predicting body dissatisfaction group membership

The results show that membership in the body dissatisfaction trajectories was also significantly related to sex, average $\chi^2(4, N = 1,050) = 95.98$ (range: 88.87-100.82); BMI-z, average $\chi^2(4, N = 1,050) = 78.62$ (range: 53.12-96.71); perceived weight, average $\chi^2(4, N = 1,050) = 58.19$ (range: 41.09-73.79); and, self-esteem, average $\chi^2(4, N = 1,050) = 113.42$ (range: 92.94-135.68), all the p values were less than 0.05. By contrast, membership in these trajectories was not associated with maternal education, average $\chi^2(4, N = 1,050) = 16.74$ (7.58-36.52) and sports participation, average $\chi^2(4, N = 1,050) = 3.84$ (3.09-4.39), *ns*.

Girls were significantly more likely than boys to be in the *high stable* group than to be in the other four trajectory groups (Table 9 for odds ratios). Results of Wald tests showed that girls were significantly less likely than boys to be in the *very low stable* group than to be in either the *low stable* or *moderate stable* groups. Adolescents with higher BMI-z scores were more likely than lower BMI adolescents to be in the *high stable* group than in any of the other four body dissatisfaction trajectories. Wald test results supported that higher BMI adolescents were more likely than those adolescents reporting lower BMI-z scores to be in the *low stable* or *moderate stable* groups than in the *very low stable* trajectory. In regard to perceived weight, self-perceived overweight adolescents were more likely than those who did not perceive themselves as overweight to be in the *high stable* group than in the *very low stable* trajectory. Self-perceived overweight youth were significantly more likely to be in the *moderate stable* trajectory

than to be in either the *none stable*, *very low stable*, or *low stable* groups. Wald test results also showed that self-perceived overweight youth were more likely to be in the *low stable* group than to be in the *very low stable* group. Self-esteem was significantly associated with membership in body dissatisfaction trajectories. Specifically, higher self-esteem adolescents were least likely to be in the *high stable* group compared with the other four trajectories. However, Wald test results suggested that higher self-esteem adolescents were more likely than lower self-esteem youth to be in the *none stable* group than to be in either the *very low stable* or *moderate stable* trajectories. Table 9 shows that maternal education and sports participation were unrelated to trajectory group membership.

In sum, I identified qualitatively distinct trajectories of eating pathology and body dissatisfaction that differed with respect to timing of onset and patterns of constancy and change across middle adolescence. In addition, several physical, psychological, and demographic factors were associated with membership in these eating pathology and body dissatisfaction trajectories. In general, the results indicated that boys, adolescents with perceptions of normal weight, and adolescents with higher levels of self-worth were more likely to be in favorable trajectories of eating pathology and body dissatisfaction. In fact, boys, adolescents having normal weight perceptions, and those reporting higher global self-esteem at Grade 9 were more likely to experience low levels of eating pathology and body dissatisfaction and to occupy decreasing trajectories over time. Although weight perceptions at Grade 9 were associated with membership in the trajectories of eating pathology, actual weight (BMI-z) was related to membership in body dissatisfaction trajectories but not to membership in eating pathology trajectories. In

the case of body dissatisfaction, lower BMI adolescents were more likely to be in the favorable groups reporting lower levels of body dissatisfaction. By contrast, several individual characteristics were associated with membership in groups that reflected higher levels of eating pathology and body dissatisfaction: i.e., being a girl, perceptions of overweight, higher actual weight, and lower self-esteem. Maternal education, included as a proxy for family SES, was not associated with membership in any of the trajectories. In terms of contextual factors, these findings also suggested that sports participation—specifically, duration of participation—was unrelated to membership in any of the eating pathology and body dissatisfaction trajectories.

Linking Eating Pathology and Body Dissatisfaction Group Membership with Positive and Problematic Functioning

In order to address the question of whether eating pathology and body dissatisfaction trajectory group membership across Grades 9 to 11 mattered in terms of youth depressive symptoms and positive youth development at Grade 11, I fitted a series of ordinary least squares (OLS) regression models with the 10 multiply-imputed datasets, and with self-worth, maternal education, and BMI-z scores as covariates, using the PROC REG procedure of SAS 9.1. Separate regression models predicting PYD and depressive symptoms were conducted, using each of the three eating pathology and body dissatisfaction trajectory models as independent predictors. Each of these models was conducted separately by sex given the aforementioned extant research that has supported sex differences in eating disorder, depression, and PYD prevalence and presentation (e.g., Kessler et al., 1994; Phelps et al., 2007; Striegel-Moore & Bulik, 2007). In addition,

results from multinomial logistic regression analyses supported the presence of sex differences in trajectory group membership.

As a first step, each of the categorical variables reflecting eating pathology and body dissatisfaction trajectory group membership were recoded into dummy variables for inclusion in the multiple regression analyses. A total of five, five, and four dummy variables were created for each of the three trajectory groups (i.e., DT: Drive-for-Thinness, BN: Bulimic Thoughts and Behaviors, and BD: Body Dissatisfaction), respectively. For males, a total of four dummy variables were created for the DT trajectory group given that the *high stable* group included only females. The reference categories for DT, BN, and BD were the *high stable* groups, with the one exception for models using DT trajectories among males (i.e., the reference category was the *increasing/decreasing* group). Next, the dummy variables reflecting eating pathology and body dissatisfaction trajectory group membership were added in each of the regression models, controlling for the effects of covariates (self-worth, SES, and BMI-z). Tables 10 and 11 show the results for the final models, separately for females and males, respectively. The combined results of the 10 imputed data sets produced unstandardized coefficients. However, overall values for F and R^2 cannot be calculated; thus, in reporting these values, I will provide their minimum and maximum values as well as the average value for R^2 .

Insert Tables 10 and 11 about here

Associations among eating pathology, body dissatisfaction, and PYD

The first three columns in both Tables 10 and 11 show variations in the patterns of associations among eating pathology, body dissatisfaction, and PYD among females and males. Specifically, among females, the results shown in Table 10 indicate that membership in specific trajectories of bulimic thoughts and behaviors, $F(8, 705) = 16.55$, $p < .001$, $R^2 = .16$ (minimum) and $F(8, 705) = 32.29$, $p < .001$, $R^2 = .27$ (maximum) and body dissatisfaction, $F(7, 706) = 12.63$, $p < .001$, $R^2 = .11$ (minimum) and $F(7, 706) = 24.52$, $p < .001$, $R^2 = .27$ (maximum), were significantly related to females' positive adjustment, when controlling for the effects of self-worth, maternal education, and BMI-z. Table 10 shows that, with the exception of the *decreasing/increasing* group, all BN trajectories were significantly associated with females' PYD scores. The positive unstandardized beta coefficients for the *very low stable*, *increasing*, *decreasing*, and *increasing/decreasing* groups suggest that female adolescents' membership in each of these groups was associated with higher PYD scores than membership in the *high stable group* (reference category). In terms of the body dissatisfaction trajectories, Table 10 shows that only the *none stable* ($B = 11.16$; $p < .05$) and *low stable* ($B = 5.29$; $p < .05$) groups were significantly higher in PYD as compared with those adolescents in the *high stable trajectory*. Both of these models accounted for a significant amount of variance in PYD scores (average $R^2 = .22$ for BN model and average $R^2 = .18$ for BD model). In the model that examined the relations among membership in the drive-for-thinness trajectories on females' PYD scores, no significant effects were found for any of the DT groups (Bs ranged from $-.50$ to 4.07 , all $ps > .05$).

In contrast to these findings among females, Table 11 shows that males' membership in DT, BN, and BD trajectories was not significantly associated with PYD scores, after accounting for the effects of self-worth, maternal education, and BMI-z. Although the minimum and maximum F values were significant across all three models, individual predictor variables reflecting trajectory group membership were all non-significant [DT: $F(7, 328) = 5.80, p < .001, R^2 = .11$ (minimum) and $F(7, 328) = 16.20, p < .001, R^2 = .27$ (maximum); BN: $F(8, 327) = 6.78, p < .001, R^2 = .14$ (minimum) and $F(8, 327) = 17.43, p < .001, R^2 = .30$ (maximum); BD: $F(7, 328) = 7.09, p < .001, R^2 = .14$ (minimum) and $F(7, 328) = 17.59, p < .001, R^2 = .30$ (maximum)].

Associations among eating pathology, body dissatisfaction, and depression

In contrast to the results of models with PYD as the outcome, Tables 10 and 11 show that eating pathology and body dissatisfaction trajectories mattered in terms of females' and males' depressive symptomatology. The last three columns in Table 10 present the final regression models for females. After accounting for the effects of self-worth, maternal education, and BMI-z, membership in various trajectories of drive-for-thinness, $F(8, 705) = 19.31, p < .001, R^2 = .18$ (minimum) and $F(8, 705) = 30.46, p < .001, R^2 = .26$ (maximum); bulimic thoughts and behaviors, $F(8, 705) = 18.55, p < .001, R^2 = .17$ (minimum) and $F(8, 705) = 33.78, p < .001, R^2 = .28$ (maximum); and, body dissatisfaction, $F(7, 706) = 18.46, p < .001, R^2 = .15$ (minimum) and $F(7, 706) = 31.33, p < .001, R^2 = .24$ (maximum) significantly related to females' depressive symptoms.

Table 10 shows that all five DT groups were significantly associated with the outcome, and the negative unstandardized beta coefficients support the idea that membership in all five of these groups (i.e., *very low stable, low stable, increasing,*

decreasing, and increasing/decreasing) is significantly related to lower depression scores than membership in the referent category, *high stable* (Bs ranged from -6.00, $p < .05$ to -11.44, $p < .001$). Similar main effects of BN trajectory group membership on females' depression scores are also shown in Table 10, suggesting lower depressive symptoms among those females in the *very low stable, increasing, decreasing, or increasing/decreasing* groups compared to girls in the *high stable* trajectory of bulimic thoughts and behaviors (Bs ranged from -6.27, $p < .001$ to -11.71, $p < .001$). Females in the *decreasing/increasing* trajectory group did not report significantly different depression scores from those girls in the *high stable* group ($B = -3.88, p > .05$).

As shown in Table 11, similar findings with respect to membership in the DT and BN trajectories were observed for males' depressive symptoms. That is, membership in particular drive-for-thinness trajectories, $F(7, 328) = 5.53, p < .001, R^2 = .11$ (minimum) and $F(7, 328) = 18.96, p < .001, R^2 = .29$ (maximum), and in trajectories of bulimic thoughts and behaviors, $F(8, 327) = 4.38, p < .001, R^2 = .10$ (minimum) and $F(8, 327) = 13.26, p < .001, R^2 = .24$ (maximum). Males in the *very low stable* ($B = -6.32, p < .01$) and *low stable* ($B = -5.84, p < .01$) groups reported fewer depression symptoms compared to males in the *increasing/decreasing* trajectory. Males in the *increasing* and *decreasing* DT trajectory groups did not report significantly different depression scores compared to those in the *increasing/decreasing* group, ($B = 2.58$ and $B = -3.36, ps > .05$, respectively). With respect to membership in BN trajectories, males in the *very low stable* group reported significantly fewer depression scores than those males in the *high stable* trajectory group ($B = -7.78, p < .05$). However, males in the *increasing, decreasing/increasing, decreasing, and increasing/decreasing* trajectory groups of

bulimic thoughts and behaviors did not report significantly different depression scores than males in the *high stable* BN group (Bs ranged from -2.51 to -6.35, all $ps >.05$).

The final columns of Tables 10 and 11 present the results for the body dissatisfaction trajectories for females and males, respectively. For females, membership in all four of the BD trajectory groups was significantly related to their depression scores, after accounting for the effects of self-worth, maternal education, and BMI-z. However, this same effect was not found among males. The unstandardized beta coefficients in Table 10 show that females in all four of these groups (i.e., *none stable*, *very low stable*, *low stable*, and *moderate*) reported fewer depressive symptoms than females in the *high stable* group (Bs ranged from -7.89, $p<.001$ to -11.07, $p<.05$).

In sum, these findings support that diverse eating pathology and body dissatisfaction trajectories were significantly associated with adolescents' PYD and depression scores, after accounting for specific demographic, physical, and psychological factors. In general, more eating pathology and body dissatisfaction trajectories were associated with adolescents' depression scores than they were with adolescents' PYD scores. In addition, these regression analyses also suggested that unique patterns of associations between trajectory group membership and psychosocial functioning exist for female and male adolescents. Specifically, for girls, membership in unhealthy or problematic eating- and weight-related trajectories was significantly associated with lower levels of PYD, as well as with of depressive symptoms. Among males, membership in problematic eating pathology trajectories, but not problematic body dissatisfaction trajectories, was related to depressive symptoms. Experiencing either

favorable or unfavorable eating- and weight-related trajectories did not matter in terms of males' PYD scores.

Sports Participation as a Potential Moderator in Associations between Eating Pathology and Body Dissatisfaction and Youth Functioning

Finally, the fourth research question addressed the influence of sports participation—assessed as duration of involvement—on associations among developmental trajectories of eating pathology and body dissatisfaction and adolescents' PYD and depression scores. I fitted a series of hierarchical multiple regression models to examine unique patterns of relations among specific eating pathology (DT, BN) and body dissatisfaction (BD) trajectory models, sports participation, and selected developmental outcomes of depression and PYD.

These models included trajectory group membership dummy variables and a continuous index of sports participation (across Grades 9-11) as predictor variables of the two dependent outcomes, depression and PYD (Grade 11). To account for the effects of background characteristics and other theoretically important potential complicating factors, I controlled for self-worth, SES, BMI-z, and youth goal orientation (SOC) in each of the regression models. With the exception of maternal education, which was a composite index of the highest reported number of years completed, all other covariates were based on Grade 9 data. Although the previous section examined the contribution of eating pathology and body dissatisfaction trajectory group membership to adolescents' depressive symptomatology and PYD scores, these models controlled for the additional complicating factor of youth goal orientation. Youth goal orientation and SES (i.e.,

access to resources) were considered important factors associated with an adolescent's activity involvement and his/her positive functioning (Zarrett et al., 2009).

First, I fitted a series of linear regression models, entering the four covariates (i.e., self-worth, SES, BMI-z, and SOC scores) and the significant dummy variables reflecting eating pathology and body dissatisfaction trajectory group membership simultaneously in each of the regression models (Block 1). Separate analyses were conducted for each of the trajectory models that were significant in the previous analyses (see Table 10 and 11), as well as for the outcomes of depressive symptoms and PYD. In addition, multivariate regression models were conducted separately for females and males. Trajectories of bulimic thoughts and behaviors and of body dissatisfaction, but not DT trajectory models, were significantly related to females' PYD scores. All three trajectory models of eating pathology and body dissatisfaction were significantly related to females' depressive symptoms. Accordingly, then, these trajectory groups were included in the models testing the moderating effects of sports participation on associations among trajectory group membership, PYD, and depression.

With regard to males, no significant effects were found for any of the trajectory groups on their PYD scores; however, in terms of their depressive symptoms, DT and BN trajectories were found to be significantly associated with these outcomes in earlier analyses. Therefore, in this set of analyses, I modeled these significant trajectories (DT and BN) as separate predictors of depressive symptoms to test for potential moderating effects of sports participation. The reference categories for BN and BD trajectory groups were again the *high stable* group. For females, the referent group for DT was *high stable*

compared to males, where the reference group was the *increasing/decreasing* trajectory given the absence of males in the *high stable* trajectory.

Sports participation was then added to the models in order to test whether it was independently related to adolescents' PYD and depression scores, while controlling for selected covariates and indices of eating pathology and body dissatisfaction (Block 2). Separate interaction terms were calculated for each of the trajectory group dummy variables and the sports participation variable. The final step in the regression analyses involved adding these interactions terms to the multivariate models to test whether sports involvement moderates associations between clusters of eating pathology and body dissatisfaction membership and youth depression and PYD (Block 3). Tables 12 and 13 present the final multivariate regression models, separately for females and males, respectively.

Insert Tables 12 and 13 about here

Relations among trajectory group membership, sports participation, and PYD

Females' eating pathology and body dissatisfaction trajectory group membership were previously identified as significantly related to their PYD scores, although no significant effects of these eating- and weight-related pathways on males' PYD scores were found. Accordingly, this section describes findings for female adolescents only. As shown in Table 12 (first two columns), no main or interactive effects of sports participation on the association between females' BN and BD trajectory group membership and their PYD scores were found, after accounting for theoretically

important factors (i.e., self-worth, maternal education, BMI-z, and SOC). Although both models accounted for significant variance in females' PYD scores, duration of sports participation did not moderate relations between membership in bulimic thoughts and behaviors (BN) or body dissatisfaction (BD) trajectories and females' positive adjustment, BN: $F(15,698) = 11.06, p < .001, R^2 = .19$ (minimum) and $F(15,698) = 21.10, p < .001, R^2 = .31$ (maximum); and BD: $F(13,700) = 9.82, p < .001, R^2 = .15$ (minimum) and $F(13,700) = 20.64, p < .001, R^2 = .28$ (maximum).

Relations among trajectory group membership, sports participation, and depression

Earlier analyses suggested the presence of main effects of eating pathology and body dissatisfaction trajectory group membership on females' and males' depressive symptoms (see Tables 10 and 11, respectively). With the addition of sports participation to these models predicting depression, results indicated that the effects of experiencing problematic trajectories of eating pathology and body dissatisfaction on depressive symptoms may depend on adolescents' duration of sports participation. Table 12 (final three columns) shows results for the three trajectory models (DT, BN, and BD) significantly associated with females' depression scores. In the first model that examined the influence of drive-for-thinness trajectory groups on females' depression scores, no significant effects of sports participation were found. The absence of a moderating effect of sports participation suggests that the influence of girls' experiencing healthy or unhealthy drive-for-thinness pathways on depressive symptoms did not depend on the duration of their sports involvement across the middle adolescent years.

By contrast, girls' duration of sports participation did significantly moderate relations between BN and BD trajectory group membership and their depressive

symptoms, $F(15,698) = 12.26, p < .001, R^2 = .21$ (minimum) and $F(15,698) = 19.55, p < .001, R^2 = .30$ (maximum) and $F(13,700) = 13.02, p < .001, R^2 = .19$ (minimum) and $F(13,700) = 18.97, p < .001, R^2 = .26$ (maximum), respectively. Specifically, an interaction between membership in the *increasing/decreasing* BN trajectory (as compared to membership in the *high stable* group) and duration of sports participation related to females' depression scores, after accounting for the effects of self-worth, maternal education, BMI-z, and self-regulation. As shown in Figure 4, more years of sports participation were associated with lower depressive symptoms among girls in the *high stable* BN trajectory. For girls in the *increasing/decreasing* BN group, the opposite effect was observed; that is, these females reported higher depression scores the longer they participated in sports across the three-year period.

Figure 5 depicts the second significant interaction effect between the *low stable* BD trajectory group (as compared to membership in the *high stable* reference group) and sports participation on females' depression scores. Consistent with the interaction effect observed in Figure 4 for BN trajectory group membership and females' sports participation, Figure 5 shows that, for girls in the *low stable* BD trajectory group, more continuous sports participation was associated with more depressive symptoms. For these females, no sports participation across the three-year period was associated with the lowest depressive scores, after controlling for theoretically important covariates. However, among girls in the *high stable* BD trajectory, continuous sports involvement was related to lower levels of depressive symptoms.

Therefore, both of these interaction effects suggest that more continuous sports participation was associated with lower depressive symptoms among females

experiencing problematic (i.e., *high stable*) BN and BD trajectories. By comparison, no sports participation was related to lower depression scores among females experiencing more favorable BN and BD trajectories (i.e., *increasing/decreasing* and *low stable*, respectively). In both of these models, the combined addition of the sports participation variable and its interactions with trajectory groups (as well as the covariate assessing youth goal orientation) accounted for, on average, an additional 3% of variance in females' depression scores (see average R^2 values in Table 10 and Table 12 for comparison estimates). No additional moderating effects of sports participation were found for the remaining BN and BD trajectories.

Insert Figures 4 and 5 about here

Table 13 presents, separately, the results of the final two models predicting males' depression scores. As previously described (see Table 11), significant effects of trajectory group membership on males' CESD scores were found for both eating pathology trajectory models (i.e., DT and BN), although membership in BD trajectory groups was not significantly related to their problematic functioning. Accordingly, Table 13 shows the results for the previously significant trajectory models, testing now for the potential moderating effect of sports participation on associations between trajectory group membership and males' depression scores, after accounting for self-worth, maternal education, BMI-z, and SOC.

With regard to the first model that examined the potential moderating effect of sports participation on relations between DT trajectories and males' depressive symptoms,

results indicated a significant interaction effect involving (a) one of the DT trajectory groups (*low stable*) and (b) the duration of males' sports participation, $F(14,321) = 5.17$, $p < .001$, $R^2 = .18$ (minimum) and $F(14,321) = 12.38$, $p < .001$, $R^2 = .35$ (maximum). Figure 6 shows that duration of sports participation had a less dramatic effect on boys' depression scores if they were in the *low stable* DT trajectory (versus the *increasing/decreasing* reference group). Nonetheless, for those boys in the *low stable* trajectory, more continuous sports participation was associated with a slight *increase* in depression scores. A more dramatic *decrease* in depressive symptoms was observed among boys in the *increasing/decreasing* DT trajectory group, the more years they participated in sports. A comparison of the average R^2 value from the earlier model that did not include the sports participation variable and interaction terms (Table 11; average $R^2 = .16$) with the value reported for the current model (Table 13; average $R^2 = .23$) shows a 7% increase, on average, in the amount of variance accounted for in males' depression scores.

Insert Figure 6 about here

Although, in earlier analyses of the BN trajectory models, only one significant effect was found for membership in the *very low stable* BN group (as compared to membership in the *high stable* trajectory) on males' depression scores, all five BN trajectories were included in this set of analyses for statistical accuracy (Cohen, Cohen, West, & Aiken, 2003). However, Table 13 shows that sports participation did not have a moderating effect on the association between *very low stable* BN group membership and

males' depressive symptoms. In fact, after adding the sports participation variable and its interactions with each of the five BN trajectory group into the model, membership in the *very low stable* BN group was no longer significantly related to males' depression scores ($B = -10.03, p = .22$).

In sum, duration of sports participation exerted a moderating effect on relations between eating pathology and body dissatisfaction trajectories and females' and males' depression scores. In general, more continuous sports participation was associated with lower levels of depression among those adolescents who experienced more problematic eating pathology and body dissatisfaction trajectories. For adolescents in more favorable eating- and weight-related trajectory groups, more continuous sports participation was related to increased depressive symptoms. Although girls' positive functioning was directly linked to their membership in particular BN and BD trajectory groups, the duration of their sports participation across Grades 9 through 11 did not affect these relationships.

Summary of the Results

The results of the group-based modeling analyses supported the presence of several qualitatively distinct trajectories of drive-for-thinness, bulimic thoughts and behaviors, and body dissatisfaction across middle adolescence (Grades 9 to 11). These trajectories were distinguished by low, moderate, or high mean levels of eating pathology and body dissatisfaction, as well as by the patterns of linear and non-linear change and levels of constancy. In general, the majority of youth exhibited relatively constant trajectories of drive-for-thinness, and *all* adolescents experienced stable levels of body dissatisfaction across the middle adolescent years. Pathways of bulimic thoughts and

behaviors showed less constancy, and more linear and non-linear changes, compared with the other two trajectories. With regard to trajectories of bulimic thoughts and behaviors, fewer pathways were constant. That is, a sizeable proportion of youth (more than one-third) endorsed increasing levels of bulimic thoughts and behaviors across the middle adolescent years, compared to 10% of adolescents who exhibited similar trajectories of dietary restraint and pursuit-of-thinness (DT). In addition, the percentage of youth who showed decreasing patterns of bulimic thoughts and behaviors was markedly lower than the percentage of youth occupying decreasing pathways of drive-for-thinness (12.87% versus 21.45%, respectively). With regard to body dissatisfaction trajectories, 75% of youth could be classified as following pathways of no, low, or very low (and stable) levels of body dissatisfaction. Across all three trajectories of eating pathology and body dissatisfaction, the highest risk group (labeled as the *high stable* group) comprised approximately 5% of the total sample.

In addition to the identifiable trajectories of stable and linear patterns of eating pathology, curvilinear trends were also observed for both measures of eating pathology (i.e., drive-for-thinness and bulimia). More favorable curvilinear trends in DT and BN models (i.e., *increasing/decreasing* groups), such as those that showed a linear increase from Grades 9 to 10, followed by a decline beginning around Grade 10, were exhibited by approximately 15% and 25% of adolescents, respectively. A more problematic curvilinear pattern, defined by a linear decrease in levels of bulimic attitudes and behaviors between Grades 9 to 10 but then followed by an increase thereafter (i.e., *decreasing/increasing* group), was observed among approximately 5% of adolescents.

Results of the multinomial logistic regression models demonstrated that trajectories of eating pathology and body dissatisfaction were distinguishable by several demographic, physical, and psychological factors, although not by family SES and sports participation. Girls, and adolescents who perceived themselves as overweight and who had lower levels of self-esteem at Grade 9, were most likely to be in problematic trajectories of eating pathology and body dissatisfaction across Grades 9 through 11. Actual weight at Grade 9 was related to membership in body dissatisfaction trajectories, but not to membership in trajectories of eating pathology.

Results of the multiple regression analyses that examined how trajectories of eating pathology and body dissatisfaction related to adolescents' PYD and depression scores suggested that, in general, eating pathology and body dissatisfaction trajectories were more closely associated with youth depression than with their positive development. However, the patterns of associations between trajectories of eating pathology and body dissatisfaction and developmental outcomes differed slightly for males and females. For girls, membership in problematic eating- and weight-related trajectories was associated with lower levels of PYD and higher levels of depressive symptoms. Among boys, pathways of eating pathology and body dissatisfaction were unrelated to their PYD scores, but these trajectories were related to their self-reported depression scores.

Findings from multiple regression analyses suggested that sports participation did moderate associations among problematic eating pathology and body dissatisfaction trajectories and adolescents' depressive symptoms. In general, more continuous participation was associated with lower levels of depression among adolescents who exhibited higher and more chronic levels of eating pathology and body dissatisfaction

across the three-year period. By contrast, for adolescents who exhibited relatively low, although still chronic, levels of these issues, continuous sports participation was associated with higher depression scores. These findings also suggested that sports participation did not moderate associations among trajectories of eating pathology and body dissatisfaction and adolescents' PYD scores.

CHAPTER 5

DISCUSSION

The problem that guided this work is the under-developed nature of the current research related to the development of adolescent eating disorders. To date, the majority of research in this area has described and operationalized split-based conceptions of eating disorder risk and resilience, conceptions that undermine the part-to-whole nature of human development (Overton, 1998, 2006; Striegel-Moore & Bulik, 2007). Such a split approach is, arguably, a major hindrance to scholars' ability to optimize healthy functioning among our youth.

Accordingly, the purpose of this dissertation was to describe, and begin to explore empirically, the developmental processes that promote and protect against adolescents' risk for these mental and physical health problems. The conceptual aim of the current research was to apply a cross-disciplinary, relational developmental perspective to the study of adolescent eating disorders in an effort to more completely and accurately explain the complex, interrelated processes that amplify or mitigate risk (e.g., Overton, 2010). By applying a systems-based approach, the present research highlighted some of the key physical, psychological, demographic, and contextual factors—and the interactions among these factors—that may be critically linked with eating pathology and body dissatisfaction among middle adolescents.

Empirically, using finite mixture modeling, this study examined the diversity that exists with respect to patterns of change in levels of eating pathology and body dissatisfaction across the middle adolescent years. This research illustrated that these pathways can be distinguished by characteristics/factors of the adolescent, that

encompass multiple levels within the individual including physical, psychological, and demographic domains. In addition, at the contextual level, this dissertation examined how characteristics of adolescents' sports participation relate to these developmental pathways of eating disorders and body dissatisfaction, and to adolescents' broader psychosocial functioning. Consistent with a systems-based perspective, the results demonstrated the dynamic interactions between individual characteristics and those systems surrounding the individual that characterize development. In addition, notwithstanding associations among selected physical, psychological, and demographic factors and pathways of eating pathology and body dissatisfaction risk and resilience, findings from the current research suggested that the intraindividual variation that exists in these trajectories has diverse implications for youth psychosocial adjustment.

There were several theoretical and methodological reasons to believe that this research is valuable and timely. As noted, existing theoretical and methodological challenges complicate scholars' capacity to describe the diverse developmental pathways of, and intraindividual variations in, eating pathology and body dissatisfaction among adolescents; and, to show how eating- and weight-related problems relate to (more generalized) facets of youth psychosocial health and development (e.g., PYD and depression). First, longitudinal evidence supports the existence of multiple risk factors in the development of eating disorders (e.g., Bravender et al., 2010; Stice, 2002), but mainly focuses on how individual and contextual factors independently contribute to risk. In addition, although the primary emphasis of these studies on differentiating high versus low risk adolescents is valuable, it does not provide a complete picture for how these issues develop and function according to a "continuum of risk and protection"

perspective. Where research has examined intraindividual variation in trajectories of adolescent eating problems, support for the diversity of these developmental pathways has been documented (e.g., Aimé et al., 2008).

Second, few studies have focused on the assets within adolescents' ecologies that, in combination with youth characteristics and strengths, may relate to positive or problematic trajectories of eating pathology and body dissatisfaction. Specifically, findings from studies that have examined associations between one central context in the lives of adolescents—that is, the sports milieu—and eating disorders are inconsistent (e.g., Holm-Denoma et al., 2009; Milligan & Pritchard, 2006; Petrie et al., 2008; Smolak et al., 2000; Sundgot-Borgen & Torstveit, 2004). As noted, these mixed findings may reflect theoretical and methodological issues. Furthermore, because the majority of the research in the area of sports participation and eating pathology is cross-sectional, little is known about how trajectories of eating pathology, and their associations with youth adjustment, may be influenced by adolescents' sports involvement. In general, sports participation as a potential *moderator* in associations between eating problems and adolescents' psychosocial health and adjustment has yet to be fully investigated, although the implications of this (potentially) interactive relationship are (arguably) critically important for the identification and treatment of these complex issues.

Arguably, the current research has important implications for enhancing the adolescent development literature. In comparison with other developmental periods, adolescence represents a relatively healthy time in the life span. Mortality and morbidity rates are quite low during adolescence (Holden & Nitz, 1995). However, this period also marks a time that is particularly pivotal in terms of the initiation of certain health risk

behaviors (e.g., smoking, alcohol and drug use, weight control behaviors) and the consolidation of health promotive behaviors (e.g., healthy diet and exercise; Williams, Holmbeck, & Greenley, 2002). Eating disorders represent one example of such health issues that have been historically associated with adolescence, primarily because of the multiple and rapid biological, physical, psychological, and social changes that occur during this period.

How adolescents negotiate these transitions has the potential to both increase risk or promote protection, and to influence the course and effects of these problems both concurrently and into the adult years (Lerner, Villarruel, & Castellino, 1999; Striegel-Moore & Bulik, 2007). Because of the prevalence and associated medical consequences of adolescent eating disorders, scholars, policymakers, and practitioners have prioritized this issue (among other mental health problems) in their adolescent mental health research, treatment, and prevention agenda (WHO, 2003). As part of this agenda, experts emphasize the critical need for a focus on the *contextual and cultural understanding* of such health issues among children and adolescence, although not to the exclusion of important genetic and biological factors (WHO, 2003, p.7). What is needed, then, is additional research focused on the developmental pathways of these disorders that simultaneously examines the interactions among individual and contextual factors that eventuate in a diversity of trajectories. Targeting the unique characteristics of this particular age group, as well as those settings most integral to adolescents' development, will facilitate the early and successful identification, prevention, and intervention for adolescent eating problems (Williams et al., 2002).

Generally, the results of the current research attested to the usefulness of a systems-based approach to the study of adolescent eating disorders. In addition, the findings provided evidence of change in eating pathology and body dissatisfaction across the middle adolescent years, a developmental phase within “this second decade of life” that has been documented as potentially “high risk” for these issues (e.g., Klump et al., 2007; Lewinsohn et al., 2000). These findings point to the importance of assessing interindividual differences in intraindividual change in these pathways by providing support for the shared and unique characteristics that describe profiles of eating pathology and body dissatisfaction among male and female adolescents. The findings also point to the implications that these multiple pathways of eating pathology and body dissatisfaction have for adolescents’ positive and problematic adjustment. Furthermore, results of this research demonstrated that sports participation may moderate associations among trajectories of eating pathology and body dissatisfaction and adolescents’ psychosocial adjustment. Accordingly, in this chapter, I discuss the findings pertinent to each of the four research questions, the strengths and limitations of this study, and the implications for future research and for current practice.

Identification of the Developmental Trajectories of

Eating Pathology and Body Dissatisfaction

This research provided a fine-grained assessment of the complexity of the developmental patterns of eating pathology and body dissatisfaction that exist across middle adolescence. By applying an integrative analytical procedure to longitudinal data on adolescents’ eating disorder pathways, the current study extended prior research that has examined change at the aggregate level or with data collected at two-points-in-time

(Willett & Sayer, 1996). Several distinctive patterns in the development of eating pathology and body dissatisfaction emerged.

The results provided support for the presence of significant interindividual differences in the intraindividual development of eating pathology and body dissatisfaction across the middle adolescent years, even with a relatively non-diverse sample. First, these findings demonstrated that distinct, although related, aspects of eating pathology (i.e., drive-for-thinness and bulimic attitudes and behaviors) and body dissatisfaction followed pathways that were characterized by nuanced patterns. Although slightly more qualitatively distinct pathways existed for eating pathology than for body dissatisfaction, each of these associated aspects of eating pathology was distinguished by (to some extent) shared patterns of change. That is, the majority of adolescents in this sample did not follow linear trajectories of increasing or decreasing eating pathology and body dissatisfaction risk. But rather, many middle adolescent males and females experienced constant levels of dietary restraint and of pursuit-of-thinness, bulimic attitudes and behaviors, and body dissatisfaction.

In general, the constancy of all of the trajectories could be differentiated as problematic (e.g., *high stable* or *moderate stable*) or less problematic (e.g., *none stable* or *very low stable*) based on the average levels of eating pathology exhibited by participants in these groups. Although the highest risk groups (labeled as the *high stable* group) comprised approximately 5% of the total sample in each of the trajectory models—compared to nearly one-half of adolescents who could be (favorably) described as following less problematic pathways of *very low stable* and *low stable* levels of drive-for-thinness—this smaller percentage of youth is not inconsequential. In fact, these findings

that 5% of adolescents are exhibiting chronically high levels of eating pathology and body dissatisfaction across their middle adolescent years is concerning. In addition, these groups provide evidence that stable (mean) levels of eating pathology and body dissatisfaction across this three-year period does not necessarily signal healthy adolescent functioning and development. In the case of trajectories of body dissatisfaction, there were no observable linear or non-linear patterns of change among either adolescent girls or boys in the current sample. As I argued throughout Chapter 1, how scholars have traditionally defined and classified eating disorder risk and resilience (i.e., according to a split-based schema that differentiates high versus low risk status) has important implications for the successful prevention and treatment of adolescent eating problems.

Although constancy of eating pathology and body dissatisfaction was a frequently shared feature among all trajectory models, a sizeable proportion of adolescents exhibited linear and non-linear patterns of change in eating pathology across Grades 9 to 11. However, these patterns of change were not consistent for the two types of eating pathology assessed in the current research. In particular, the results suggested that trajectories of bulimic thoughts and behaviors were generally less favorable than drive-for-thinness trends. That is, pathways of increasing bulimic thoughts and attitudes were endorsed by a higher percentage of adolescents (nearly one-third of adolescents) as compared to the percentage of youth that exhibited these same trends with regard to drive-for-thinness (less than 10%). In addition, a smaller percentage of youth (12.87%) were showing decreasing levels of bulimic thoughts and behaviors over time compared to the proportion of youth (21.45%) that exhibited decreasing trends in drive-for-thinness levels. These findings are consistent with the extant research that has shown a differential

“window of vulnerability” during adolescence for different types of eating pathology. Specifically, anorexia nervosa, characterized by an intense preoccupation with a pursuit of thinness, has been documented as having an (initial) earlier peak age of onset than bulimia nervosa (Keel, Eddy, Thomas, & Schwartz, 2010). Therefore, the observed gap in the percentage of youth who endorsed more problematic levels of bulimic thoughts and behaviors relative to levels of drive-for-thinness may be reflective of the age-related trends reported in the general population.

In general, the patterns that were found in the current research with regard to trajectories of eating pathology are consistent with those identified in another study that also examined trajectories of eating pathology over a four-year period among same-aged adolescents, using the same group-based methodology (Aimé et al., 2008). Although these researchers used a different (composite) measure to index eating pathology, specifically anorexic-type attitudes and behaviors (EAT-26; Garner et al., 1982), they similarly reported that the majority of adolescent boys and girls experienced relatively constant (and low) levels of eating pathology and body dissatisfaction. However, Aimé et al. (2008) identified trajectories characterized by unstable patterns of change; however, these trajectories were fewer than the number of constant or chronic eating pathology trajectories. These results suggest that, at least in the short-term, it is possible that relatively low levels of constant eating pathology or body dissatisfaction may not eventuate into full-blown eating issues. Nevertheless, and as analyses linking these trajectories with problematic developmental outcomes (i.e., depression) have supported, even low chronic levels of these issues are associated with adolescents’ distress.

Aimé et al. (2008) did not examine body dissatisfaction as a separate (although related) facet of eating pathology, despite research that has suggested that body dissatisfaction may be a risk factor for eating disorders and, as well, that it is associated (independently) with significant distress (Jacobi, Hayward, de Zwaan, Kraemer, & Agras, 2004; Paxton et al., 2006; Stice, 2002). Accordingly, comparisons with the trends in levels of body dissatisfaction observed in the current study are not possible. Nonetheless, I predicted that levels of body dissatisfaction would be, on average, higher and less stable than levels of eating pathology because research has supported that body dissatisfaction and weight concerns are (to some extent) developmentally normative experiences that may show increasing trends across the adolescent years (e.g., Field et al., 2001; Jones, 2004; Rodin, Silberstein, & Stiegel-Moore, 1985; van den Berg et al., 2010). Contrary to my expectation, more than three-quarters of the sample could be classified as following trajectories of *no*, *low*, or *very low* (and stable) levels of body dissatisfaction. In fact, all five pathways of body dissatisfaction followed constant trends, which is a notable finding in contrast to some of the unstable DT and BN trajectories that were identified.

Quite possibly, the relative constancy of these pathways, as well as the generally low mean levels of body dissatisfaction, can be attributed to the interindividual differences in the developmental phases of adolescence. That is, although some research has suggested that body dissatisfaction peaks at Grade 10 (e.g., Jones, 2004), prospective studies have also shown that the greatest fluctuations occur in the early adolescent years (e.g., Paxton et al., 2006). Therefore, it is plausible that the fluctuations in levels of body dissatisfaction that have been shown to occur in the early adolescent years stabilize by middle adolescence. Alternatively, it is quite possible that some adolescents experience

more transient episodes of body dissatisfaction and weight concern compared to other teenagers whose experiences may be more prolonged (Ohring et al., 2002). However, as with eating pathology, even low and chronic levels of body dissatisfaction can be associated with significant distress (Johnson & Wardle, 2005). In short, these findings highlight the importance of consistently adopting a spectrum-based approach to the study of the development of both eating pathology and body dissatisfaction, and to the examination of trends in eating pathology and body dissatisfaction across different phases of the adolescent period.

Individual and Contextual Predictors of Eating Pathology and Body Dissatisfaction

Group Membership

Additional distinctions were observed in the nature of these eating pathology and body dissatisfaction trajectories. These nuances represent a second contribution of this research; that is, the identification of individual and contextual factors that differentiated adolescents' membership in particular trajectory groups. Specifically, trajectories were distinguishable by several demographic, physical, and psychological factors, but not by family SES or by the central contextual factor investigated in the current research, sports participation. Consistent with my hypothesis, girls, and adolescents who perceived themselves as overweight and who had lower levels of self-esteem at Grade 9, were most likely to be in problematic trajectories of eating pathology and body dissatisfaction across Grades 9 through 11.

That actual weight at Grade 9 was related to membership in body dissatisfaction trajectories, but not to membership in trajectories of eating pathology, has been supported by research demonstrating that overweight teens, or those adolescents with higher body

mass indices, typically report greater body dissatisfaction compared with normal weight adolescents (e.g., Neumark-Sztainer et al., 2002; Paxton et al., 2006; van den Berg et al., 2010). In addition, the unique associations that actual and perceived weight shared with eating pathology and body dissatisfaction trajectories provide additional support for the argument that these factors cannot be considered independent of one another at the risk of inaccurately describing how these two weight-related factors may be distinctly associated with facets of eating pathology (Frisco et al., 2010). Research has shown that perceived weight may matter more than actual weight in terms of adolescents' weight concerns and eating behaviors (Bardone-Cone et al., 2006; Frisco et al., 2010; Mamun et al., 2007; Pesa et al., 2000; Wilson et al., 2005). However, it may be that the issue is not that one factor exerts a greater effect on eating pathology and body dissatisfaction, but that they exert *different* effects depending on the specific eating- or weight-related outcome under investigation.

Although the predicted positive effect of sports participation on eating pathology and body dissatisfaction trajectory group membership was not found in the current research, it is possible that continuity of sports participation may instead have an interactive effect on trajectory group membership. As I will discuss in the next section, the observed moderating impact of sports participation on relations between eating pathology and youth developmental outcomes provides additional support for the absence of a direct effect. In addition, although research examining the links between sports participation and eating pathology is vast—and characterized by mixed results—developmental research in this area is non-existent. In addition, no prior studies assessed sports participation (in the context of eating pathology) according to separable

dimensions (e.g., intensity, breadth, duration), and nearly all have drawn conclusions about effects based on dichotomous indices of behavioral participation or team membership (e.g., DiBartolo & Shaffer, 2002; Holm-Denoma, et al., 2009; Milligan & Pritchard, 2006; Petrie et al., 2008; Reinking & Alexander, 2005; Sanford-Martens et al., 2005; Sundgot-Borgen & Torstveit, 2004). However, the current research indexed sports participation according to adolescents' duration of involvement over a three-year period.

There is, however, developmental research that has shown that whether or how sports participation shapes adolescent health outcomes depends on the nature of adolescents' involvement (e.g., Nelson & Gastic, 2009; Zaff et al., 2003; Zarrett et al., 2009). Accordingly, an absence of any main effect of the duration of sports participation on trajectories of eating pathology may be related to the selected measure of sports participation used in the current research. For example, the type of sport and combinations of sports-based activities with non-sports based activities have been shown to differentially affect adolescents' mental and physical health (e.g., Holm-Denoma et al., 2009; Zarrett et al., 2009). At the same time, however, numerous studies have found no effect of sports participation on eating pathology (e.g., Hausenblaus & Mack, 1999; Reinking & Alexander, 2005), which suggests that, for some adolescents, sports involvement may not be directly related to eating- and weight-related trajectories. That SES was unrelated to membership in any of the eating pathology and body dissatisfaction trajectories may not be particularly surprising, given that this sample of adolescents come from socioeconomically advantaged family backgrounds.

The findings that factors such as sex, actual and perceived weight statuses, and self-esteem were related to trajectories of eating pathology and body dissatisfaction—

including, as well, the directionality of these effects—were not unexpected and are consistent with past research (e.g., Lock, 2009; Striegel-Moore & Bulik, 2007; van den Berg et al., 2010). However, when considering these factors, there were a few surprising exceptions to these general patterns, specifically with regard to associations between sex, self-worth, and trajectories of bulimic attitudes and behaviors. That is, girls were less likely than boys to be in the *increasing* BN group. In addition, those youth with higher levels of self-worth were more likely to be in the *increasing* BN trajectory than to be in the *high stable* group.

One possible explanation for the greater likelihood of boys in the *increasing* BN group—a finding that is inconsistent with the idea that eating disorders are a female issue—may be related to the sex-based variation in symptom profiles of eating pathology. The extant research has shown that non-purging forms of compensatory behavior (e.g., excessive exercise) and binge-eating behaviors prototypical of bulimia nervosa may occur as frequently or more frequently among males than among females (Anderson & Bulik, 2004; Lewinsohn et al., 2002). By contrast, males are less likely to report higher drive-for-thinness scores than females, a trend that was supported in the present research given the absence of males in the highest risk drive-for-thinness trajectory group (Anderson & Bulik, 2004; Lewinsohn et al., 2002). These results provide additional support for the complexity of the developmental trends in eating pathology, and underscore the need for gender-specific measures of these issues in order to elucidate just how the *spectrum* of disordered eating symptoms relate uniquely (as well as uniformly, in some cases) to adolescent males and females.

Similarly, the unexpected finding that youth in the *increasing* BN trajectory had higher self-esteem than youth in the *high stable* group shows that prospective relations between self-esteem and eating pathology and body dissatisfaction are also complex. Specifically, this finding highlights that self-esteem and trajectories of eating pathology are not (entirely) inversely related. Therefore, the well-supported assumption that low self-esteem is associated with increased eating disorder risk requires additional investigation using person-centered analytic methodologies in order to better understand *whether*, *when*, and *how* self-esteem relates to diverse trajectories of eating pathology and body dissatisfaction.

Linking Eating Pathology and Body Dissatisfaction Group Membership with Positive and Problematic Functioning

The third contribution of the current study was to extend the literature by examining how trajectories of eating pathology and body dissatisfaction across Grades 9 through 11 were associated with adolescents' PYD and depression scores at Grade 11. Results were only partially consistent with my hypothesis that higher levels of PYD would be associated with lower levels of eating pathology and body dissatisfaction, and that depressive symptoms would be associated with more chronic, high, and increasing levels of eating pathology. Findings showed that the assumed inverse relationship between healthy and problematic development may not exist in the case of adolescents' eating pathology and body dissatisfaction (e.g., Benson, Mannes, Pittman, & Ferber, 2004). Rather, these results supported findings from studies of adolescents' psychosocial development that showed complex associations between adolescents' problematic (i.e., depression and risk behaviors) and positive development (e.g., Lewin-Bizan et al., 2010;

Phelps et al., 2007). Findings in the present research demonstrated that less problematic (or more favorable) trajectories of eating pathology were related to higher levels of PYD and to fewer depressive symptoms, although not for all adolescents and not for all types of eating pathology.

Therefore, what these findings add to the literature is that whether and how patterns of eating pathology and body dissatisfaction across middle adolescence shape adolescents' development depend on characteristics of the youth (e.g., sex), the specific nature or type of eating issue under investigation, and the selected developmental outcome. For example, patterns of change in body dissatisfaction have no effect on boys' self-reported depression scores at Grade 11. By contrast, however, females' experiencing pathways of body dissatisfaction characterized by either no, low, or very low stable levels endorsed fewer depressive symptoms compared to those females in BD trajectories marked by high and stable levels. Although body dissatisfaction—specifically, a perceived divergence from cultural ideals for body shape and weight—has been shown to negatively affect adolescent boys and girls over time, the effect has been described as more powerful among females because of the centrality of body weight and shape to their general self-concept (Jones, 2004). In addition, body dissatisfaction among males often relates to a desire to gain weight (in order to achieve a more muscular ideal) compared to females who idealize a thinner body type (Cohane & Pope, 2001; Smolak, 2004). However, it is possible that the measure of body dissatisfaction used in the current study may not accurately reflect these symptoms (i.e., related to muscularity) in adolescent boys, which may partially explain the absence of any effect of weight and shape concerns on males' depressive symptoms (Bardone-Cone, Cass, & Ford, 2008).

Consistent with a systems-based approach to the study of adolescent development, the implications that experiencing specific eating pathology and body dissatisfaction trajectories have for females' and males' PYD and depression scores were not uniform. In turn, the successful prevention and treatment of these issues requires scholars to be sensitive to the characteristics of the individual adolescent, the particular nature of the eating- or weight-related issue, as well as the specific developmental outcome being targeted.

Sports Participation as a Potential Moderator in Associations between Eating Pathology and Body Dissatisfaction and Youth Functioning

The fourth major contribution of the current research was that it sought to examine whether sports participation may confer positive benefits (i.e., higher PYD and lower depression) on adolescents exhibiting more problematic (i.e., high, increasing, or chronic) trajectories of eating pathology and body dissatisfaction. To my knowledge, the current research represents the first study aimed at addressing the question of whether adolescents' duration of sports participation can moderate negative and positive developmental outcomes associated with diverse trajectories of eating pathology and body dissatisfaction. As predicted, more continuous participation was associated with lower levels of depression among adolescents who exhibited higher and more chronic levels of eating pathology and body dissatisfaction across the three-year period. However, contrary to my expectations, no moderating influence of sports participation on associations between eating pathology and body dissatisfaction trajectories and levels of PYD was found.

The finding that continuity of sports participation mattered for adolescents' depressive symptoms, particularly if they were in more problematic trajectories of eating pathology and body dissatisfaction, was not surprising. Developmental research has shown that sustained sports participation may have greater potential than transient participation to positively influence adolescents' psychosocial well-being, because many of the benefits of involvement accumulate over time (e.g., Zaff et al., 2003; Zarrett et al., 2009). However, the less positive effects (i.e., increased depressive symptoms over time) of continuous sports participation on adolescent boys and girls who were in more favorable eating- and weight-related trajectories (i.e., *low stable, increasing/decreasing* groups) was a striking finding. It is plausible that participation in a highly intense and competitive sports environment has the potential to increase risk, specifically via the higher levels of stress experienced in these types of sports contexts (Larson et al., 2006). Although the measure of sports continuity used in the current study combines, to some degree, indices of both duration of involvement with intensity (i.e., participation defined as several times per month or more), conclusions about the competitive level of the sport context cannot be made.

The extent to which this effect (of level of competition and intensity on heightened stress experiences) is present requires further investigation into the nature of the sports participation patterns of adolescents in the less problematic eating pathology and body dissatisfaction trajectories. Such analysis will enable me to specify whether there are differences in the characteristics of the sports context that explain the likelihood for negative effects among adolescents who experience specific types of eating pathology and body dissatisfaction pathways.

Another possibility is that youth in the less problematic eating pathology trajectories encounter fewer rewards/benefits and more challenges from the sports context, either because issues involving weight or body image now become salient to them in the sports context or because they face challenges to their self-confidence if they find their abilities are fewer compared with their peers. Qualitative research may be particularly useful with regard to gaining a fuller understanding of the unique experiences that these adolescents have in the sports context that relates to their heightened depression risk. Through interviews with the youth themselves, their parents, coaches, and peers, it may be possible to clarify the motivations, expectations, and perceived benefits and disadvantages of adolescents' sports participation, assessment that would elucidate the specific mechanisms involved in these findings.

Nonetheless, the significance of the present findings is that scholars and practitioners need to recognize the diversity of effects that are possible in terms of youth developmental outcomes. Scholars need to consider how specific "profiles" of eating pathology and body dissatisfaction interact with distinct characteristics of sports involvement. That is, these results clearly demonstrated that sports participation was not equally beneficial with regard to mental health for all adolescents, particularly in the context of eating- and weight-related issues. In addition, these findings suggested that the assumption of a linear relationship between adolescents' sports participation and their positive development was not universally supported.

In sum, these findings showed that the positive impact of sports participation was most profound for those girls and boys who were in the "highest risk" eating pathology and body dissatisfaction trajectories across middle adolescence. Conversely, for

adolescents who exhibited relatively low, although still chronic, levels of these issues, continuous participation had the potential to negatively affect their mental health. That continuity of sports participation across the middle adolescent years has the potential to indirectly influence how developmental pathways of problematic eating pathology and body dissatisfaction may eventuate in positive or negative functioning among adolescents is a provocative finding.

Such an interpretation is well-aligned with the goals of applied developmental scientists who synthesize research in an attempt to describe, explain, and enhance development in individuals and families across the life span (Fisher & Lerner, 1994; Lerner, 2002). In order to optimize positive outcomes, it is critical that scholars understand which youth will benefit from what types of programs/interventions and, as well, at what points in adolescents' development the potential for positive growth can be actualized. In the complex case of adolescent eating pathology and body dissatisfaction and, as well, the inconsistent effects of how sports involvement affects these domains of adolescent health, such findings contribute to a broader understanding of what characteristics of the adolescent, his/her ecology, and his/her developmental timing may interactively relate to healthy or unhealthy adaptation.

Limitations and Future Research

Despite the strengths and contributions of the current study to existing literature, several limitations warrant discussion. First, the use of a longitudinal research design allows researchers to *model* developmental change, but causal inferences or determination of the directionality of relations among different developmental processes is not possible. For example, it is likely that specific forms of sports participation are

associated with increased susceptibility to eating disorders and body dissatisfaction among adolescent males and females. However, it is also plausible that an adolescent's eating pathology or body dissatisfaction history and profile affects his/her involvement in particular sports activities. Research has shown that adolescents may self-select into sports environments that reinforce their own psychological characteristics and those norms within the broader social and cultural spheres that are associated with increased eating disorder risk (Klump et al., 2001; Thomas et al., 2005).

Thus, the same case can be made for the observed relationship between adolescents' eating pathology and depressive symptomatology. There is empirical evidence suggesting that a reciprocal relationship may exist between depression and eating pathology (e.g, Presnell, Stice, Seidel, & Madley, 2009), although the directionality of these effects may be gender-specific (e.g., Bearman & Stice, 2008). Determination of the directionality of these relations requires simultaneous examination of the contribution of pre-existing developmental conditions to subsequent outcomes (e.g., depression and eating pathology), as well as the inverse direction of influence among such associations. Future studies that estimate how changes in eating pathology are associated with changes in depression, or sports participation for that matter, may add valuable information to the extant literature about the dynamic interrelations of these developmental processes.

However, the methodology of this study also had a number of limitations. First, study findings are limited by the nature of the sample. The sample was predominantly European American, with only a small percentage of ethnic minority youth represented in the study. In addition, the reported average family income was much higher than the

national average, and only a small percentage of adolescents resided in urban or inner city areas, where the experience of adolescents' sports participation is influenced by community-based factors such as access to resources and safety (Leventhal et al., 2009; Urban et al., 2010).

These demographic and contextual factors have been associated with the nature, prevalence, and effects of both eating pathology risk and resilience, as well as with adolescents' patterns of sports involvement (Johnston et al, 2007; Seabra et al., 2008; Striegel-Moore & Bulik, 2007; Walters et al., 2009). However, the small percentage of minority and low SES youth in the current sample complicate the ability to make meaningful comparisons across groups, and to understand whether these factors differentially influence developmental processes across diverse populations.

Furthermore, it is not possible to make comparisons that describe the interactive effects of SES and race/ethnicity on these developmental outcomes. Therefore, although the sample had adequate size and representation of American middle adolescent males and females, findings are not necessarily generalizable to youth in other community and cultural settings, or at different development stages within adolescence.

The implications for how the homogeneity of the sample may limit the ability to describe and identify interindividual variation in developmental processes, such as eating pathology and sports participation, is unclear. Although issues of skewness and non-normal distributions were addressed by applying estimation procedures that are robust to the effects of nonnormality, nonnormality attributable to sampling issues may not be accounted for by technical explanations. For instance, unmeasured factors at both the individual and contextual levels can introduce selection bias that may potentially

obscure associations between predictor variables and the developmental outcome(s) of interest (e.g., as discussed in the Chapter 2 section related to endogeneity).

Overcontrolling for these potential factors that are intertwined with the outcome introduces additional methodological challenges.

As previously discussed, the selection process for an adolescent into a particular sport is multi-determined by reciprocal interactions between individual assets (e.g., talents and abilities) and contextual resources, as well as by constraints to participation (e.g., community-based barriers). Adolescent sports participants and their non-involved peers need to be appropriately matched on factors known to influence their involvement and, relatedly, their propensity for eating or body image problems. Propensity-matching would allow treatment of endogenous differences in the probability that specific adolescents may participate in sports and/or may be at an increased risk for an eating problem, given observed complicating covariates (e.g., sex, race/ethnicity, BMI, perceived weight, self-esteem, community-based resources, youth goal orientation; Rosenbaum & Rubin, 1983). The use of propensity scores has been advocated as an effective approach for addressing concerns of selection bias in research and for making causal inferences (Hill, Waldfogel, & Brooks-Gunn, 2002; Shonkoff & Phillips, 2000). Propensity score analysis allows for greater statistical equivalency with respect to background variables known to influence outcomes. By applying propensity score analysis in future research, some of the complicating effects that produce heterogeneous findings could potentially be removed. In addition, adjusting analytical models for school- or region-based variations that may affect sports participation patterns and

membership would also address issues of endogeneity. However, even such approaches cannot fully overcome problems of selection bias.

In turn, there are important benefits for using a person-centered analytic methodology, e.g., it aids in describing a more nuanced (qualitative) perspective about development, compared with variable-centered methodologies. However, the approach also has limitations—findings are sample dependent. That is, the identified trajectory groups are not distinct clusters that remain constant over time and across diverse samples. The size and number of identified groups are affected by characteristics of the sample (e.g., size) and of the particular measurement model used in the current study.

For instance, the decision to measure developmental outcomes and change using annual assessments depended largely on practical and economic considerations, which is often the case with longitudinal research. However, if x -axis divisions were made primarily based on theoretical understanding of the developmental processes being studied, the developmental trajectories identified in the current study may be quite different (Wohlwill, 1970). To illustrate, the shape of the identified trajectories are particularly sensitive to the number of assessments. The ability to detect cubic or quadratic trends, for example, is not possible given the focus on three time points in the current research. Thus, although a major strength of the group-based trajectory modeling strategy is its ability to generate data-driven findings, the nature of the assessments (e.g., the number and timing of measurements) constrains models to estimating linear or quadratic trends. Thus, it is possible that real developmental change that is neither linear nor quadratic may be masked by the use of only three data points. In general, then, future

research should aim to replicate these trajectory models in other, more diverse samples of adolescents, and across a greater number of developmental time points.

One potential challenge to the validity of the present research also concerns the issue of timing, and whether the stable eating pathology and body dissatisfaction trends actually reflect plateau effects or trait-based characteristics of these particular adolescents. Because the analyses in the present research were based on secondary data, for which test-retest eating pathology and body dissatisfaction data were not available, the temporal stability of these trajectories cannot be determined. That is, whether the constant trajectories of eating pathology and body dissatisfaction that were observed in the current research would remain stable with either longer or shorter increments of the x-axis is an important question for future research. However, without controlling for temporal stability, it is not possible to determine whether the constant patterns that were observed for some eating pathology and body dissatisfaction trajectories reflect stabilizing trends (i.e., “plateau effects”) or whether these patterns indicate trait-based characteristics.

The majority of longitudinal studies that have examined developmental pathways of eating disorders and body dissatisfaction have (similarly) considered more proximal risk factors, with follow-up periods of one to two years (e.g., Donovan et al., 2006; Field et al., 2001; Halpern et al., 1999; Presnell et al., 2004). However, it may be that the length of the follow-up period, as well as the particular developmental stage, is associated with the identification of distinct risk factors (Paxton et al., 2006). In addition, changes in developmental processes may be faster, slower, or take an entirely different form depending upon the sampled data points in ontogeny (see Lerner et al., 2009 for review). Although middle adolescence has been supported as a time when symptoms of

eating pathology and body dissatisfaction may emerge (Lewinsohn et al., 2000), examining factors in childhood and early adolescence—as well as fluctuations in these factors over time—that may act as developmental precursors for adolescents' eating pathology and body dissatisfaction (e.g., self-esteem, BMI-z) are, arguably, as important as investigating more developmentally localized effects of these factors. Therefore, adding more time points that extend across the entire course of adolescence, or altering the spacing of data points to reflect either finer or less fine gradients, have the potential to more accurately describe the spectrum of quantitative and qualitative changes that exist.

Specifically, some factors increase vulnerability or protection over a more sustained period of time. Self-esteem may be one such example of a factor that exerts its influence over a longer period of time by increasing susceptibility to internalization of cultural values and ideals. In fact, although self-esteem has been supported as a correlate of body dissatisfaction, few studies have identified low self-esteem as a prospective risk factor for body dissatisfaction. One study that assessed changes in adolescents' body dissatisfaction over a 5-year period suggested that low self-esteem was associated with increased risk among adolescent girls (Paxton et al., 2006). However, in general, the extant literature has not yet described a coherent and reliable pattern with respect to trends in adolescents' body dissatisfaction. Among males, in particular, an examination of the changes that occur across adolescence in levels of body dissatisfaction may be especially relevant because they are under-represented in existing research (Jones, 2004). At an even more fundamental level, examining the nature of those factors that contribute to males' body dissatisfaction risk, both concurrently and prospectively, will be integral to understanding sex-based variations in these issues. In addition, future research should

examine these developmental trends of eating pathology when more data using more points-in-time (at least four) are available.

In addition to issues of timing in longitudinal research, the survey procedure may be another source of limitation. First, although the study assessments were designed to be implemented yearly, the actual interval might have been longer or shorter than 12 months. Some youth, because they may have been tested at the beginning of one six-month annual data collection period and at the end of a subsequent one (or vice versa), may have inter-test intervals that are not separated by 12 months. Therefore, any observed change or lack of change and individual differences in such change may be affected by differences in the time-of-testing parameter. Second, the sample was derived from online as well as onsite data collection procedures. Although every effort was made to provide detailed administrative protocols, there is no way to fully ensure fidelity with the desired survey procedures. In addition, given the length of the entire questionnaire, possible error could be introduced because of fatigue and boredom.

Furthermore, the study is limited by several features of the measures used to operationalize the key constructs of sports participation, eating pathology and body dissatisfaction, and weight status. First, the current research was based entirely on youth self-reports. This method was selected, given that the purpose of the current study was to assess adolescents' perceptions, feelings, and thoughts about their eating, weight, and patterns of activity involvement. However, relying on students' self-report may introduce potential problems of socially desirable responding, common method variance, and the possibility of inaccurate recall of past behaviors (e.g., retrospective accounts of sports participation).

The reporting of symptoms of eating pathology and body dissatisfaction, as well as of depression, may be most likely affected by issues of social desirability. Among college-aged females, Lavender and Anderson (2009) demonstrated that both perceived anonymity and response format were associated with greater endorsement of eating attitudes and behaviors. The most notable effects were observed for symptoms of purging and extreme dieting, suggesting that these types of behaviors may be most sensitive to issues of anonymity (compared to weight and shape concerns, for example). In addition to eating pathology and other sensitive mental health issues, self-reported height and weight also have the potential to introduce bias. However, empirical support exists for the presence of a high correlation between self-reported and measured height and weight, although the accuracy of these assessment methods may depend on factors such as sex, age, and SES (Gorber, Tremblay, Moher, & Gorber, 2007; Kuczmarski, Kuczmarski, & Najjar, 2001).

Accordingly, other methods of data collection or data from multiple informants (e.g., observer ratings, as well as parent, teacher, or sport coach reports), are needed to triangulate across measures. In addition, future research should use multiple assessments of disordered eating that include standardized, structured clinical interviews (e.g., the EDE), as well as assessments of weight control practices that have been increasing in their prevalence, specifically among men (Chao et al., 2008). The EDI subscales do not strictly adhere to DSM-IV-TR criteria and, thus, cannot be used diagnostically. Nonetheless, these three subscales are the most strongly correlated with eating pathology, and do assess these essential domains (Garner et al., 1983; Hurley, Palmer, & Stretch, 1990).

An additional challenge related to the measures used to assess eating pathology and body dissatisfaction in the current study was the relevance of these instruments to adolescent males. For instance, the Body Dissatisfaction subscale used in the present study asks about participants' satisfaction with certain parts of the body, but does not inquire about those parts that are most relevant to males (e.g., parts of the upper torso) or about muscle size and shape (Bardone-Cone et al., 2008). Furthermore, this measure of body dissatisfaction does not account for the trend that boys are influenced more by ideals related to muscularity, compared to girls where thinness is the valued ideal (Cafri & Thompson, 2004; Smolak, 2004; van den Berg et al., 2010). Females generally indicate a desire to lose weight, whereas males are often divided by those who would like to gain weight versus those who would desire to lose weight (e.g., Cohane & Pope, 2001).

In fact, research among adolescent boys (Grades 8 through 11) suggests that dual pathways to body dissatisfaction may exist among males. Specifically, in comparison to female adolescents, where weight concerns are positively correlated with body dissatisfaction, an emphasis on both weight and muscularity may be equally important in understanding males' risk (Jones & Crawford, 2005). Given this distinction, the body dissatisfaction measure may not capture the full spectrum of body dissatisfaction among males given that the primary emphasis of the items relates to weight loss (Bardone-Cone et al., 2008; Lewinsohn et al., 2002). In one study of a community sample of young adult males and females, the greatest mean level differences on EDI subscales were found for the two subscales, BD and DT, used in the present study (Lewinsohn et al., 2002). Thus, future research that includes gender-sensitive assessments of eating pathology and body

dissatisfaction would improve the relevance of these issues to male participants and, as well, cross-validate the current study findings.

In addition to measures of eating pathology, assessments of sports participation should consider its measurement in the full context of adolescents' out-of-school time involvement. Future studies relating sports participation and adolescent eating and weight issues should emphasize the differential effects of multiple activity combinations (that include sports) on these developmental outcomes. As noted, the majority of adolescents who participate in sports also simultaneously participate in other types of activities, and these diverse patterns confer unique benefits (e.g., Zarrett et al., 2009). The increased benefits of participating in diverse activity contexts, and specifically in a profile of activities that combine sports with youth development (YD) programs (e.g., Boys and Girls Clubs, Scouts, YMCA, or Big Brothers and Big Sisters), may be due to adolescents' exposure to more diverse challenges, tasks, and activities that may foster the development of multiple technical, interpersonal, and psychosocial skills. The particular advantages of simultaneous participation in sports activities and YD programs, may be the cultivation of a better balance in the values and skills conferred onto youth; for example, although both sports and YD programs emphasize teamwork, sports also teach adolescents the value of competition in goal attainment compared to YD programs, where competition is de-emphasized. Talent and ability are important factors in adolescents' sports-related success and sustained activity involvement, but these factors do not directly relate to adolescents' participation or success in YD programs.

Accordingly, including measures of sports participation that account for the effects of simultaneous activity experiences would enhance the ecological validity of the

present research. The current research also includes only an aggregated assessment of sports participation, given that no differentiation among different types of sports activities was made. As previously discussed, classifying participants according to sport type (i.e., lean versus non-lean) was problematic, given the overlap in youth involvement in both types of these sports contexts. However, future research may want to elucidate the unique contributions of specific types of sports activities according to its team-based or individually-focused structure.

Moreover, the present study measured global self-esteem but did not assess domain specific self-worth or the degree of importance that participants' assigned to valuations of weight and body shape in determining self-esteem. Research that has examined relations among indices of global and physical self-esteem and sports participation has shown a stronger association between sports involvement and physical self-esteem as compared with the association between sports involvement and global self-esteem (e.g., Gabois & Bowker, 2007). In addition, future studies that index self-esteem in the context of eating and weight issues may want to include a measure of weight and shape concern, given the extant research that has described body image in multi-dimensional terms (Allen, Byrne, McLean, & Davis, 2008).

Conclusions

The limitations of this research with regard to the design and sample suggest that more studies are needed to examine developmental pathways of eating disorder risk and resilience and, specifically, including the moderating role of sports participation in the promotion of positive or problematic adjustment among adolescent males and females. Studies that are conducted using more diverse and representative samples, those that

model these issues across the entire adolescent period and that control for the temporal stability of these relations, and studies that encompass information from multiple informants will be particularly valuable. Finally, the use of multiple and gender-specific measures of eating pathology and body dissatisfaction, as well as more ecologically sensitive indices of sports participation, are necessary to ascertain whether the findings of the present research can be replicated by other scholars interested in these issues.

Moreover, in order to achieve a more systems-based framework that is developmental in its perspective, sensitive to individual diversity, and aware of the historical, social, and cultural contexts of adolescents' development, future studies need to conceptualize and measure factors from multiple levels of the adolescent's ecology that influence and are influenced by the sports context. During adolescence, youth spend increasingly more time away from their parents and are exposed to socializing agents—such as peers, neighborhoods, media, and schools—that occupy a more central role in shaping development (Steinberg, 2001). In fact, biopsychosocial models of adolescent health behavior emphasize that these settings, in combination with individual factors such as temperament, are critical to the development of positive or problematic behaviors during this time (Williams et al., 2002).

Accordingly, then, a solitary focus on sports-based factors to understand the development of eating disorders among adolescents does not measure the interactive nature, and the individual differences in these effects, of varied contexts on adolescents' development. That is, multi-tiered models that conceptualize and measure relations among individual characteristics (e.g., perceived and actual weight, gender, ethnicity), sports-related context factors (e.g., type of sport, intensity of involvement,

competitiveness, micro-cultures of teams), and non-sports contexts (e.g., neighborhoods, peers, families) will clarify the direct and interactive effects of sports participation on adolescents' eating and weight outcomes. Future research may incorporate some of the variables that I have examined in the current study, but would greatly benefit from an expansion of this existing model to include additional (non-sports) related contexts that may exert an interactive influence on these developmental processes. Although the current research certainly extends our understanding related to the development of eating pathology, and whether and how sports potentially influences associations between eating- and weight-related issues and adolescents' broader mental health and psychosocial functioning, expanding the current theoretical model would allow scholars to describe a more complete picture of these processes.

In sum, however, and notwithstanding these limitations, there are several important implications of the current study. First, since there are distinct developmental patterns of eating pathology and body dissatisfaction, and because they differ for youth from diverse backgrounds, a “one-size-fits-all” approach to the study, treatment, and prevention of these issues is likely to obscure the individual differences for risk and resilience that exist. For example, coaches and parents may need to be particularly sensitive to the distinct effects that transient versus more continuous sports participation will (potentially) have on adolescents' mental health. More specifically, a stronger emphasis on the health- and socially-related benefits of continuous sports participation (e.g., increased cardiovascular fitness, more social connections with peers and mentors)—rather than on the weight-related benefits—may potentially be a way for coaches and parents to use sports to maintain (rather than reverse) positive mental health

outcomes among adolescents who do not show problematic trajectories of eating pathology or body dissatisfaction. Second, the qualitatively distinct eating pathology and body dissatisfaction trajectories that were identified in the current research demonstrate the utility of applying person-centered methodological approaches to the study of these complex issues and their effects on adolescent development. Third, in addressing issues related to eating and weight, the role of context—in particular, sports participation—will be an important setting within which to focus prevention efforts and design intervention programs.

However, practitioners and programs need to jointly consider the unique individual and contextual assets and constraints that characterize a particular adolescent's experience, both in terms of his/her eating pathology and body dissatisfaction profile as well as his/her unique pattern of sports participation. Of particular import to applied developmental scientists, the existence of diverse eating pathology and body dissatisfaction trajectories—and the specific interrelations among these pathways, sports participation, and adolescents' positive and problematic outcomes—highlights the need for person ↔ context, developmental systems models to study these issues and to understand and effectively respond to the developmental heterogeneity which policies and programs are designed to impact.

Although the potential for systems-based theories and methodologies to address complex questions about adolescent development is powerful, these aspects of developmental science are, in many respects, still a “work in progress.” Systems-based perspectives represent a “good fit” for scholars interested in the study of whether and how sports participation affects the associations between adolescents' experiences with

eating pathology and body dissatisfaction, and its effects on positive and problematic functioning. These theoretical and methodological frameworks allow researchers to model the distinct patterns of change that exist in normative development and to highlight the “off-diagonal” effects and change patterns of non-normative development. However, despite the major statistical advances that have made possible such analyses that were applied in the current research, there is still a critical need for methodologies that target the dynamic feedback processes and life-span changes that characterize development (Urban, Osgood, & Mabry, forthcoming).

An important distinction that warrants discussion in terms of the interpretation and implications of these findings is between statistical and clinical significance. In clinical research, scholars have argued that statistical significance and effect sizes may not be easily interpretable or meaningful for practitioners and patients (Shearer-Underhill & Marker, 2010). As is widely known, *statistical significance* (i.e., *p*-value estimates) provides researchers with an index of whether the observed effect is unlikely to have occurred by chance (Fisher, 1926). Effect sizes, which estimate the strength of relationships among variables, have been described as measures of *practical significance*. However, even these statistics only indicate how much of the variance in the dependent variable can be attributed to the independent factor(s). Although statistical and practical significance are necessary to understanding relations between factors and outcomes, they do not provide sufficient empirical support for the efficacy and effectiveness of treatment (i.e., the *clinical significance* of the findings; Conner, 2010).

Conner (2010) suggests that reporting all three indices of significance may be ideal for facilitating the process of transforming research into effective practice.

However, the standards for reporting are neither uniform nor well-defined. Nevertheless, this debate is particularly relevant to the current dissertation. That is, the findings from the present research are certainly suggestive of the potential relations between adolescents' trajectories of eating pathology and body dissatisfaction, experiences with sports participation, and their broad psychosocial adjustment. However, their relevance to practice and the specific positive implications that sports participation will have for adolescents with problematic eating pathology experiences depend on additional research that not only broadens the existing theoretical framework, as I have described, but that also integrates clinically-relevant evaluations of impact.

Nonetheless, the present study offers clear evidence that the developmental processes of eating pathology and body dissatisfaction are characterized by systematic differences in patterns of intraindividual change. These differences, in combination with the distinct factors within the adolescent and his/her ecology, have unique implications for adolescent development.

REFERENCES

- Abramovitz, B. A., & Birch, L. L. (2000). Five-year-old girls' ideas about dieting are predicted by their mothers' dieting. *Journal of the American Dietetic Association, 100*, 1157-1163.
- Ackard, D.M.P., Fedio, G.M., Neumark-Sztainer, D.P.M., & Britt, H.R.P. (2008). Factors associated with disordered eating among sexually active adolescent males: Gender and number of sexual partners. *Psychosomatic Medicine, 70*, 232-238.
- Ackard, D.M., Fulkerson, J.A., & Neumark-Sztainer, D. (2007). Prevalence and utility of DSM-IV eating disorder diagnostic criteria among youth. *International Journal of Eating Disorders, 40*, 409-417.
- Aimé, A., Craig, W.M., Pepler, D., Jiang, D., & Connolly, J. (2008). Developmental pathways of eating problems in adolescents. *International Journal of Eating Disorders, 41*, 686-696.
- Alegria, M., Woo, M., Cao, Z., Torres, M., Meng, X., & Striegel-Moore, R. (2007). Prevalence and correlates of eating disorders in Latinos in the United States. *International Journal of Eating Disorders, 40*(suppl), 15-S21.
- Alfano, C., Klesges, R., Murray, D., Beech, B., & McClanahan, B. (2002). History of sport participation in relation to obesity and related health behaviors in women. *Preventive Medicine, 1*, 82-89.
- Allen, K. L., Byrne, S. M., McLean, N. J., & Davis, E.A. (2008). Overconcern with weight and shape is not the same as body dissatisfaction: Evidence from a prospective study of pre-adolescent boys and girls. *Body Image, 5*, 261 – 270.
- Allison, P. D. (2002). *Missing data*. Thousand Oaks, CA: Sage Publications.

- Allison, P.D. (2004) Convergence Problems in Logistic Regression. In M. Altman, J.Gill, & M.P. McDonald (Eds.), *Numerical issues in statistical computing for the social scientist* (pp.238-252). Hoboken, NJ: John Wiley & Sons.
- American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed., text rev.). Washington, DC: Author.
- Anderson, C.B. & Bulik, C.M. (2004). Gender differences in compensatory behaviors, weight and shape salience, and drive-for-thinness. *Eating Behaviors*, 5, 1–11.
- Andersen, A. E. & Holman, J. E. (1997). Males with eating disorder: Challenges for treatment and research. *Psychopharmacology Bulletin*, 33, 391-397.
- Asci, F.H., Gökmen, H., Tiryaki, G., & Asci, A. (1997). Self-concept and body image of Turkish high school male athletes and nonathletes. *Adolescence*, 32, 959-968.
- Attia E., & Roberto, C.A. (2009). Should amenorrhea be a diagnostic criterion for anorexia nervosa?. *International Journal of Eating Disorders*, 42(7), 581-589.
- Attie, I., & Brooks-Gunn, J. (1989). Development of eating problems in adolescent girls: A longitudinal study. *Developmental Psychology*, 25, 70-79.
- Babio, N., Arija, V., Sancho, C., & Canals, J. (2008). Factors associated with body dissatisfaction in non-clinical adolescents at risk of eating disorders. *Journal of Public Health*, 16, 107-115.
- Baghurst, T., Hollander, D., Nardella, B., & Haff, G. (2006). Change in sociocultural ideal male physique: an examination of past and present action figures. *Body Image*, 3, 87-91.

- Bahrke, M.S., Yesalis, C.E., & Brower, K.J. (1998). Anabolic-androgenic steroid abuse and performance-enhancing drugs among adolescents. *Child and Adolescent Psychiatric Clinics of North America*, 7(4), 821-838.
- Balsano, A., Phelps, E., Theokas, C., Lerner, J.V., & Lerner, R.M. (2009). Patterns of early adolescents' participation in youth developing programs having positive youth development. *Journal of Research on Adolescence*, 19(2), 249-259.
- Baltes, P.B., Lindenberger, U., & Staudinger, U.M. (1998). Life-span theory in developmental psychology. In R. M. Lerner (Ed.), *Handbook of Child Psychology: Theoretical models of human development* (5th ed., pp. 1029-1143). New York: Wiley.
- Baltes, P.B., Lindenberger, U. & Staudinger, U.M. (2006). Life-span theory in developmental psychology. In W. Damon & R. Lerner (Eds.) *Handbook of Child Psychology, 6th Ed.* (Vol. 1, pp. 569-564). New York: Wiley.
- Baltes, P.B., Reese, H.W., & Nesselroade, J.R. (1977). *Life-span developmental psychology: Introduction to research methods*. Monterey: Brooks Cole.
- Baltes, P. B., Reese, H. W., & Nesselroade, J. R. (1988). *Life-span developmental psychology: Introduction to research methods*. Hillsdale, NJ: Erlbaum.
- Barber, B.L., Abbott, B.D., Blomfield, C.J., & Eccles, J. (2009). Secrets of their success: Activity participation and positive youth development. In R. Gilman & E.S. Huebner (Eds.). *Handbook of positive psychology in schools* (pp. 273-289). New York: Routledge/Taylor & Francis Group.

- Barber, B.L., Eccles, J.S., & Stone, M.R. (2001). Whatever happened to the Jock, the Brain, and the Princess? Young adult pathways linked to adolescent activity involvement and social identity. *Journal of Adolescent Research, 16*, 429-455.
- Bardone-Cone, A.M., Abramson, L.Y., Vohs, K.D., Heatherton, T.F., & Joiner, T.E. (2006). Predicting bulimic symptoms: An interactive model of self-efficacy, perfectionism, and perceived weight status. *Behavioral Research Therapy, 44*, 27-42.
- Bardone-Cone, A.M., Cass, K.M., & Ford, J.A. (2008). Examining body dissatisfaction in young men within a biopsychosocial framework. *Body Image, 5*, 183-194.
- Barlow, S.E. (2007). Expert committee recommendations regarding the prevention, assessment, and treatment of child and adolescent overweight and obesity: summary report. *Pediatrics, 120*(S4):S164-192.
- Bartko, W. T., & Eccles, J. S. (2003). Adolescent participation in structured and unstructured activities: A person-orientated analysis. *Journal of Youth and Adolescence, 32*, 233-245.
- Baum, A. (2006). Eating disorders in the male athlete. *Sports Medicine, 36*, 1-6.
- Bearman, S.K. & Stice, E. (2008). Testing a gender additive model: A longitudinal study of risk factors for adolescent depression. *Journal of Abnormal Child Psychology, 36*, 1251-1263.
- Becker, A.E. (2007). Culture and eating disorders classification. *International Journal of Eating Disorders, 40*, S11-116.

- Becker, A.E., Eddy, K.T., & Perloe, A. (2009). Clarifying criteria for cognitive signs and symptoms for eating disorders in DSM-V. *International Journal of Eating Disorders, 42*, 611-9.
- Becker, A.E., & Fay, K. (2006). Socio-cultural issues and eating disorders (pp.35-63). In S. Wonderlich, M. de Zwaan, H. Steiger, & J. Mitchell (Eds.), *Annual review of eating disorders: Part 2*. Chicago, IL: Academy for Eating Disorders.
- Becker, A.E., Fay, K., Agnew-Blais, J., Guarnaccia, P., Striegel-Moore, R.M. & Gilman, S. (2010). Development of a measure of “acculturation” for ethnic Fijians: Methodologic and conceptual considerations for application to eating disorders research. *Transcultural Psychiatry, 47*(5), 754-788.
- Becker, A.E., Fay, K., Agnew-Blais, J., Khan, A.N., Striegel-Moore, R.H., & Gilman, S. (2011). Mass media exposures and increased risk for adolescent eating pathology in Fiji. *British Journal of Psychiatry, 198*, 43-50.
- Behrens, J.T. (1997). Principles and procedures of exploratory data analysis, *Psychological Methods, 2*, 131–160.
- Bell, J., Wilson, J., & Liu, G. (2008). Neighborhood greenness and 2-year changes in body mass index of children and youth. *American Journal of Preventative Medicine, 37*(5), 547-553.
- Benson, P. L. (2003). Toward asset-building communities: How does change occur? In R. M. Lerner & P. L. Benson (Eds.). *Developmental assets and asset-building communities: Implications for research, policy, and practice* (pp. 213-221). New York, NY: Kluwer Academic/Plenum Publishers.

- Benson, P., Mannes, M., Pittman, K., & Ferber, T. (2004). Youth development, developmental assets and public policy. In R. M. Lerner & L. Steinberg (Eds). *Handbook of adolescent psychology (2nd edition)*. New York: Wiley. (pp. 781–814).
- Benson, P.L., Scales, P.C., Hamilton, S. F., & Sems, A., Jr. (2006). Positive youth development: Theory, research, and applications. In R. M. Lerner (Ed.). *Theoretical models of human development. Vol. 1. Handbook of Child Psychology* (6th ed., pp. 894-941). Editors-in-chief: W. Damon & R. M. Lerner. Hoboken, NJ: Wiley.
- Bergman, L.R., Magnusson, D. (1997). A person-oriented approach in research on developmental psychopathology. *Development and Psychopathology, 9(2)*, 291-319.
- Bergman, L.R., & Trost, K. (2006). The person-oriented versus the variable-oriented approach: Are they complementary, opposites, or exploring different worlds? *Merrill-Palmer Quarterly, 52(3)*, 601-632.
- Berry, T. R., & Howe, B. L. (2000). Risk factors for disordered eating in female university athletes. *Journal of Sport Behavior, 23*, 207-219.
- Bhugra, D. & Bhui, K. (2003). Eating disorders in teenagers in East London: A survey. *European Eating Disorders Review, 11*, 46-57.
- Birch, K. (2005). Female athlete triad. *British Medical Journal, 330*, 244-246.

- Bisaga, K., Whitaker, A., Davies, M., Chuang, S., Feldman, J., & Walsh, B.T. (2005). Eating disorder and depressive symptoms in urban high school girls from different ethnic backgrounds. *Journal of Developmental and Behavioral Pediatrics, 26*, 257–66.
- Blond, A., Feldman, J., Lorenz, J., & Whitaker, A. (2008). Eating attitudes and weight concerns in female low birth weight adolescents. *International Journal of Eating Disorders, 41*, 573-575.
- Blundell, J.E., & King, N.A. (1999). Physical activity and regulation of food intake: Current evidence. *Medicine and Science in Sports and Exercise, 31*, S573-583.
- Bowers, E. P., Li, Y., Kiely, M. K., Brittan, A., Lerner, J. V., & Lerner, R. M. (2010). The Five Cs Model of Positive Youth Development: A longitudinal analysis of confirmatory factor structure and measurement invariance. *Journal of Youth and Adolescence, 39*(7), 720-735.
- Bowker, A., Gadbois, S., & Cornock, B. (2003). Sports participation and self esteem: Variations as a function of gender and gender role orientation. *Sex Roles, 49*, 47-58.
- Brandtstädter, J. (1998). Action perspectives on human development. In W. Damon (Series Ed.) & R. M. Lerner (Vol. Ed.), *Handbook of child psychology: Vol. 1. Theoretical models of human development* (5th ed., pp. 807–863). New York: Wiley.
- Brandtstädter, J. (2006). Action perspectives on human development. In R. M. Lerner (Ed.). *Theoretical models of human development. Handbook of child psychology* (6th ed.). Hoboken, NJ: Wiley.

- Bravender, T., Bryant-Waugh, R., Herzog, D., Katzman, Kriepe, R.D., & Lask, B. (2010). Workgroup for classification of eating disorders in children and adolescents (WCEDCA). *European Eating Disorders Review*, *18*, 79-89.
- Brewer, B.W., Winter, C., & Van Raalte, J.L. (2006). Athletic identity and student involvement of female athletes at NCAA Division III women's and coeducational colleges. *Journal of College Student Development*, *47*, 457-464.
- Bronfenbrenner, U. (2001). The bioecological theory of human development. In N.J. Smelser & P.B. Baltes (Eds.), *International encyclopedia of the social and behavioral sciences* (Volume 10, pp. 6963-6970). New York: Elsevier.
- Bronfenbrenner, U. & Morris, P. A. (2006). The bioecological model of human development. In R. M. Lerner (Ed.). *Theoretical models of human development*. Volume 1 of *Handbook of Child Psychology* (6th ed.). Editors-in-chief: W. Damon & R. M. Lerner. Hoboken, NJ: Wiley.
- Brooks-Gunn, J., Burrow, C., & Warren, M.P. (1988). Attitudes toward eating and body weight in different groups of female adolescent athletes. *International Journal of Eating Disorders*, *7*, 749-758.
- Brooks-Gunn, J., Duncan, G.J. & Maritato, N. (1997). Poor families, poor outcomes: The well-being of children and youth. In J. Brooks-Gunn, & G. Duncan (Eds.). *Consequences of growing up poor* (pp. 1-17). New York, NY: Russell Sage.
- Brooks-Gunn, J., & Graber, J. A. (1994). Puberty as a biological and social event: Implications for research on pharmacology. *Journal of Adolescent Health*, *15*, 663-671.

- Brooks-Gunn, J., Petersen, A.C., & Eichorn, D. (1985). The study of maturational timing effects in adolescence. *Journal of Youth and Adolescence, 14*, 149-161.
- Brown, J.E. (2005). *Nutrition through the life cycle*. Belmont, CA: Wadsworth.
- Brown, B.B., & Larson, J. (2009). Peer relationships in adolescence. In R. M. Lerner, & L. Steinberg (Eds.). *Handbook of Adolescent Psychology* (3rd ed.) (pp. 74-103). Hoboken, NJ: Wiley.
- Brunelle, J., Danish, S. J. & Forneris, T. (2007). The impact of a sport-based life skill program on adolescent prosocial values. *Applied Developmental Science, 11*, 43–55.
- Bulik, C. M. (2002). Eating disorders in adolescents and young adults. *Child and Adolescent Psychiatric Clinics, 11*, 201–218.
- Bulik, C., Sullivan, P., Fear, J. & Pickering, A. (1997). Predictors of the development of bulimia nervosa in women with anorexia nervosa. *Journal of Nervous and Mental Disease, 185*, 704-707.
- Bulik, C.M., Sullivan, P.F., Tozzi, F., Furberg, H., Lichtenstein, P., & Pedersen, N.L. (2006). Prevalence, heritability and prospective risk factors for anorexia nervosa. *Archives of General Psychiatry, 63*, 305-312.
- Bulik, C.M., Sullivan, P.F., Wade, T.D. & Kendler, K.S. (2000) Twin studies of eating disorders: a review. *International Journal of Eating Disorders, 27*, 1-20.
- Burak, L. J., & Burckes-Miller, M. (2000). Weight control beliefs and behaviours of middle-class school athletes. *International Journal of Adolescence and Youth, 8*, 1-11.

- Burckes-Miller, M.E., & Black, D.R. (1988). Male and female college athletes: Prevalence of anorexia nervosa and bulimia nervosa. *Athletic Training, 23*, 137–140.
- Byrne, S., & McLean, N. (2001). Eating disorders in athletes: A review of the literature. *Journal of Science and Medicine in Sport, 4*, 145-159.
- Cachelin, F., Phinney, J., Schug, R., & Striegel-Moore, R.H. (2006). Acculturation and eating disorders in a Mexican American community sample. *Psychology of Women Quarterly, 30*, 340-347.
- Cachelin, F., Veisel, C., Barzegarnazari, E., & Striegel-Moore, R. (2000). Disordered eating, acculturation, and treatment-seeking in a community sample of Hispanic, Asian, Black, and White women. *Psychology of Women Quarterly, 24*, 244-233.
- Cachelin, F., Weiss, J.W. & Garbanati, J.A. (2003). Dieting and its relationship to smoking, acculturation, and family environment in Asian and Hispanic adolescents. *Eating Disorders: The Journal of Treatment and Prevention, 11*, 51-61.
- Cafri, G., & Thompson, J.K. (2004). Evaluating the convergence of muscle appearance attitude measures. *Assessment, 11*, 224-229.
- Cafri, G., Thompson, J. K., Ricciardelli, L., McCabe, M., Smolak, L., & Yesalis, C. (2005). Pursuit of the muscular ideal: Physical and psychological consequences and putative risk factors. *Clinical Psychology Review, 25*, 215–239.
- Caron, S., Carter, B., & Brightman, L.A. (1985). Sex-role orientation and attitudes towards women: Differences among college athletes and nonathletes. *Perceptual and Motor Skills, 61*, 803-806.

- Cash, T. F., Morrow, J. A., Hrabosky, J. I. & Perry, A. A. (2004). How has body image changed? A cross-sectional investigation of college women and men from 1983 to 2001. *Journal of Consulting and Clinical Psychology, 72*, 1081-1089.
- Centers for Disease Control and Prevention (2005). *Youth Risk Behavior Surveillance United States, 2005*. Surveillance Summaries, [June 9, 2006]. MMWR 2006; 55(No. SS-5).
- Centers for Disease Control and Prevention (2009). *Youth Risk Behavior Surveillance United States, 2009*. Surveillance Summaries, [June 4, 2010]. MMWR 2010; 59(No. SS-5).
- Chamay-Weber, C., Narring, F. & Michaud, P. (2005). Partial eating disorders among adolescents: A review. *Journal of Adolescent Health, 37*, 417–427.
- Chamorro, R. & Flores-Ortiz, Y. (2000). Acculturation and disordered eating patterns among Mexican American women. *International Journal of Eating Disorders, 28*, 125–129.
- Chao, Y.M., Pisetsky, E.M., Dierker, L.C., Dohm, F., Rosselli, F., May, A.M., et al. (2008). Ethnic differences in weight control practices among U.S. adolescents from 1995 to 2005. *International Journal of Eating Disorders, 41*(2), 124-133.
- Chen, E. & Paterson, L.Q. (2006). Neighborhood, family, and subjective socioeconomic status: How do they relate to adolescent health. *Health Psychology, 25*(6), 704-714.
- Choate, N., Forster, C., Almquist, J., Olsen, C., & Poth, M. (2007). The prevalence of overweight in participants in high school extramural sports. *The Journal of Adolescent Health, 40*, 283-285.

- Cohane, G.H., & Pope, H.G. (2001). Body image in boys: A review of the literature. *International Journal of Eating Disorders, 29*(4), 373-379.
- Cohen, J., Cohen, P., West, S.G., & Aiken, L.S. (2003). *Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences* (3rd edition). New Jersey: Lawrence Erlbaum Associates.
- Cohen, S., & Willis, T. A. (1985). Stress, social support, and the buffering hypothesis. *Psychological Bulletin, 98*, 310–357.
- Collins, L.M., Schafer, J.L., & Kam, C.M. (2001). A comparison of inclusive and restrictive strategies in modern missing-data procedures. *Psychological Methods, 6*, 330-351.
- Commission on Adolescent Eating Disorders (2005). Defining eating disorders. In D.L. Evans, E.B. Foa, R.E. Gur, H. Hendin, C.P. O'Brien, M. Seligman, et al (eds.), *Treating and preventing adolescent mental health disorders: What we know and what we don't know*. Oxford University Press, New York.
- Conner, B.T. (2010). When is the difference significant? Estimates of meaningfulness in clinical research. *Clinical Psychology: Science and Practice, 17*, 52-57.
- Cook, B., & Hausenblas, H. (2008). The role of exercise dependence for the relationship between exercise behavior and eating pathology: Mediator or moderator? *Journal of Health Psychology, 13*, 495-502.
- Cooper, Z. & Fairburn, C. G. (1987). The Eating Disorder Examination: A semi-structured interview for the assessment of the specific psychopathology of eating disorders. *The International Journal of Eating Disorders, 6*, 1-8.

- Courtney, E.A., Gamboz, J., & Johnson, J.G. (2008). Problematic eating behaviors in adolescents with low self-esteem and elevated depressive symptoms. *Eating Behaviors*, 9(4), 408-411.
- Crisp, A.H. (1995). *Anorexia nervosa; Let me be*. London: Lawrence Erlbaum Associates.
- Crissey, S.R., & Honea, J.C. (2006). The relationship between athletic participating and perceptions of body size and weight control in adolescent girls: The role of sport type. *Sociology of Sport Journal*, 23, 248-272.
- Crow, S. J., Agras, S., Halmi, K., Mitchell, J. E. & Kraemer, H. C. (2002). Full syndromal versus subthreshold anorexia nervosa, bulimia nervosa, and binge eating disorder: A multicenter study. *The International Journal of Eating Disorders*, 32, 309-318.
- Crow, S.J., Praus, B., & Thuras, P. (1999). Mortality from eating disorders a 5- to 10-year record linkage study. *International Journal of Eating Disorders*, 26, 97-101.
- Culbert, K.M., Breedlove, S.M., Burt, S.A., & Klump, K.L. (2008) Prenatal testosterone exposure and risk for eating disorders: a comparison of opposite-sex and same-sex twins. *Archives of General Psychiatry*, 65, 329-336.
- Cummins, L.H., Simmons, A.M., & Zane, N. (2005). Eating disorders in Asian populations: A critique of current approaches to the study of culture, ethnicity, and eating disorders. *American Journal of Orthopsychiatry*, 75(4): 553-574
- Damon, W. (2004). *The moral advantage*. San Francisco: Berrett-Koehler.

- Davis, C., Kennedy, S. H., Ralevski, E., & Dionne, M. (1994). The role of physical activity in the development and maintenance of eating disorders. *Psychological Medicine, 24*, 957-967.
- Davison, K.K., Earnest, M.B., & Birch, L.L. (2002). Participation in aesthetic sports and girls' weight concerns at ages 5 and 7 years. *International Journal of Eating Disorders, 31*, 312-317.
- Davison, K.K., Markey, C.N., & Birch, L.L. (2003). A longitudinal examination of patterns in girls' weight concerns and body dissatisfaction from ages 5 to 9 years. *International Journal of Eating Disorders, 33*, 320-332.
- De Bruin, A.P. de, Oudejans, R.R.D., & Bakker, F.C. (2007). Dieting and body image in aesthetic sports: A comparison of Dutch female gymnasts and non-aesthetic sport participants. *Psychology of Sport and Exercise, 8*, 507-520.
- DeAngelis, T. (2002). A genetic link to anorexia nervosa. *Monitor on Psychology, 33*, 34-36.
- DeBate, R.D., & Thompson, S.H. (2005). Girls on the run: Improvements in self-esteem, body size satisfaction and eating attitudes/behaviours. *Eating and Weight Disorders, 10*, 25-32.
- Deforche, B.I., De Bourdeaudhuij, I.M., & Tanghe, A.P. (2006). Attitudes toward physical activity in normal-weight, overweight, and obese adolescents. *Journal of Adolescent Health, 38*, 560-568.

- DeLeel, M., Hughes, T., Miller, J., Hipwell, A., & Theodore, L. (2009). Prevalence of eating disturbance and body image dissatisfaction in young girls: an examination of the variance across racial and socioeconomic groups. *Psychology in the Schools, 46*, 767-775.
- Deter, H.C., & Herzog, W. (1994). Anorexia nervosa in a long-term perspective: Results of the Heidelberg-Mannheim study. *Psychosomatic Medicine, 56*, 20–27.
- DiBartolo, P.M., & Shaffer, C. (2002). A comparison of female collegiate athletes and nonathletes: Eating disorder symptomatology and psychological well-being. *Journal of Sport and Exercise Psychology, 24*, 33-41.
- Dishman, R.K., Hales, D., Pfeiffer, K.A., Felton, G., Sanders, R., Ward, D. et al. (2006). Physical self-concept and self-esteem mediate cross-sectional relations of physical activity and sport participation with depression symptoms among adolescent girls. *Healthy Psychology, 25*, 396-407.
- Dodge, H.H., Shen, C., & Ganguli, M. (2008). Application of the pattern-mixture latent trajectory model in an epidemiological study with non-ignorable missingness. *Journal of Data Science, 6*, 231-246,
- Dominé, F., Berchtold, A., Akre, C., Michaud, P. & Suris, J. (2009). Disordered eating behaviors: What about boys? *Journal of Adolescent Health, 44*, 111–117.
- Donovan, C.L., Spence, S.H., & Sheffield, J.K. (2006). Investigation of a model of weight restricting behaviour amongst adolescent girls. *European Eating Disorders Review, 14*, 1-17.
- Duncan, G.J., Magnuson, K.A. & Ludwig, J. (2004). The endogeneity problem in developmental studies. *Research in Human Development, 1*(1&2), 59-80.

- East, P.L. & Rook, K.S. (1992). Compensatory patterns of support among children's peer relationships: A test using school friends, nonschool friends, and siblings. *Developmental Psychology*, 28(1), 163-172.
- Eberenz, K. P. & Gleaves, D. H. (1994). An examination of the internal consistency and factor structure of the eating disorder inventory-2 in a clinical sample. *International Journal of Eating Disorders*, 16, 371-379.
- Eccles, J. S. (Ed.). (2004). *Contextual influences on life span/life course: A special issue of research in human development*. Mahwah, NJ: Lawrence Erlbaum.
- Eccles, J.S. (2005). The present and future of research on activity settings as developmental contexts. In: Mahoney JL, Larson RW, Eccles JS, editors. *Organized activities as contexts of development: Extracurricular activities, after-school and community programs* (pp.353-374). Mahwah, NJ: Erlbaum.
- Eccles, J.S., Barber, B.L., Stone, M., & Hunt, J. (2003). Extracurricular activities and adolescent development. *Journal of Social Issues*, 59, 865-889.
- Eccles, J., & Gootman, J.A. (Eds.) (2002). *Community programs to promote youth development*. Washington, DC: National Academies Press.
- Eccles, J. S., Lord, S., & Buchanan, C. M. (1996). School transitions in early adolescence: What are we doing to our young people. In J. L. Graber, J. Brooks-Gunn, & A.C. Petersen (Eds.), *Transitions through adolescence: Interpersonal domains and context* (pp. 251-284). Mahwah, NJ: Lawrence Erlbaum Associates.

- Eddy, K., Dorer, D., Franko, D., Tahilani, K., Thompson-Brenner, H., & Herzog, D. (2008). Diagnostic crossover in anorexia nervosa and bulimia nervosa: Implications for DSM-V. *American Journal of Psychiatry, 165*, 245-250.
- Eddy, K. T., Hennessey, M. & Thompson-Brenner, H. (2007). Eating pathology in East African women: The role of media exposure and globalization. *The Journal of Nervous and Mental Disease, 195*, 196-202.
- Edler, C., Lipson, S. F., & Keel, P. K. (2007). Ovarian hormones and binge eating in bulimia nervosa. *Psychological Medicine, 37*, 131-141.
- Eisenberg, M.E., Neumark-Sztainer, D., & Paxton, S.J. (2006). Five-year change in body satisfaction among adolescents. *Journal of Psychosomatic Research, 61*, 521-527.
- Elder, G. H. (1998). The life course as developmental theory. *Child Development, 69*(1), 1-12.
- Elder, G. H., & Conger, R. D. (Ed.). (2000). *Children of the land: Adversity and success in rural America*. Chicago: University of Chicago Press.
- Elder, G. H., Jr., & Shanahan, M. J. (2006). The life course and human development. In R. M. Lerner (Vol. Ed.) & W. Damon & R. M. Lerner (Eds.), *Handbook of child psychology: Vol. 1. Theoretical models of human development* (6th ed., pp. 665-715). Hoboken, NJ: John Wiley.
- Elkins, W., Cohen, D., Koralewicz, L., & Taylor S. (2004). After school activities, overweight, and obesity among inner city youth. *Journal of Adolescence, 27*(2):181-189.
- Epling, W.F., & Pierce, W.D. (1988). Activity-based anorexia: A biobehavioral perspective. *International Journal of Eating Disorders, 7*, 475-485.

- Fairburn, C.G., Beglin, S. (1994). Assessment of eating disorder pathology: Interview or self-report questionnaire? *International Journal of Eating Disorders, 16*, 363-370.
- Fairburn, C., & Bohn, K. (2005). Eating disorders NOS (EDNOS): An example of the troublesome 'Not Otherwise Specified' (NOS) category in the DSM-IV. *Behavior Research and Therapy, 43*, 691-701.
- Fauth, R. S., Roth, J. L. & Brooks-Gunn, J. (2007). Does the neighborhood context alter the link between youths' after-school time activities and developmental outcomes? A multilevel analysis. *Developmental Psychology, 43*, 760-777.
- Feldman, A.F., & Matjasko, J.L. (2007). Profiles and portfolios of adolescent school-based extracurricular activity participation. *Journal of Adolescence, 30*, 313-332.
- Fichter, M.M., Quadflieg, N., & Hedlund, S. (2006). Twelve-year course and outcome predictors of anorexia nervosa. *International Journal of Eating Disorders, 39*, 87-100.
- Field, A.F., Javaras, K.M., Aneja, P., Kitos, N., Camargo, C.A., Barr Taylor, C., et al. (2008). Family, peer, and media predictors of becoming eating disordered. *Archives of Pediatric and Adolescent Medicine, 162*, 574-579.
- Field, A.E., Austin, S.B., Taylor, C.B., Malspeis, S., Rosner, B., Rockett, H.R., et al. (2003). The relation between dieting and weight change among preadolescents and adolescents. *Pediatrics, 112*, 900-906.

- Field, A.E., Camargo, C.A., Barr Taylor, C., Berkey, C., Roberts, S.B., & Colditz, G.A. (2001). Peer, parent, and media influences on the development of weight concerns and frequent dieting among preadolescent and adolescent girls and boys. *Pediatrics, 107*, 54-60.
- Fingeret, M. C. & Gleaves, D. H. (2004). Sociocultural, feminist, and psychological influences on women's body satisfaction: A structural modeling analysis. *Psychology of Women Quarterly, 28*, 370-380.
- Fisher, R. A. (1926). The arrangement of field experiments. *Journal of the Ministry of Agriculture of Great Britain, 33*, 503-513.
- Fisher, M., Golden, N.H., Katzman, D.K., Kreipe, R.E., Rees, J., Schebenbach, J., et al. (1995). Eating disorders in adolescents: A background paper. *Journal of Adolescent Health, 16*, 420-437.
- Fisher, C.B., & Lerner, R.M. (Eds.) (1994). *Applied developmental psychology*. New York: McGraw-Hill.
- Franko, D. (2007). Race, ethnicity, and eating disorders: Considerations for DSM-IV. *International Journal of Eating Disorders, 40*, S31-34.
- Fredricks, J. & Eccles, J. (2006). Is extracurricular participation associated with beneficial outcomes? Concurrent and longitudinal relations. *Developmental Psychology, 42*, 698-713.
- Freud, A. (1969). Adolescence as a developmental disturbance. In G. Caplan & S. Lebovici (Eds.), *Adolescence* (pp.5-10). New York: Basic Books.

- Freund, A. M., & Baltes, P. B. (2002). Life-management strategies of selection, optimization, and compensation: Measurement by self-report and construct validity. *Journal of Personality & Social Psychology*, *82*, 642-662.
- Frisco, M.L., Houle, J.N., & Martin, M.A. (2010). The image in the mirror and the number on the scale: Weight, weight perceptions, and adolescent depressive symptoms. *Journal of Health and Social Behavior*, *51*(2), 215-228.
- Frisco, M.L., Martin, M.A., & Houle, J.N. (2009). Adolescent weight and depressive symptoms: For whom is weight a burden? *Social Science Quarterly*, *90*, 1019–38.
- Fulkerson, J.A., Keel, P.K., Leon, G.R., & Dorr, T. (1999). Eating-disordered behaviors and personality characteristics of high school athletes and nonathletes. *International Journal of Eating Disorders*, *26*, 73-79.
- Furstenberg, F.F., Jr., Cook, T.D., Eccles, J., Elder, G.H., Jr., & Sameroff, A. (1999). *Managing to make it: Urban families and adolescent success*. Chicago: The University of Chicago Press.
- Gadbois, S., & Bowker, A. (2007). Self-esteem and participation in extracurricular activities. *Sex Roles*, *56* (9-10), 675-689.
- Garner, D.M. (1991). *Eating Disorders Inventory-2: Professional Manual*. Psychological Assessment Resources, Odessa, FL (1991).
- Garner, D.M. (1997). Psychoeducational principles in treatment. In D. M. Garner & P. E. Garfinkel (Eds.), *Handbook of treatment for eating disorders* (2nd ed., pp. 145–177). New York: Guilford.
- Garner, D. M., Garfinkel, P. E., Schwartz, D. & Thompson, M. (1980). Cultural expectations of thinness in women. *Psychological Reports*, *47*, 483-491.

- Garner, D.M., Olmstead, M.P., Bohr, Y., & Garfinkel, P.E. (1982). The eating attitudes test: Psychometric features and clinical correlates. *Psychological Medicine, 12*, 871-878.
- Garner, D.M., Olmstead, M.P., & Polivy, J. (1983). Development and validation of a multidimensional eating disorder inventory for anorexia nervosa and bulimia. *International Journal of Eating Disorders, 2*(2), 15-33.
- Gestsdottir, S., Bowers, E., von Eye, A., Napolitano, C.M., Lerner, R.M. (2010). Intentional self-regulation in middle adolescence: The emerging role of loss-based selection in positive youth development. *Journal of Youth and Adolescence, 39*, 764-782.
- Gestsdottir, S., Lewin-Bizan, S., von Eye, A., Lerner, J.V., & Lerner, R.M. (2009). The structure and function of selection, optimization, and compensation in middle adolescence: Theoretical and applied implications. *Journal of Applied Developmental Psychology, 30*, 585–600.
- Ghaderi, A., & Scott, B. (2001). Prevalence, incidence and prospective risk factors for eating disorders. *Acta Psychiatrica Scandinavica, 104*, 122–130.
- Golden, N.H. (2002) A review of the female athlete triad (amenorrhea, osteoporosis and disordered eating). *International Journal of Adolescent Medicine and Health, 14*, 9-17.
- Golden, N., Katzman, D., Kreipe, R., Stevens, S., Sawyer, S., Rees, J., et al. (2003). Eating disorders in adolescents. Position paper of the Society for Adolescent Medicine. *Journal of Adolescent Health, 33*, 6, 496-503.

- Goldschmidt, A.B., Aspen, V.P., Sinton, M.M., Tanofsky-Kraff, M., & Wilfley, D.E. (2008). Disordered eating attitudes and behaviors in overweight youth. *Obesity, 16*, 257-264.
- Goldsmith, P.A. (2003). Race relations and racial patterns in school sports participation. *Sociology of Sport Journal, 20*(2), 147-171.
- Gorber, S.C., Tremblay, M., Moher, D., & Gorber, B. (2007). A comparison of direct vs. self-report measures for assessing height, weight, and body mass index: A systematic review. *Obesity Reviews, 8*, 307-328.
- Gore, S., Farrell, F. & Gordon, J. (2001). Sports involvement as protection against depressed mood. *Journal of research on adolescence, 11*, 119–130.
- Gottlieb, G. (1992). *Individual development & evolution*. New York: Oxford University Press.
- Gottlieb, G. (1997). *Synthesizing nature–nurture: Prenatal roots of instinctive behavior*. Mahwah, NJ: Lawrence Erlbaum Associates, Inc.
- Gottlieb, G., Wahlsten, D., & Lickliter, R. (2006). The significance of biology for human development: A developmental psychobiological systems view. In R.M. Lerner (Ed.). *Theoretical models of human development. Volume 1 of Handbook of Child Psychology (6th Ed.)* (pp. 210–257). Hoboken, N.J.: Wiley.
- Gowers, S. & Bryant-Waugh, R. (2004). Management of child and adolescent eating disorders: the current evidence base and future directions. *Journal of Child Psychology and Psychiatry, 45*, 63–83.

- Graber, J. A., Lewinsohn, P. M., Seeley, J. R., & Brooks-Gunn, J. (1997). Is psychopathology associated with the timing of pubertal development? *Journal of the American Academy of Child and Adolescent Psychiatry*, *36*, 1768-1776.
- Greenleaf, C., Petrie, T., Carter, J., & Reel, J. (2009). Prevalence of eating disorders and disordered eating behaviors. *The Journal of American College Health*, *57*(5), 489-495.
- Grice, D. E., Halmi, K. A., Fichter, M. M., Strober, M., Woodside, D. B., Treasure, J. T., et al. (2002). Evidence for a susceptibility gene for anorexia nervosa on chromosome 1. *American Journal of Human Genetics*, *70*, 787-792.
- Grieve, F. G., Newton, C. C., Kelley, L., Miller, R. C. Jr., & Kerr, N. A. (2005). The preferred male body shapes of college men and women. *Individual Differences Research*, *3*, 188-192.
- Grunbaum, J.A., Kann, L., Kinchen, S., Ross, J.G., Lowry, R., Harris, W.A., et al. (2004). *Youth risk behavior surveillance—United States, 2003*. MMWR 2004, *53*(SS-2):1-100.
- Guest, A., & Schneider, B. (2003). Adolescents' extracurricular participation in context: The mediating effects of schools, communities, and identity. *Sociology of Education*, *76*, 89-109.
- Gupta, S., Rosenthal, M.Z., Mancini, A.D., Cheavens, J.S., & Lynch, T.R. (2008). Emotion regulation skills mediate the effects of shame on eating disorder symptoms in women. *Eating Disorders: The Journal of Treatment & Prevention*, *16*(5), 405-417.

- Hall, G. S. (1904). *Adolescence: Its psychology and its relation to physiology, anthropology, sociology, sex, crime, religion, and education* (Vols. I & II). Englewood Cliffs, NJ: Prentice-Hall.
- Halpern, C. T., Udry, J. R., Campbell, B., & Suchindran, C. (1999). Effects of body fat on weight concerns, dating, and sexual activity: A longitudinal analysis of Black and White adolescent girls. *Developmental Psychology, 35*, 721–736.
- Harris, E.C., Barraclough, B. (1998). Excess mortality of mental disorder. *British Journal of Psychiatry, 173*, 11-53.
- Harter, S. (1982). The Perceived Competence Scale for Children. *Child Development, 53*, 87–97.
- Harter, S. (1983). Supplementary description of the Self-Perception Profile for Children: Revision of the Perceived Competence Scale for Children. Unpublished manuscript, University of Denver.
- Harter, S. (1985). *Manual for the Self-Perception Profile for Children*. Denver, CO: University of Denver.
- Hartwig, F., & Dearing, B.E. (1979). *Exploratory data analysis*. Beverly Hills, CA: Sage.
- Hausenblas, H. A., & Carron, A. V. (1999). Eating disorders indices and athletes: An integration. *Journal of Sport and Exercise Psychology, 21*, 230-58.
- Hausenblas, H. A., & Mack, D. E. (1999). Social physique anxiety and eating disorder correlates among female athletic and non-athletic populations. *Journal of Sport Behavior, 22*, 502-513.

- Hausenblas, H. A., & McNally, K. D. (2004). Eating disorder prevalence and symptoms for track and field athletes and nonathletes. *Journal of Applied Sport Psychology, 16*, 274-286.
- Hebebrand, J., Casper, R., Treasure, J., & Schweiger, U. (2004). The need to revise the diagnostic criteria for anorexia nervosa. *Journal of Neural Transmission, 111*(7), 827-840.
- Herpertz-Dahlmann, B., Muller, B., Herpertz, S., Heusen N., Hebebrand, J. & Renschmidt, H. (2001). Prospective 10-year follow-up in adolescent anorexia nervosa: course, outcome, psychiatric comorbidity and psychosocial adaptation. *Journal of Child Psychology and Psychiatry and Allied Disciplines, 42*(5), 603-12.
- Herzog, D.B., Greenwood, D.N., Dorer, D.J., Flores, A.T., Ekeblad, E.R., Richards, A., et al. (2000). Mortality in eating disorders: A descriptive study. *International Journal of Eating Disorders, 28*, 20-26.
- Hill, J., Waldfogel, J., & Brooks-Gunn, J. (2002). Assessing differential impacts: The effects of high-quality child care on children's cognitive development. *Journal of Policy Analysis and Management, 21*(4), 601-628.
- Hillebrand, J.J., Koeners, M.P., de Rijke, C.E., Kas, M.J., Adan, R.A. (2005). Leptin treatment in activity-based anorexia. *Biological Psychiatry, 58*(2), 165-71.
- Hirsch, B. J., Roffman, J. G., Deutsch, N. L., Flynn, C. A., Loder, T. L., & Pagano, M. E. (2000). Inner-city youth development organizations: Strengthening programs for adolescent girls. *Journal of Early Adolescence, 20*(2), 210-230.
- Hoek, H. W. (2006). Incidence, prevalence and mortality of anorexia nervosa and other eating disorders. *Current Opinions in Psychiatry, 19*, 389-94.

- Hoek, H. W. & van Hoeken, D. (2003). Review of the prevalence and incidence of eating disorders. *International Journal of Eating Disorders, 34*, 383–396.
- Holden, E. W., & Nitz, K. (1995). Epidemiology of adolescent health disorders. In J. L. Wallander & L. J. Siegel (Eds.), *Adolescent health problems: Behavioral perspectives* (pp. 7–21). New York: Guilford Press.
- Holm-Denoma, J.M., Scaringi, V., Gordon, K.H., van Orden, K.A., & Joiner, T.E. (2009). Eating disorder symptoms among undergraduate varsity athletes, club athletes, independent exercisers, and nonexercisers. *International Journal of Eating Disorders, 42*(1), 47-53.
- Holsen, I., Kraft, P., & Roysamb, E. (2001). The relationship between body image and depressed mood in adolescence: A 5-year longitudinal panel study. *Journal of Health Psychology, 6*, 613–627.
- Hopkinson, R.A. & Lock, J. (2004). Athletics, perfectionism, and disordered eating. *Eating and Weight Disorders, 9*, 99-106.
- Houseworth, S., Peplow, K., & Thirer, J. (1989). Influence of sport participation upon sex role orientation of caucasian males and their attitudes towards women. *Sex Roles, 20*(5/6), 317-324.
- Hudson, J.I., Hiripi, E., Pope, H.G., & Kessler, R.C. (2007). The prevalence and correlates of eating disorders in the National Comorbidity Survey Replication. *Biological Psychiatry, 61*, 348–358.
- Hulley, A., Currie, A., Njenga, F., & Hill, A. (2007). Eating disorders in elite female distance runners: Effects of nationality and running environment. *Psychology of Sport and Exercise, 8*, 521-533.

- Hulley, A.J., & Hill, A.J. (2001). Eating disorders and health in elite women distance runners. *International Journal of Eating Disorders*, 30, 312-317.
- Hurley, J. B., Palmer, R. L., & Stretch, D. (1990). The specificity of the Eating Disorders Inventory: A reappraisal. *International Journal of Eating Disorders*, 9, 419-424.
- Jackson, S. C., Keel, P. K., & Lee, Y. H. (2006). Trans-cultural comparison of disordered eating in Korean women. *International Journal of Eating Disorders*, 39, 498-502.
- Jackson, J.S., Keiper, S., Brown, K.T., Brown, T. N., & Manuel, W. (2002). Athletic identity, racial attitudes, and aggression in first-year Black and White intercollegiate athletes. In M. Gatz et al. (Eds.), *Paradoxes of youth and sport* (pp. 159-172). Albany: SUNY Press.
- Jacobi, C., Hayward, C., de Zwaan, M., Kraemer, H.C., & Agras, W.S. (2004). Coming to terms with risk factors for eating disorders: application of risk terminology and suggestions for a general taxonomy. *Psychological Bulletin*, 130(1),19-65.
- Jeličić, H., Phelps, E., & Lerner, R. M. (2009). Use of missing data methods in longitudinal studies: The persistence of bad practices in developmental psychology. *Developmental Psychology* 45(4), pp. 1195-1199.
- Jeličić, H., Phelps, E., & Lerner, R. M. (2010). Why missing data matter in the longitudinal study of adolescent development: Using the 4-H Study to understand the uses of different missing data methods. *Journal of Youth and Adolescence*, 39(7), 816-835.
- Johnson, C., Crosby, R., Engel, S., Mitchell, J., Powers, P., Wittrock, D., et al. (2004). Gender, ethnicity, self-esteem and disordered eating among college athletes. *Eating Behaviors*, 5, 147-156.

- Johnson, C., Powers, P.S., & Dick, R. (1999). Athletes and eating disorders: The National Collegiate Athletic Association Study. *International Journal of Eating Disorders, 26*, 179-188.
- Johnson, F., & Wardle, J. (2005). Dietary restraint, body dissatisfaction, and psychological distress: A prospective analysis. *Journal of Abnormal Psychology, 115*, 119–125.
- Johnston, L.D., Delva, J., & O'Malley, P.M. (2007). Sports participation and physical education in American secondary schools: Current levels and racial/ethnic and socioeconomic disparities. *American Journal of Preventive Medicine, 33*, (4, Suppl), S195-S208.
- Joiner, T. E., Heatherton, T. F., & Keel, P. K. (1997). Ten-year stability and predictive validity of five bulimia-related indicators. *American Journal of Psychiatry, 154*, 1133-1138.
- Joiner, T. E., Heatherton, T. F., Rudd, M. D., & Schmidt, N. (1997). Perfectionism, perceived weight status, and bulimic symptoms: Two studies testing a diathesis–stress model. *Journal of Abnormal Psychology, 106*, 145-153.
- Jones, D.C. (2004). Body image among adolescent girls and boys: A longitudinal study. *Developmental Psychology, 40*, 823–835.
- Jones, D.C., & Crawford, J.K. (2005). Adolescent boys and body image: Weight and muscularity concerns as dual pathways to body dissatisfaction. *Journal of Youth and Adolescence, 34*(6), 629-636.

- Jones, K., & Duncan, C. (1995). Individuals and ecologies: Analysing the geography of chronic illness within a multilevel modelling framework. *Health and Place, 1*, 27–40.
- Jones, B.L., & Nagin, D. (2007). Advances in group-based trajectory modeling and a SAS procedure for estimating them. *Sociological Methods & Research, 35*, 542-571.
- Jones, B., Nagin, D. S., & Roeder, K. (2001). A SAS procedure based on mixture models for estimating developmental trajectories. *Sociological Methods and Research, 24*, 892-901.
- Jones, D.C., Vigfusdottir, T., & Lee, Y. (2004). Body image and the appearance culture among adolescent girls and boys: An examination of friend conversations, peer criticism, appearance magazines, and the internalization of appearance ideals. *Journal of Adolescent Research, 19*, 323-339.
- Kahan, Polivy, & Herman, 2003 Kahan, D., Polivy, J., & Herman, C. P. (2003). Conformity and dietary disinhibition: A test of the ego-strength model of self-regulation. *International Journal of Eating Disorders, 33*, 165–171.
- Karwautz A., Vökl-Kernstock, S., Nobis, G., Kalchmayr G., Hafferl-Gattermayer, A., Wöber-Bingöl, C., et al. (2001). Characteristics of self-regulation in adolescent patients with anorexia nervosa. *British Journal of Medical Psychology, 74*(1), 101-114.
- Kaye, W. (2008). Neurobiology of anorexia and bulimia nervosa. *Physiology and Behavior, 94*(1), 121-135.

- Keel, P.K. & Klump, K.L. (2003). Are eating disorders culture-bound syndromes? Implications for conceptualizing their etiology? *Psychological Bulletin*, *129*(5), 747-769.
- Keel, P.K., Dorer, D.J., Franko, D.L., Jackson, S.C., Herzog, D.B. (2005). Postremission predictors of relapse in women with eating disorders. *American Journal of Psychiatry*, *162*, 2263–2268.
- Keel, P.K., Eddy, K.T., Thomas, J.J., & Schwartz, M.B. (2010). Vulnerability to eating disorders across the lifespan. In R.E. Ingram & J.M Price (Eds.), *Vulnerability to psychopathology: Risk across the lifespan* (pp. 489-494). New York, NY: Guilford Press.
- Kennedy, S.H., Ravelski, E., & Dionne, M. (1994). The role of physical activity in the development and maintenance of eating disorders. *Psychological Medicine*, *24*, 957-967.
- Kessler, R.C., Berglund, P., Demler, O., Jin, R., Merikangas, K.R., & Walters, E.E. (2005). Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. *Archives of General Psychiatry*, *62*, 593-602.
- Kessler, R.C., McGonagle, K.A., Zhao, S., Nelson, C.B., Hughes, M., Eshleman, S., et al. (1994). Lifetime and 12-month prevalence of DSM-III-R psychiatric disorders in the United States: Results from the National Comorbidity Survey. *Archives of General Psychiatry*, *51*(1), 8-19.
- Kimball, A., & Freysinger, V. J. (2003). Leisure, stress, and coping: The sport participation of collegiate student-athletes. *Leisure Sciences*, *25*, 115-141.

- Kimm, S.Y., Glynn, N.W., Kriska, A.M., Fitzgerald, S.L., Aaron, D.J., Similo, S.L., et al. (2000). Longitudinal changes in physical activity in a biracial cohort during adolescence. *Medicine & Science in Sports & Exercise*, 2(38), 1445-1454.
- Kinningham, R. B., & Gorenflo, D. W. (2001). Weight loss methods of high school wrestlers. *Medicine and Science in Sports and Exercise*, 33, 810–813.
- Kirk, G., Singh, K., & Getz, H. (2001). Risk of eating disorders among female college athletes and non-athletes. *Journal of College Counseling*, 4, 122-133.
- Kjelsås, E., Bjørstrøm, C., & Gøtestam, K.G. (2003). Prevalence of eating disorders in female and male adolescents (14–15 years). *Eating Behaviors*, 5, 13–25.
- Klump, K.L., Burt, A.S., McGue, M., & Iacono, W.G. (2007). Changes in genetic and environmental influences on disordered eating across adolescence: A longitudinal twin study. *Archives of General Psychiatry*, 64(12), 1409-1415.
- Klump, K.L., Gobrogge, K.L., Perkins, P.S., Thorne, D., Sisk, C., & Breedlove, S.M. (2006). Preliminary evidence that gonadal hormones organize and activate disordered eating. *Psychological Medicine*, 36(4), 539-46.
- Klump, K. L., Kaye, W. H., & Strober, M. (2001). The evolving genetic foundations of eating disorders. *The Psychiatric Clinics of North America*, 24(2), 215–225.
- Klump, K. L., Keel, P. K., Culbert, K. M., & Edler, C. (2008). Ovarian hormones and binge eating: Exploring associations in community samples. *Psychological Medicine*, 38, 1749-1757.

- Klump, K. L., Miller, K. B., Keel, P. K., McGue, M., & Iacono, W. G. (2001). Genetic and environmental influences on anorexia nervosa syndromes in a population-based twin sample. *Psychological Medicine, 1*(4), 737–740.
- Klump, K.L., Perkins, P.S., Burt, S.A., McGue, M., & Iacono, W.G. (2007). Puberty moderates genetic influences on disordered eating. *Psychological Medicine, 37*, 627-634.
- Klump, K.L., Ringham, R.M., Marcus, M.D., & Kaye, W.H. (2001, December). *A family history/family study approach to examining the nature of eating disorder risk in ballet dancers: Evidence for gene-environment combinations?* Paper presented at the Eating Disorders Research Society Annual Meeting; Albuquerque, NM.
- Konstanski, M., Fisher, A., & Gullone, E. (2004). Current conceptualization of body image dissatisfaction: Have we got it wrong? *Journal of Child Psychology and Psychiatry, 45*, 1317-1325.
- Kortegaard, L.S., Hoerder, K., Joergensen, J., Gillberg, C., & Kyvik, K.O. (2001). A preliminary population-based twin study of self-reported eating disorder. *Psychological Medicine, 31*, 361-365.
- Kuczmarski, M.F., Kuczmarski, R.J., & Najjar, M. (2001). Effects of age on validity of self-reported height, weight, and body mass index: Findings from the Third National Health and Nutrition Examination Survey, 1988-1994. *Journal of the American Dietetics Association, 101*, 28-34.
- Kuczmarski, R.J., Ogden, C.D., Grummer-Strawn, L.M., Flegal, K.M., Guo, S.S., Wei, R., et al. (2000). CDC growth charts: United States. *Advance Data, 314*: 1–27.

- Labre, M.P. (2005). Burn fat, build muscle: A content analysis of men's health and men's fitness. *International Journal of Men's Health, 4*, 187-200.
- Larson, R. W., Hansen, D., & Moneta, G. (2006). Differing profiles of developmental experiences across types of organized youth activities. *Developmental Psychology, 42*(5), 849-863.
- Larson, R., & Seepersad, S. (2003). Adolescents' leisure time in the United States: Partying, sports, and the American experiment. In S. Verma & R. Larson (Vol. Eds.), *New directions for child and adolescent development: Vol. 99. Examining adolescent leisure time across cultures: Developmental opportunities and risks* (pp. 53-64). San Francisco: Jossey-Bass.
- LaVeist, T. (2005). Disentangling race and socioeconomic status: A key to understanding health inequalities, *Journal of Urban Health, 82*(2), Supplement 3: iii1-iii4.
- LaVeist, T., Thorpe, R., Mance, G. A., & Jackson, J. (2007). Overcoming confounding of race with socioeconomic status and segregation to explore race disparities in smoking. *Addictions, 102*, 65-70.
- Lavender, J. M., & Anderson, D. A. (2009). Effect of perceived anonymity in assessments of eating disordered behaviors and attitudes. *International Journal of Eating Disorders, 42*, 546-551.
- Lawler, M., & Nixon, E. (2011). Body dissatisfaction among adolescent boys and girls: The effects of body mass, peer appearance culture and internationalization of appearance ideals. *Journal of Youth and Adolescence, 40*, 59-71.

- Le Grange, D., & Loeb, K.L. (2007). Early identification and treatment of eating disorders: Prodrome to syndrome. *Early Intervention in Psychiatry, 1*, 27-39.
- Lee, S. (1994). The diagnostic interview schedule and anorexia nervosa in Hong Kong. *Archives of General Psychiatry, 51*, 251–252.
- Lee, S., Kwok, K., Liao, C., Leung, T. (2002). Screening Chinese patients with eating disorders using the Eating Attitudes Test in Hong Kong. *International Journal of Eating Disorders, 32*, 91–97.
- Lee, S., Lee, A.M., Ngai, E., Lee, D., & Wing, Y.K. (2001). Rationales for food refusal in Chinese patients with anorexia nervosa. *International Journal of Eating Disorders, 29*(2), 224-229.
- Lee, H. & Lock, J. (2007). Anorexia nervosa in Asian-American adolescents: Do they differ from their non-Asian peers. *International Journal of Eating Disorders, 40*, 227-231.
- Lerner, R.M (1984). *On the nature of human plasticity*. New York: Cambridge University Press.
- Lerner, R.M. (2002). *Concepts and theories of human development* (3rd ed.). Mahwah, NJ: Lawrence Erlbaum.
- Lerner, R. M. (2004). *Liberty: Thriving and civic engagement among America's youth*. Thousand Oaks, CA: Sage Publications.
- Lerner, R.M. (2005, September). *Promoting positive youth development: Theoretical and empirical bases*. White paper prepared for the Workshop on the Science of Adolescent Health and Development, National Research Council/Institute of Medicine. Washington, D.C.: National Academies of Science.

- Lerner, R.M. (2006). Developmental science, developmental systems, and contemporary theories of human development. In R. M. Lerner (Ed.). *Theoretical models of human development*. Volume 1 of *Handbook of Child Psychology* (6th ed., pp. 1-17). Editors-in-chief: W. Damon & R. M. Lerner. Hoboken, NJ: Wiley.
- Lerner, R.M. (2009). The positive youth development perspective: Theoretical and empirical bases of a strength-based approach to adolescent development. In C.R. Snyder & S. J. Lopez (Eds.), *Oxford handbook of positive psychology* (2nd ed., pp. 149—163). Oxford, England: Oxford University Press.
- Lerner, R.M., Fisher, C.B., & Weinberg, R.A. (2000). Toward a science for and of the people: Promoting civil society through the application of developmental science. *Child Development*, *71*, 11–20.
- Lerner, R.M., Lerner, J.V., Almerigi, J., Theokas, C., Phelps, E., Gestsdottir, S., et al. (2005). Positive youth development, participation in community youth development programs, and community contributions of fifth grade adolescents: Findings from the first wave of the 4-H Study of Positive Youth Development. *Journal of Early Adolescence*, *25*(1), 17-71.
- Lerner, J.V., Phelps, E., Forman, Y.E., & Bowers, E. (2009). Positive youth development. In R. M. Lerner & L. Steinberg (Eds.). *Handbook of adolescent psychology* (3rd ed.) (pp. 524-558). Hoboken, NJ: Wiley.
- Lerner, R.M., & Steinberg, L. (2009). The scientific study of adolescent development. In R. M. Lerner, & L. Steinberg (Eds.). *Handbook of adolescent psychology* (3rd ed.) (pp. 3-14). Hoboken, NJ: Wiley.

- Lerner, R. M., Villarruel, F. A., & Castellino, D. (1999). Adolescence. In W. K. Silverman & T. H. Ollendick (Eds.), *Developmental issues in the clinical treatment of children* (pp.125-136). Boston: Allyn & Bacon.
- Leventhal, T., Dupéré, V., Brooks-Gunn, J. (2009). Neighborhood influences on adolescent development. In R.M. Lerner & L. Steinberg (Eds.), *Handbook of adolescent psychology* (3rd Ed, pp. 411-413). Hoboken, NJ: Wiley.
- Levine, M.P. & Piran, N. (2004). The role of body image in the prevention of eating disorders. *Body image, 1*(1), 57-70.
- Levine, M. P., Smolak, L. (2006). *The prevention of eating problems and eating disorders: Theory, research, and practice*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Lewin-Bizan, S., Doyle Lynch, A., Fay, K., Schmid, K., Lerner, J.V., McPherran, C., et al. (2010). Trajectories of positive and negative behaviors from early- to middle-adolescence. *Journal of Youth and Adolescence, 39*, 751-763.
- Lewinsohn, P.M., Seeley, J.R., Moerk, K.C., & Striegel-Moore, R.H. (2002). Gender differences in eating disorder symptoms in young adults. *International Journal of Eating Disorders, 32*, 426-440.
- Lewinsohn, P. M., Striegel-Moore, R. H., & Seeley, J. R. (2000). Epidemiology and natural course of eating disorders in young women from adolescence to young adulthood. *Journal of the American Academy of Child and Adolescent Psychiatry, 39*, 1284-1292.

- Leydon, M. A. & Wall, C. (2002) New Zealand jockeys' dietary habits and their potential impact on health. *International Journal of Sport Nutrition and Exercise Metabolism*, 12, 220-237.
- Li, Y. & Lerner, R. M. (In press). Trajectories of school engagement during adolescence: Implications for grades, depression, delinquency, and substance use. *Developmental Psychology*.
- Liechty, J. (2010). Body image distortion and three types of weight loss behaviors among nonoverweight girls in the United States. *Journal of Adolescent Health*, 47(2), 176-182.
- Lin, L. A., & Kulik, J. A. (2002). Social comparison and women's body satisfaction. *Basic Applied Social Psychology*, 24, 115-123
- Linver, M.R., Roth, J.L., & Brooks-Gunn, J. (2009). Patterns of adolescents' participation in organized activities: Are sports best when combined with other activities? *Developmental Psychology*, 45, 354-367.
- Little, R.J.A., & Rubin, D.B. (1987) *Statistical analysis with missing data*. J. Wiley & Sons, New York.
- Littleton, H. L., & Ollendick, T. (2003). Negative body image and disordered eating: What places youth at risk and how can these problems be prevented? *Clinical Child and Family Psychology Review*, 6, 51-66.
- Lock, J. (2009). Trying to fit square pegs in round holes: Eating disorders in males. *Journal of Adolescent Health*, 44, 99-100.

- Lock, J., Reisel, B., & Steiner, H. (2001). Associated health risks of adolescents with disordered eating: how different are they from their peers? Results from a high school survey. *Child Psychiatry and Human Development, 31*, 249-265.
- Lowry, R, Galuska, D.A., Fulton, J.E., Burgeson, C.R., & Kann, L. (2005). Weight management goals and use of exercise for weight control among U.S. high school students, 1991–2001. *Journal of Adolescent Health, 36*, 320–326.
- Luthar, S.S., Shoum, K.A., & Brown, P. J. (2006). Extracurricular involvement among affluent youth: A scapegoat for “ubiquitous achievement pressures”? *Developmental Psychology, 42*, 583-597.
- Lynch, W.C., Heil, D.P., Wagner, E., & Havens, M.D. (2008). Body dissatisfaction mediates the association between body mass index and risky weight control behaviors among White and Native American adolescent girls. *Appetite, 51*, 210-213.
- Machado, P.P., Machado, B.C., Goncalves, S., & Hoek, H.W. (2007). The prevalence of eating disorders not otherwise specified. *International Journal of Eating Disorders, 40*, 212–217.
- Magnusson, D. (2003). The person approach: Concepts, measurement models, and research strategy. In W. Damon (Series Ed.) & S. C. Peck & R. W. Roeser (Vol. Eds.), *New directions for child and adolescent development: Vol. 101. Person-centered approaches to studying human development in context* (pp. 3-23). San Francisco: Jossey-Bass.

- Magnusson, D., & Stattin H. (1998). Person–context interaction theories. In W. Damon (Series Ed.) & R. Lerner (Vol. Ed.), *Handbook of child psychology: Vol. 1. Theoretical models of human development* (5th ed.,pp. 685–760). New York: Wiley.
- Mahoney, J. L., Larson, R. W., & Eccles, J. S. (Eds.) (2005). *Organized activities as contexts of development: Extracurricular activities, after-school and community programs*. Mahwah, NJ: Lawrence Erlbaum & Associates.
- Mahoney, J. L., Vandell, D. L., Simpkins, S. D., & Zarrett, N. R. (2009). Adolescent out-of-school activities. In R. M. Lerner & L. Steinberg (Eds.) *Handbook of adolescent psychology (3rd ed.)*. Vol. 2: *Contextual influences on adolescent development* (pp. 228-267). Hoboken, NJ: Wiley & Sons.
- Malmstrom, M., Johansson, S. E., & Sundquist, J. (2001). A hierarchical analysis of long-term illness and mortality in socially deprived areas. *Social Science and Medicine*, 53, 265–275.
- Mamun, A.A., Cramb, S., R., O’Callaghan, M., Najman, J.M., McDermott, B., & Williams, G.M. (2007). Adolescents’ perceived overweight associated with depression in young adulthood: A longitudinal study. *Obesity*, 15(12), 3097–3105.
- Markey, C.N. (2010). Invited commentary: Why body image is important to adolescent development. *Journal of Youth and Adolescence*, 39, 1387-1391.
- Martin, M.A., Frisco, M.L., & May, A.L. (2009). Gender and race/ethnic differences in inaccurate weight perceptions among U.S. adolescents. *Women’s Health Issues*, 19(5), 292-299.

- Mayer, B., Muris, P., Meesters, C., & Zimmerman-van Beuningen, R. (2009). Direct and indirect relations of risk factors with eating behavior problems in late adolescent females. *Journal of Adolescence*, *32*, 741-745.
- Mays, D., DePadilla, L., Thompson, N.J., Kushner, H.I., & Windle, M. (2010). Sports participation and problem alcohol use in a multi-wave, national sample of adolescents. *American Journal of Preventive Medicine*, *38*(5), 491-498.
- Mazzeo, S.E., Slof-Op't Landt, M.T., van Furth, E.F., & Bulik, C.M. (2006). Genetics of eating disorders. In S. Wonderlich, J.E. Mitchell, M. deZwaan, and H. Steiger (Eds.). *Annual Review of Eating Disorders, Part 2* (pp.17-33). Oxford: Radcliffe Publishing.
- McArdle, J.J., & Epstein, D. (1987). Latent growth curves within developmental structural equation models. *Child Development*, *58*, 110-113.
- McCabe, M. & Ricciardelli, L. (2004) Weight and shape concerns of boys and men. In J.K. Thompson (Ed.), *Handbook of eating disorders and obesity* (pp. 606-634). United States: John Wiley & Sons.
- McCandless, R.R. (1961). *Children and adolescents*. New York: Holt, Reinhart, & Winston.
- McCarthy, M. (1990). The thin ideal, depression, and eating disorders in women. *Behavioral Research and Therapy*, *28*, 205–218.
- McElhaney, K., Allen, J., Stephenson, C., & Hare, A. (2009). Attachment and autonomy during adolescence. In L. Steinberg & R. Lerner (Eds.). *Handbook of adolescent psychology* (3rd ed.) (pp. 358-404). New York, NY: Plenum.

- Mignano, A.C., Brewer, B.W., Winter, C., & Van Raalte, J.L. (2006). Athletic identity and student involvement of female athletes at NCAA Division III women's and coeducational colleges. *Journal of College Student Development, 9*, 457-464.
- Miller, K.E., Farrell, M.P., Barnes, G.M., Melnick, M.J., & Sabo, D. (2005). Gender/racial differences in jock identity, dating, and adolescent sexual risk. *Journal of Youth and Adolescence, 34*(2), 123-136.
- Miller, K. E., Hoffman, J. H., Barnes, G. M., Farrell, M. P., Sabo, D., & Melnick, M. (2003). Jocks, gender, race, and adolescent problem drinking. *Journal of Drug Education, 33*(4), 445-462.
- Miller, P. S., & Kerr, G. A. (2003). The role experimentation of intercollegiate student athletes. *Sport Psychologist, 17*(2), 196-220.
- Miller, K.E., Melnick, M.J., Farrell, M.P., Sabo, D.F., & Barnes, G.M. (2006). Jocks, gender, binge drinking, and adolescent violence. *Journal of Interpersonal Violence, 21*, 105-120.
- Miller, M.N. & Pumareiga, A.S.G. (2001). Culture and eating disorders: A historical and cross-cultural review. *Psychiatry, 64*(2), 93-110.
- Miller, K.E., Sabo, D.F., Farrell, M.P., Barnes, G.M., & Melnick, M.J. (1998). Athletic participation and sexual behavior in adolescents: The different worlds of boys and girls. *Journal of Health and Social Behavior, 39*, 108-123.
- Milligan, B., & Pritchard, M.E. (2006). The relationship between gender, sport, self-esteem and eating disorder behaviors in Division I athletes. *Athletic Insight, 8*, 9-43.
- Milos, G., Spindler, A. & Schnyder, U. (2005). Instability of eating disorder diagnoses: prospective study. *British Journal of Psychiatry, 187*, 573-578.

- Mintz, L. B., O'Halloran, S.M., Mulholland, A.M., & Schneider, P.A. (1997). Questionnaire for Eating Disorder Diagnoses: Reliability and validity of operationalizing DSM-IV criteria into a self-report format. *Journal of Counseling Psychology, 44*, 63-79.
- Mistry, J. & Wu, J. (2010). Navigating cultural worlds and negotiating Identities: A conceptual model. *Human Development, 53*, 5-25.
- Moffitt, T.E., Caspi, A., & Rutter, M. (2005). Strategy for investigating interactions between measured genes and measured environments. *Archives of General Psychiatry, 62*(5), 473-481.
- Molnar, B.E., Gortmaker, S.L., Bull, F.C., & Buka, S.L. (2004). Unsafe to play? Neighborhood disorder and lack of safety predict reduced physical activity among urban children and adolescents. *American Journal of Health Promotion, 18*(5), 378-386.
- Mond, J. M., Hay, P. J., Rodgers, B., & Owen, C. (2007). Health service utilization for eating disorders: Findings from a community-based study. *International Journal of Eating Disorders, 40*, 399–408.
- Muise, A., Stein, D., Arbess, G. (2003). Eating disorders in adolescent boys: A review of the adolescent and adult literature. *Journal of Adolescent Health, 33*(6), 427-435.
- Nagin, D. (2005). *Group-based modeling of development*. Cambridge, MA: Harvard University Press.
- Nagin, D., & Tremblay, R. E. (1999). Trajectories of boys' physical aggression, opposition, and hyperactivity on the path to physically violent and nonviolent juvenile delinquency. *Child Development, 70*(5), 1181–1196.

- National Center for Education Statistics. (2005). *Youth indicators, 2005: Trends in the well-being of American youth*. Washington, DC: U.S. Government Printing Office.
- National Collegiate Athletic Association. (2002). *1982-2001 NCAA Sports Sponsorship and Participation Report*. Indianapolis, IN: National Collegiate Athletic Association.
- National Institute on Out-of-School Time. (2008). *The Afterschool Program Assessment System (APAS)*. Retrieved August 15, 2009, from http://niost.org/publications/APAS%20brochure_Jan_25_08.pdf
- Nelson, I.A., & Gastic, B. (2009). Street ball, swim team, and the sour cream machine: A cluster analysis of out of school time participation portfolios. *Journal of Youth and Adolescence, 39*(9), 1172-1186.
- Neumark-Sztainer, D. (2009). The interface between the eating disorders and obesity fields: Moving toward a model of shared knowledge and collaboration. *Eating and Weight Disorders, 14*, 51-58.
- Neumark-Sztainer, D. & Hannan, P. (2000). Weight-related behaviors among adolescent girls and boys: Results from a national survey. *Archives of Pediatrics and Adolescent Medicine, 154*, 569-577.
- Neumark-Sztainer, D., Levine, M.P., Paxton, S.J., Smolak, L., Piran, N., & Wertheim, E.H. (2006). Prevention of body dissatisfaction and disordered eating: What next? *Eating Disorders: Journal of Treatment and Prevention, 14*, 265-285.

- Neumark-Sztainer, D., Story, M., Dixon, L.B., & Murray, D.M. (1998). Adolescents engaging in unhealthy weight control behaviors: Are they at risk for other health-compromising behaviors? *American Journal of Public Health, 88*, 952–955.
- Neumark-Sztainer, D., Story, M., Falkner, N.H., Beuhring, T., & Resnick, M. (1999). Sociodemographic and personal characteristics of adolescents engaged in weight loss and weight/muscle gain behaviors: Who is doing what? *Preventive Medicine, 28*, 40-50.
- Neumark-Sztainer, D., Story, M., Hannan, P.J., Perry, C.L., & Irving, L.M. (2002). Weight-related concerns and behaviors among overweight and non-overweight adolescents: Implications for preventing weight-related disorders. *Archives of Pediatrics and Adolescent Medicine, 156*, 171-178.
- Neumark-Sztainer, D., Wall, M., Eisenberg, M.E., Story, M., & Hannan, P.J. (2006). Overweight status and weight control behaviors in adolescents: Longitudinal and secular trends from 1999-2004. *Preventive Medicine, 43*, 52-59.
- Neumark-Sztainer, D., Wall, M., Haines, J., Story, M., & Eisenberg, M.E. (2007). Why does dieting predict weight gain in adolescents? Findings from Project EAT-II: A five-year longitudinal study. *Journal of the American Dietetic Association, 107*, 448-455.
- Nicholls, D., Chater, R., & Lask, B. (2000). Children into DSM don't go: A comparison of classification systems for eating disorders in childhood and early adolescence. *International Journal of Eating Disorders, 28*(3), 317-24.

- Ode, J. J., Pivarnik, J. M., Reeves, M. J., & Knous, J. L. (2007). Body mass index as a predictor of percent fat in college athletes and nonathletes. *Medicine & Science in Sports & Exercise*, *39*, 403–409.
- Ogden, C.L., Flegal, K.M., Carroll, M.D., & Johnson, C.L. (2002). Prevalence and trends in overweight among US children and adolescents, 1999-2000. *JAMA*, *288*, 1772-1773.
- Ohring, R., Graber, J. A., & Brooks-Gunn, J. (2002). Girls' recurrent and concurrent body dissatisfaction: Correlates and consequences over 8 years. *International Journal of Eating Disorders*, *31*, 404–415.
- Overton, W.F. (1998). Relational-developmental theory: A psychological perspective. In D. Goerlitz, H. J. Harloff, J. Valsiner, & G. Mey (Eds.), *Children, cities, and psychological theories: Developing relationships* (pp. 315-335). Berlin-New York: de Gruyter/Mouton.
- Overton, W.F. (2006). Developmental psychology: Philosophy, concepts, methodology. In R. M. Lerner (Ed.) *Theoretical models of human development*. Volume 1 of the *Handbook of child psychology* (pp. 18-88) (6th ed.). New York: Wiley.
- Overton, W.F. (2010). Life-span development: Concepts and issues. In W. F. Overton (Ed). *Cognition, biology, and methods across the lifespan. Volume 1 of the Handbook of life-span development*. (pp. 1-29) Editor-in-chief: R. M. Lerner. Hoboken, NJ: Wiley.
- Page, R.M., Hammermeister, J., Scanlon, A., & Gilbert, L. (1998). Is school sports participation a protective factor against adolescent health risk behaviors? *Journal of Health Education*, *29*, 186-192.

- Papanikolaou, Z., Nikolaidis, D., Patsiaouras, A., & Alexopoulos, P. (2003). The freshman experience: High stress-low grades. *Athletic Insight: The On-line Journal of Sport Psychology*, 5. Retrieved on July 13, 2009 from <http://www.athleticinsight.com/Vol5Iss4/Commentary.htm>.
- Paxton, S.J., Eisenberg, M. E., & Neumark-Sztainer, D. (2006). Prospective predictors of body dissatisfaction in adolescent girls and boys: A five year longitudinal study. *Developmental Psychology*, 42, 888-899.
- Perez, M. & Joiner, T.E. (2003). Body image dissatisfaction and disordered eating in black and white females. *International Journal of Eating Disorders*, 33, 342-350.
- Pernick, Y., Nichols, J. E., Rauh, M. J., Kern, M., Ji, M., Lawson, M. J., et al. (2006). Disordered eating among a multi-racial/ethnic sample of female high school athletes. *Journal of Adolescent Health*, 38, 689-695.
- Perrin, E.M, Boone-Heinonen, J., Field, A.E., Coyne-Beasley, T., & Gordon-Larsen, P. (2010). Perception of overweight and self-esteem during adolescence. *International Journal of Eating Disorders*, 43, 447-454.
- Pesa, J.A., Syre, T.R., & Jones, E. (2000). Psychosocial differences associated with body weight among female adolescents: the importance of body image. *Journal of Adolescent Health*, 26, 330-7.
- Petrie, T., & Greenleaf, C. (2007). Eating disorders in sport: From theory to research to intervention. In G. Tenebaum & R. C. Eklund (Ed.), *Handbook of sport psychology* (3rd ed., pp. 352-378). Wiley.

- Petrie, T. A., Greenleaf, C., Reel, J., & Carter, J. (2007). Psychosocial correlates of eating disorders among male collegiate athletes. *Journal of Clinical Sport Psychology, 1*, 340-357.
- Petrie, T. A., Greenleaf, C., Reel, J., & Carter, J. (2008). Prevalence of eating disorders and disordered eating behaviors among male collegiate athletes. *Psychology of Men & Masculinity, 9*, 267-277.
- Petrie, T.A., & Rogers, R. (2001). Extending the discussion of eating disorders to include men and athletes. *Counseling Psychologist, 29*, 743-753.
- Petrie, T.A., & Sherman, R.T. (1999). Recognizing and assisting athletes with eating disorders. In R. Ray & D.M. Wiese-Bjornstal (Eds.), *Counseling in sports medicine* (pp. 205-226). Champaign, IL: Human Kinetics.
- Phelps, E., Balsano, A., Fay, K., Peltz, J., Zimmerman, S., Lerner, R.M., et al. (2007). Nuances in early adolescent development trajectories of positive and problematic/risk behaviors: Findings from the 4-H Study of Positive Youth Development. *Child and Adolescent Psychiatric Clinics of North America, 16*(2), 473-496.
- Phelps, E., Zimmerman, S., Warren, A. A., Jelicic, H., von Eye, A. & Lerner, R. M. (2009). The structure and developmental course of positive youth development (PYD) in early adolescence: Implications for theory and practice. *Journal of Applied Developmental Psychology, 30*(5), 571-584.
- Picard, C.L. (1999). The level of competition as a factor for the development of eating disorders in female collegiate athletes. *Journal of Youth and Adolescence, 28*(5), 583-594.

- Polivy, J. & Herman, C.P. (1985). Dieting and bingeing: A causal analysis. *American Psychologist, 40*, 193-201.
- Pope, H.G., Phillips, K.A., & Olivardia, R. (2000). *The Adonis complex: The secret crisis of male body obsession*. New York: Free Press.
- Presnell, K., Bearman, S., & Stice, E. (2004). Risk factors for body dissatisfaction in adolescent boys and girls: A prospective study. *International Journal of Eating Disorders, 36*, 389-401.
- Presnell, K., Stice, E., Seidel, A., & Madley, M.C. (2009). Depression and eating pathology: Prospective reciprocal relations in adolescents. *Clinical Psychology and Psychotherapy, 16*(4), 357-365.
- Pritchard, M. E., King, S. L., & Czajka-Narins, D. M. (1997). Adolescent body mass indices and self-perception. *Adolescence, 32*(128), 863-881.
- Pritchard, M.E., Milligan, B., Elgin, J., Rush, P., & Shea, M. (2007). Comparisons of risky health behaviors between male and female college athletes and non-athletes. *Athletic Insight: The Online Journal of Sport Psychology, 9*, retrieved on July 13, 2009 from <http://www.athleticinsight.com/Vol9Iss1/HealthBehaviors.htm>.
- Pyle, R.P., McQuivey, R.W., Brassington, G.S., & Steiner, H. (2003). High school student athletes: Associations between intensity of participation and health factors. *Clinical Pediatrics, 42*(8), 697-701.
- Radloff, L. S. (1977). The CES-D Scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement, 1*, 385-401.

- Rajaratnam, J.K., Burke, J.G., O'Campo, P. (2006). Maternal and child health and neighborhood context: the selection and construction of area-level variables. *Health & Place, 12*, 547-556.
- Raudenbush, S.W. (2001). Toward a coherent framework for comparing trajectories of change. In Collins, L. M. & Sayer, A. G. (Eds.) *New methods for the analysis of change* (pp. 33-64). Washington, DC: APA.
- Raudenbush, S.W., & Bryk, A.S. (2002). *Hierarchical linear models: Applications and data analysis methods* (2nd edition). Newbury Park, CA: Sage.
- Reinking, M.F., & Alexander, L.E. (2005). Prevalence of disordered-eating behaviors in undergraduate female collegiate athletes and nonathletes. *Journal of Athletic Training, 40*(1), 47-51.
- Repetti, R. L., Taylor, S. E., & Seeman, T. (2002). Risky families: Family social environments and the mental and physical health of offspring. *Psychological Bulletin, 128*, 330–366.
- Rhea, D. J. (1999). Eating disorder behaviors of ethnically diverse urban female adolescent athletes and non-athletes. *Journal of Adolescence, 22*, 379-388.
- Ricciardelli, L. A., & McCabe, M. P. (2004). A biopsychosocial model of disordered eating and the pursuit of muscularity in adolescent boys. *Psychological Bulletin, 130*, 179–205.
- Ricciardelli, L., McCabe, M., Holt, K., & Finemore, J. (2003). A biopsychosocial model for understanding body image and body change strategies among children. *Journal of Applied Developmental Psychology, 24*(4), 475–495.

- Rierdan, J., & Koff, E. (1991). Depressive symptomatology among very early maturing girls. *Journal of Youth & Early Adolescence, 20*, 415-425.
- Ringham, R., Klump, K., Kaye, W., Stone, D., Libman, S., Stowe, S., et al. (2006). Eating disorder symptomatology among ballet dancers. *International Journal of Eating Disorders, 39*, 503–508.
- Risch, N., Herrell, R., Lehner, T., Liang Kung-Lee, Eaves, L., Hoh, J., et al. (2009). Interaction between the serotonin transporter gene (5-HTTLPR), stressful life events, and risk of depression: A meta-analysis. *Journal of the American Medical Association, 301*(23): 2462-2471.
- Rodin, J., Silberstein, L., & Striegel-Moore, R. (1985). Women and weight: A normative discontent. In T. B. Sonderegger (Ed.), *Psychology and gender: Nebraska symposium on motivation* (pp. 267-307). Lincoln, NE: University of Nebraska Press.
- Roeser, R.W., & Peck, S. C. (2003). Patterns and pathways of educational achievement across adolescence: A holistic-developmental perspective. In W. Damon (Series Ed.), Peck, S. C., & Roeser, R. W. (Vol. Eds.), *New directions for child and adolescent development: Vol. 101. Person-centered approaches to studying human development in context* (pp. 39–62). San Francisco: Jossey-Bass.
- Rome, E.S., Ammerman, S., Rosen, D., Keller, R.J., Lock, J., A. Mammel, K., et al. (2003). Children and adolescents with eating disorders: The state of the art. *Pediatrics, 111*(1), 98-108.

- Rose-Krasnor, L., Busseri, M. A., Willoughby, T., & Chalmers, H. (2006). Breadth and intensity of youth activity involvement as context for positive development. *Journal of Youth and Adolescence, 35*, 385-499.
- Rosen, L.W., & Hough, D.O. (1988). Pathogenic weight-control behaviors of female college gymnasts. *Physician and Sports Medicine, 16*, 141–146.
- Rosen, D. S., & Neumark-Sztainer, D. (1998). Review options for primary prevention of eating disturbances among adolescents. *Journal of Adolescent Health, 23*, 334-363.
- Rosenbaum, P.R., & Rubin, D.B. (1983). The central role of the propensity score in observational studies for causal effects, *Biometrika, 70*, 41-55.
- Rubin, D.B. (1987) *Multiple Imputation for Nonresponse in Surveys*. J. Wiley & Sons, New York.
- Rubin, B., Gluck, M. E., Knoll, C. M., Lorence, M., & Geliebter, A. (2008). Comparison of eating disorders and body image disturbances between Eastern and Western countries. *Eating and Weight Disorders, 13*, 73–80.
- Russell, C. & Keel, P. (2002). Homosexuality as a specific risk factor for eating disorders in men. *International journal Eating Disorders, 31*, 300–306.
- Sabo, D., Miller, K.E., Farrell, M.P., Melnick, M.J., & Barnes, G.M. (1999). High school athletic participation, sexual behavior and adolescent pregnancy: A regional study. *Journal of Adolescent Health, 25*(3), 207-216.
- Sallis, J. F., Alcatraz, J. E., McKenzie, T. L., & Hovell, M. F. (1999). Predictors of change in children's physical activity over 20 months: Variations by gender and level of adiposity. *American Journal of Preventive Medicine, 16*, 222-229

- Sampson, R.J., Raudenbush, S.W., & Earls, F. (1997). Neighborhoods and violent crime: A multilevel study of collective efficacy. *Science*, 227, 918–924.
- Sanford-Martens, T.C., Davidson, M.M., Yakushiko, O.F., Martens, M.P., Hinton, P., & Beck, N. (2005). Clinical and subclinical eating disorders: An examination of collegiate athletes. *Journal of Applied Sport Psychology*, 17, 79-86.
- Scanlan, T.K., Babkes, M.L., & Scanlan, L.A. (2005). Participation in sport: A developmental glimpse at emotion. In J.L. Mahoney, J.S. Eccles, & R. Larson (Eds.), *Organized activities as contexts of development: Extracurricular activities, after school and community programs* (pp. 275-309). Lawrence Erlbaum Associates Inc: Mahwah, NJ.
- Schafer, J.L. (1997). *Analysis of incomplete multivariate data*. Chapman & Hall, London.
- Schulenberg, J., O'Malley, P.M., Bachman, J.G., Wadsworth, K.N., Johnston, L.D. (1996). Getting drunk and growing up: Trajectories of frequent binge drinking during the transition to young adulthood. *Journal of Studies on Alcohol and Drugs*, 57, 289 –304.
- Schwarz, H. C., Gairrett, R.L., Aruguete, M.S., & Gold, E.S. (2005). Eating attitudes, body dissatisfaction, and perfectionism in female college athletes. *North American Journal of Psychology*, 7(3), 345-352.
- Seabra, A.F., Mendonca, D.M., Thomis, M.A., Peters, T.J., & Maia, J.A. (2008). Associations between sport participation, demographic and socio-cultural factors in Portuguese children and adolescents. *European Journal of Public Health*, 18(1), 25-30.

- Shaffer, D. R., & Wittes, E. (2006). Women's precollege sports participation, enjoyment of sports, and self-esteem. *Sex Roles, 55*, 225-233.
- Shaw, H., Ramirez, L., Trost, A., Randall, P., & Stice, E. (2004). Body image and eating disturbances across ethnic groups: More similarities than differences. *Psychology of Addictive Behaviors, 18*, 12-18.
- Shearer-Underhill, C., & Marker, C. (2010). The use of the number needed to treat (NNT) in randomized clinical trials in psychological treatment. *Clinical Psychology: Science and Practice, 17*, 41-47.
- Sherman, R.T., & Thompson, R.A. (2001). Athletes and disordered eating: Four major issues for the professional psychologist. *Professional Psychology: Research and Practice, 32*, 27-33.
- Sherman, R.T., Thompson, R.T., DeHass, D., & Wilfert, M. (2005). NCAA coaches survey: The role of the coach in identifying and managing athletes with disordered eating. *Eating Disorders: The Journal of Treatment and Prevention, 13*, 447-466.
- Shonkoff, J., & Phillips, D.A. (2000). *From neurons to neighborhoods: The science of early childhood development*. Washington, DC: National Academy Press.
- Simpkins, S. D., Ripke, M., Huston, A.C., & Eccles, J. S. (2005). Predicting participation and outcomes in out-of-school activities: Similarities and differences across social ecologies. In H. B. Weiss, P. M. D. Little, & S. M. Bouffard (Eds.), *New directions for youth development: Participation in youth programs: Enrollment, attendance, and engagement* (Vol. 105; G. Noam, Series Ed., pp. 51-70). San Francisco: Jossey-Bass.

- 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*, 346-354.
- Sirin, S. R. & Rogers-Sirin, L. (2005). Components of school engagement among African American adolescents. *Applied Developmental Science, 9*(1), 5-13
- Smolak, L. (2004). Body image in children and adolescents: Where do we go from here? *Body Image, 1*(1), 15-28.
- Smolak, L., Levine, M., & Striegel-Moore, R.H. (1996). *The developmental psychopathology of eating disorders: Implications for research, treatment, and prevention*. Hillsdale, NJ: Erlbaum Associates.
- Smolak, L., Murnen, S.K., & Ruble, A.E. (2000). Female athletes and eating problems: A meta-analysis. *International Journal of Eating Disorders, 27*(4), 371-380.
- Smolak, L., & Striegel-Moore, R.H. (2001). *Challenging the myth of the golden girl: Ethnicity and eating disorders*. Washington, DC: American Psychological Association.
- Spanos, A., Burt, A., Klump, K.L. (2009). Do weight and shape concerns exhibit genetic effects? Investigating discrepant findings. *International Journal of Eating Disorders, 43*(1), 29 – 34.
- Steinberg, L. (2001). Socialization in adolescence. In N. Smelser, & P. Baltes, (Eds.), *International encyclopedia of the social & behavioral sciences*. New York: Pergamon.

- Stice, E. (1994). A review of the evidence for a sociocultural model of bulimia nervosa and an exploration of the mechanisms of action. *Clinical Psychology Review, 14*, 633–661.
- Stice, E. (2001). A prospective test of the dual pathway model of bulimic pathology: Mediating effects of dieting and negative affect. *Journal of Abnormal Psychology, 110*, 124-135.
- Stice, E. (2002). Risk and maintenance factors for eating pathology: A meta-analytic review. *Psychological Bulletin, 128*, 825-848.
- Stice, E., Hayward, C., Cameron, R.P., Killen, J.D., & Taylor, C.B. (2000). Body image and eating related factors predict onset of depression in female adolescents: A longitudinal study. *Journal of Abnormal Psychology, 109*, 438–444.
- Stice, E., Presnell, K., & Spangler, D. (2002). Risk factors for binge eating onset in adolescent girls: A 2-year prospective investigation. *Health Psychology, 21*(2), 131-138.
- Stice, E. & Shaw, H.E. (1994). Adverse effects of the media portrayed thin-ideal on women and linkages to bulimic symptomatology. *Journal of Social & Clinical Psychology, 13*, 288-308.
- Stice, E., & Whitenton, K. (2002). Risk factors for body dissatisfaction in adolescent girls: A longitudinal investigation. *Developmental Psychology, 38*, 669–678.
- Stoutjesdyk, D., & Jevne, R. (1993). Eating disorders among high performance athletes. *Journal of Youth and Adolescence, 22*, 272-282.
- Striegel-Moore, R. & Bulik, C. (2007). Risk factors for eating disorders. *American Psychologist, 63*, 181-198.

- Striegel-Moore, R.H. & Cachelin, F.H. (2001). Etiology of eating disorders in women. *The Counseling Psychologist, 29*, 635-661.
- Striegel-Moore, R.H., DeBar, L., Wilson, G.T., Dickerson, J., Rosselli, F., Perrin, N., et al. (2008). Health services use in eating disorders, *Psychological Medicine, 38*(10), 1465-1474.
- Striegel-Moore, R.H., Franko, D. L., Thompson, D., Barton, B., Schreiber, G. B., & Daniels, S. R. (2005). An empirical study of the typology of bulimia nervosa and its spectrum variants. *Psychological Medicine, 35*, 1563–1572.
- Striegel-Moore, R.H., Silberstein, L.R., & Rodin, J. (1986). Toward an understanding of risk factors for bulimia. *American Psychologist, 41*, 246–263.
- Strober, M., Freeman, R., Lampert, C., Diamond, J., Kaye, W. (2000). A controlled family study of anorexia nervosa and bulimia nervosa: Evidence of shared liability and transmission of partial syndromes. *American Journal of Psychiatry, 157*, 393-401.
- Strober, M., Freeman, R., Lampert, C., Diamond, J., Kaye, W. (2001). Males with anorexia nervosa: A controlled study of eating disorders in first-degree relatives. *International Journal of Eating Disorders, 29*, 263-269.
- Strober, M., Freeman, R., & Morrell, W. (1997). The long-term course of severe anorexia nervosa in adolescents: Survival analysis of recovery, relapse, and outcome predictors over 10–15 years in a prospective study. *International Journal of Eating Disorders, 22*(4), 339–60.

- Sundgot-Borgen, J. (1994). Risk and trigger factors for the development of eating disorders in female elite athletes. *Medicine and Science in Sports and Exercise*, 26(4), 414–419.
- Sundgot-Borgen, J., & Torstveit, M. K. (2004). Prevalence of eating disorders in elite athletes is higher than in the general population. *Clinical Journal of Sport Medicine*, 14(1), 25–32.
- Suomi, S. J. (2004). How gene-environment interactions influence emotional development in rhesus monkeys. In C. Garcia Coll, E. Bearer, & R. M. Lerner (Eds.). *Nature and nurture: The complex interplay of genetic and environmental influences on human behavior and development* (pp. 35-51). Mahwah, NJ: Lawrence Erlbaum Associates.
- Susman, E. J., & Dorn, L. D. (2009). Puberty: Its role in development. In R. M. Lerner and L. Steinberg (Eds.). *Handbook of adolescent psychology* (pp. 116-151). New York: John Wiley & Sons.
- Susman, E. J., & Rogol, A. (2004). Puberty and psychological development. In R. M. Lerner & L. Steinberg (Eds.). (2004), *Handbook of adolescent psychology* (2nd ed., pp. 15–44). Hoboken, NJ: Wiley.
- Swami, V., Frederick, D.A., Aavik, T., Alcalay, L., Allik, J., Anderson, D., et al. (2010). The attractive female body weight and female body dissatisfaction in 26 countries across 10 world regions: Results of the International Body Project I. *Personality and Social Psychological Bulletin*, 36(3), 309-325.

- Swami, V., Steadman, L., & Toveé, M.J. (2009). A comparison of body size ideals, body dissatisfaction, and media influence between female track athletes, martial artists, and non-athletes. *Psychology of Sport and Exercise, 10*(6), 609-614.
- Talwar, R., Schwab, J., & Lerner, R. M. (1986). Early adolescent temperament and academic competence tests of “direct effect” and developmental contextual models. *Journal of Early Adolescence, 9*, 291-309.
- Ter Bogt, T., van Dorsselaer, S., Monshouwek, K., Verdumen, J., Engels, R., & Vollebergh, W. (2006). Body mass index and body weight perceptions as risk factors for internalizing and externalizing problem behavior among adolescents. *Journal of Adolescent Health, 39*, 27-34.
- Terzian, M., & Moore, K.A. (May, 2009). Physical inactivity in U.S. adolescents: Family, neighborhood, and individual factors. *Child Trends Research-to-Results Brief*. Publication 2009-28.
- Thelen, E. & Smith, L.B. (2006). Dynamic systems theories. In R.M. Lerner (Ed.), *Theoretical models of human development* . Volume 1 of *Handbook of Child Psychology* (6th Ed.) (pp. 258–312). Hoboken,N.J.: Wiley.
- Theokas, C. (2009) Youth sport participation a view of the issues: Introduction to the special section. *Developmental Psychology, 45*(2), Mar 2009, pp. 303-306.
- Theokas, C., Lerner, J.V., Lerner, R.M. & Phelps, E. (2006). Cacophony and change in youth after school activities: Implications for development and practice from the 4-H Study of Positive Youth Development. *Journal of Youth Development: Bridging Research and Practice, 1*(1).

- Thomas, J.J., Keel, P. K., & Heatherton, T. F. (2005). Disordered eating attitudes and behaviors in ballet students: Examination of environmental and individual risk factors. *International Journal of Eating Disorders, 38*, 263-268.
- Thomas, J.J., Roberto, C.A., & Brownell, K.D. (2009). Eight-five per cent of what? Discrepancies in the weight cut-off for anorexia nervosa substantially affect the prevalence of underweight. *Psychological Medicine, 39*(5), 833-843.
- Thomas, J.J., Vartanian, L.R., & Brownell, K.D. (2009). The relationship between eating disorder not otherwise specified and officially recognized eating disorders: Meta-analysis and implications for DSM. *Psychological Bulletin, 135*, 407-433.
- Thompson, S.H. & Digsby, S. (2004). A preliminary survey of dieting, body dissatisfaction, and eating problems among high school cheerleaders. *Journal of School Health, 74*(3), 85-90.
- Thompson, J. K., Heinberg, L. J., Altabe, M., & Tantleff-Dunn, S. (1999). *Exacting beauty: Theory, assessment and treatment of body image disturbance*. Washington, DC: American Psychological Association.
- Thompson, R. A., & Sherman, R. T. (2010). *Eating disorders in sport*. New York: Routledge.
- Tiggemann, M. (2001). The impact of adolescent girls' life concerns and leisure activities on body dissatisfaction, disordered eating, and self esteem. *Journal of Genetic Psychology, 162*(2), 133-142.

- Tobin-Richards, M. H., Boxer, A. M., Kavrell, S. M., & Petersen, A. C. (1984). Puberty and its psychological and social significance. In R. M. Lerner and N. L. Galambos (Eds.), *Experiencing adolescence: A sourcebook for parents, teachers, and teens*. Garland Press: New York.
- Torstveit, M.K., Rosenvinge, J. H., & Sundgot-Borgen, J. (2008). Prevalence of eating disorders and the predictive power of risk models in female elite athletes: A controlled study. *Scandinavian Journal of Medicine & Science in Sports*, *18*(1), 108-118.
- Tozzi, F., Thornton, L.M., Klump, K.L., Fichter, M.M., Halmi, K.A., Kaplan, A.S., et al. (2005). Symptom fluctuation in eating disorders: Correlates of diagnostic crossover. *American Journal of Psychiatry*, *162*, 732-740.
- Tyrka, A.R., Waldron, I., Graber, J.A., & Brooks-Gunn, J. (2002). Prospective predictors of the onset of anorexic and bulimic syndromes. *International Journal of Eating Disorders*, *32*, 282–290.
- Urban, J. B., Lewin-Bizan, S., & Lerner, R. M. (2010). The role of intentional self regulation, lower neighborhood ecological assets, and activity involvement in youth developmental outcomes. *Journal of Youth and Adolescence*, *39*(7), 783-800.
- Urban, J.B., Osgood, N., & Mabry, P. (forthcoming). Developmental systems science: Exploring the application of non-linear methods to developmental science questions. *Research in Human Development*.

- van den Berg, P.A., Mond, J., Eisenberg, M., Ackard, D., & Neumark-Sztainer, D. (2010). The links between body dissatisfaction and self-esteem in adolescents: Similarities across gender, weight status, race/ethnicity, and socioeconomic status. *Journal of Adolescent Health, 47*, 290-296.
- Van den Berg, P., Thompson, J. K., Brandon, K. & Covert, M. (2002). The tripartite influence model of body image and eating disturbance: A covariance structure modelling investigation testing the mediational role of appearance comparison. *Journal of Psychosomatic Research, 53*, 1007-1020.
- Videon, T.M., & Manning, C.K. (2003). Influences on adolescent eating patterns: the importance of family meals. *Journal of Adolescent Health, 32*(5), 365-373.
- Villejo, R.E., Humphrey, L.L. & Kirschenbaum, D.S. (1997). Affect and self-regulation in binge eaters: Effects of activating family images. *International Journal of Eating Disorders, 21*, 237-249.
- Vohs, K.D., Bardone, A.M., Joiner, T.E., Jr., Abramson, L.Y., & Heatherton, T.F. (1999). Perfectionism, perceived weight status, and self-esteem interact to predict bulimic symptoms: A model of bulimic symptom development. *Journal of Abnormal Psychology, 108*, 695-700.
- Vohs, K.D., Voelz, Z.R., Pettit, J.W., Bardone, A.M., Katz, J., Abramson, L.Y., et al. (2001). Perfectionism, body dissatisfaction, and self-esteem: An interactive model of bulimic symptom development. *Journal of Social and Clinical Psychology, 20*, 476-497.

- von Eye, A., & Bergman, L. R. (2003). Research strategies in developmental psychopathology: Dimensional identity and the person-oriented approach. *Development and Psychopathology, 15*(3), 553-580.
- von Eye, A., Bogat, G. A., & Rhodes, J. (2006). Variable-oriented and person-oriented perspectives of analysis: The example of alcohol consumption in adolescence. *Journal of Adolescence, 29*(6), 981-1004.
- Wade, T.D., Bulik, C.M., Neale, M.C., & Kendler, K.S. (2000). Anorexia nervosa and major depression: shared genetic and environmental risk factors. *American Journal of Psychiatry, 157*, 469-471.
- Walcott, D.D., Pratt, H.D., & Patel, D. R. (2003). Adolescents and eating disorders: Gender, racial, ethnic, sociocultural, and socioeconomic issues. *Journal of Adolescent Research, 18*, 223-243.
- Walsh, B.T. (2007). DSM-V from the perspective of the DSM-IV perspective. *International Journal of Eating Disorders, 40*, S3-7.
- Walters, S., Barr-Anderson, D.J., Wall, M., & Neumark-Sztainer, D. (2009). Does participation in organized sports predict future physical activity for adolescents from diverse economic backgrounds? *Journal of Adolescent Health, 44*(3):268-74.
- Wear, R.W., & Pratz, O. (1987). Test-retest reliability for the Eating Disorder Inventory. *International Journal of Eating Disorders, 6*, 767-769.
- Werner, H. (1957). The concept of development from a comparative and organismic point of view. In D. Harris (Ed.), *The concept of development*. Minneapolis, Minn: University of Minnesota Press.

- White, M.A., Kohlmaier, J.R., Varnado-Sullivan, P., & Williamson, D.A. (2003). Racial/ethnic differences in weight concerns: Protective and risk factors for the development of eating disorders and obesity among adolescent females. *Eating & Weight Disorders*, 8(1), 20-25.
- Wichstrom, L. (1995). Social, psychological and physical correlates of eating problems. A study of the general adolescent population in Norway. *Psychological Medicine*, 25, 567-579.
- Wichstrom, L. (2000). Predictors of adolescent suicide attempts: A nationally representative longitudinal study of Norwegian adolescents. *Journal of the American Academy of Child and Adolescent Psychiatry*, 39, 603-610.
- Willet, J., & Sayer, A. (1996). Cross-domain analyses of change over time: Combining growth modeling and covariance structure analysis. In G.A. Marcoulides & R.E. Schumacker (Eds.), *Advanced structural equation modeling*. Lawrence Erlbaum, Mahwah.
- Williams, P. G., Holmbeck, G. N., & Greenley, R. N. (2002). Adolescent health psychology. *Journal of Consulting and Clinical Psychology*, 70, 828-842.
- Wilson, J., Tripp, D., & Boland, F. (2005). The relative contributions of subjective and objective measures of body shape and size to body image and disordered eating in women. *Body Image*, 2, 233-247.
- Windle, M., Hooker, K., Lernerz, K., East, P. L., Lerner, J. V., & Lerner, R. M. (1986). Temperament, perceived competence, and depression in early- and late-adolescents. *Developmental Psychology*, 22, 384-392.

- Wohlwill, J.F. (1970). Methodology and research strategy in the study of developmental change. In L. R. Goulet & P. B. Baltes (eds.), *Life-span developmental psychology: Research and theory* (pp. 149–91). New York: Academic Press.
- Woodside, D., Garfinkel, P. E., Lin, E., Goering, P., Kaplan, A. S., Goldbloom, D. S., et al. (2001). Comparisons of men with full or partial eating disorders, men without eating disorders, and women with eating disorders in the community. *American Journal of Psychiatry, 158*, 570-574.
- World Health Organization. (2003). *Caring for children and adolescents with mental disorders: Setting WHO directions. Geneva, Switzerland: World Health Organization.*
- Yeager, K.K., Agostini, R., Nattiv, A., & Drinkwater, B. (1993). The female athlete triad: Disordered eating, amenorrhea, osteoporosis. *Medicine and Science in Sports and Exercise, 25*, 775-777.
- Yuan, A.V. (2010). Body perceptions, weight control behavior, and changes in adolescents' psychological well-being over time: A longitudinal examination of gender. *Journal of Youth and Adolescence, 39*(8), 927-939.
- Zaff, J. F., Moore, K. A., Papillo, A. R., & Williams, S. (2003). Implications of extracurricular activity participation during adolescence on positive outcome. *Journal of Adolescent Research, 18*, 599-630.
- Zarrett, N.R. (2007). The dynamic relation between out-of-school activities and adolescent development (Doctoral dissertation, University of Michigan, 2006). *Dissertation Abstracts International, 67*(10).

- Zarrett, N., Fay, K., Caranno, J., Li, Y., Phelps, E., & Lerner, R.M. (2009). More than child's play: Variable- and pattern-centered approaches for examining effects of sports participation on youth development. *Developmental Psychology, 45*(2), 368-382.
- Zarrett, N., Peltz, J., Fay, K., Li, Y., Lerner, J. V., & Lerner, R.M. (Summer, 2007). Sports and youth development programs: Implications for theory and practice of early adolescent participation in multiple instances of structured out-of-school (OST) activity. *Journal of Youth Development, 2*(1).
- Zimmerman, S., Phelps, E., & Lerner, R.M. (2008). Positive and negative developmental trajectories in U.S. adolescents: Where the PYD perspective meets the deficit model. *Research in Human Development, 5*(3), 153-165.

Table 1

Sample characteristics for cross-sectional and longitudinal participants from Grades 9, 10, and 11 of the 4-H Study of PYD.

Characteristics	Grade 9	Grade 10	Grade 11	Longitudinal	Grade 9 longitudinal	Grade 10 longitudinal	Grade 11 longitudinal
	1,189	2,344	1,127	1,050	559	949	711
Sex (n, %)							
Female	721 (60.6%)	1491 (63.6%)	767 (68.1%)	714 (68.0%)	365 (65.3%)	643 (67.8%)	490 (68.9%)
Age (mean, SD)	14.94 (1.09)	15.71 (1.4)	16.80 (1.4)	14.90 (1.0)	14.90 (1.0)	15.73 (1.26)	16.75 (1.46)
Race/ethnicity							
European American	733 (61.6 %)	1788 (76.3%)	892 (79.1%)	758 (72.2%)	341 (61.0%)	693 (73.0%)	562 (79.0%)
African American	101 (8.5%)	131 (5.6%)	60 (5.3%)	80 (7.6%)	55 (9.8%)	72 (7.6%)	36 (5.1%)
Latino	98 (8.2%)	144 (6.1%)	28 (2.5%)	45 (4.3%)	38 (6.8%)	41 (4.3%)	18 (2.5%)
Asian	30 (2.5%)	37 (1.6%)	26 (2.3%)	27 (2.6%)	18 (3.2%)	21 (2.2%)	19 (2.7%)
Native American	28 (2.4%)	22 (0.9%)	12 (1.1%)	11 (1.0%)	8 (1.4%)	7 (0.7%)	9 (1.3%)
Multiethnic or multiracial	18 (1.5%)	50 (2.1%)	9 (0.8%)	11 (1.0%)	9 (1.6%)	11 (1.2%)	2 (0.3%)
Other	171 (14.3%)	155 (6.6%)	98 (8.7%)	118 (11.3%)	90 (16.1%)	104 (10.9%)	65 (10.0%)
Not available	10 (0.8%)	17 (0.7%)	2 (0.2%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Urbanicity							
Urban	194 (16.3%)	199 (8.5%)	225 (20.0%)	189 (18.0%)	110 (19.7%)	170 (17.9%)	113 (15.9%)
Suburban	531 (44.7%)	463 (19.8%)	469 (41.6%)	412 (39.2%)	210 (37.6%)	362 (38.1%)	307 (43.2%)
Rural	459 (38.6%)	533 (22.7%)	424 (37.6%)	440 (41.9%)	239 (42.8%)	408 (43.0%)	282 (39.7%)
Not available	5 (0.4%)	1199 (49.0%)	9 (0.8%)	9 (0.8%)	0 (0%)	9 (0.9%)	9 (1.2%)
Annual family income per capita (mean, sd)	15,700.80 (10,565.04)	18,988.64 (14,071.21)	18,881.52 (13,884.83)	18,623.57 (14,008.92)	17,124.09 (11,311.35)	19,013.38 (14,649.08)	19,622.80 (15,143.50)

Table 1 continued

Characteristics	Grade 9	Grade 10	Grade 11	Longitudinal	Grade 9 longitudinal	Grade 10 longitudinal	Grade 11 longitudinal
Geographic Location							
Northeast	199 (16.7%)	267 (11.4%)	156 (13.8%)	118 (11.2%)	82 (14.7%)	100 (10.5%)	67 (9.4%)
North central	609 (51.2%)	1140 (48.6%)	574 (50.9%)	541 (51.5%)	295 (52.8%)	489 (51.5%)	369 (51.9%)
Southern	205 (17.2%)	217 (9.3%)	124 (11.0%)	134 (12.8%)	97 (17.4%)	114 (12.0%)	75 (10.5%)
West	175 (14.7%)	717 (30.6%)	273 (24.2%)	257 (24.5%)	85 (15.2%)	246 (25.9%)	200 (28.1%)
Not available	1 (0.1%)	3 (0.1%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Maternal education (highest reported)							
8th grade or less	17 (1.4%)	4 (0.2%)	2 (0.4%)	5 (0.5%)	5 (0.9%)	4 (0.4%)	2 (0.3%)
Some high school	33 (2.8%)	16 (0.7%)	11 (2.1%)	11 (1.0%)	1.8 (10.0%)	8 (0.8%)	5 (0.7%)
High school diploma/G.E.D.	137 (11.5%)	123 (5.2%)	74 (6.6%)	90 (8.6%)	72 (12.9%)	77 (8.1%)	47 (6.6%)
Trade/vocational school	124 (10.4%)	125 (5.3%)	76 (6.7%)	84 (8.0%)	53 (9.5%)	75 (7.9%)	50 (7.0%)
2-year college	180 (15.1%)	153 (6.5%)	123 (10.9%)	128 (12.2%)	89 (15.9%)	105 (11.1%)	77 (10.8%)
4-year college-bachelor's	128 (10.8%)	246 (10.5%)	146 (13.0%)	142 (13.5%)	73 (13.1%)	131 (13.8%)	100 (14.1%)
Masters' degree	73 (6.1%)	89 (3.8%)	59 (5.2%)	65 (6.2%)	42 (7.5%)	55 (5.8%)	41 (5.8%)
Doctoral/professional	19 (1.6%)	25 (1.1%)	21 (1.9%)	17 (1.6%)	11 (2.0%)	16 (1.7%)	12 (1.7%)
Not available	478 (40.2%)	1563 (6.6%)	615 (54.6%)	508 (48.4%)	204 (36.5%)	478 (50.4%)	377 (53.0%)

Table 2

Means, standard deviations, and number of participants for all measures before multiple imputation

Measures	Grade 9			Grade 10			Grade 11			Possible range
	N	Mean	SD	N	Mean	SD	N	Mean	SD	
Positive Youth Development (PYD)	483	71.77	13.49	933	73.37	11.63	699	74.39	11.20	0-100
Depression	509	14.45	10.47	915	12.89	9.36	685	12.03	8.80	0-60
Eating Pathology and Body Dissatisfaction										
Drive for Thinness (EDI-DT)	521	6.46	6.29	937	6.55	6.78	703	6.75	6.80	0-35
Bulimia (EDI-BN)	521	3.16	4.05	938	3.21	4.06	703	3.36	4.27	0-35
Body Dissatisfaction (EDI-BD)	521	5.22	4.60	938	5.25	4.66	701	5.36	4.66	0-30
Actual weight (BMI-z)	442	.43	.93	772	.37	1.19	571	.38	.94	-/+2
Perceived overweight	521	.29	.46	936	.32	.47	700	.32	.47	0-1
Global self-esteem	363	3.27	.69	908	3.20	.62	687	3.19	.64	1-4
Sports participation ^a (≥ a couple times/month)	1050	.39	.49	937	.83	.38	696	.77	.44	0-1
Youth Goal Orientation (SOC)	514	.59	.16	927	.58	.14	689	.59	.14	0-1
Mother's Education (highest) ^b	542	14.57	2.29		-----			-----		8-20

Note: ^a Multinomial logit and multiple regression analyses were based on a composite index of sports continuity that ranged from 0 = *None* to 2 = 2 or more years of sports involvement at least a couple times/month ($M = 1.57$; $SD = .65$), but values shown here reflect dichotomous participation by grade.

^b Mother's Education is a composite index of the highest scores reported across all study time points

Table 3

Attrition information: Means, standard deviations, and percentages of selected demographic variables by participation status

Variables	Cross-sectional sample	Longitudinal sample
Demographic characteristics		
Sex (% female)	60.7%	68.0%
Grade 9 Age (M, SD)	14.97 (1.17)	14.90 (1.00)
Mother's education (M, SD)	14.33 (2.74)	14.57 (2.29)
Family income (M, SD)	\$64,012.74 (\$38,478.26)**	\$70,765.33 (\$41,805.85)
Race/ethnicity (%)		
African American	5.3%*	7.6%
Asian American	1.5%*	2.6%
American Indian	1.6%*	1.0%
European American	75.3%	72.2%
Latino/a American	7.2%*	4.3%
Multiracial	2.3%*	1.0%
Other (inconsistent)	6.8%*	11.3%
Location		
Urban	17.1%	18.0%
Suburban	44.3%*	39.3%
Rural	36.9%*	41.9%
Drive for Thinness (EDI-DT)		
Grade 9	6.61 (6.66)	6.46 (6.29)
Grade 10	6.72 (6.77)	6.55 (6.78)
Grade 11	5.65 (6.20)*	6.75 (6.80)
Bulimia (EDI-BN)		
Grade 9	3.14 (4.39)	3.16 (4.05)
Grade 10	3.30 (4.32)	3.21 (4.06)
Grade 11	2.95 (3.82)	3.36 (4.27)

Table 3 continued

Variables	Cross-sectional sample	Longitudinal sample
Body Dissatisfaction (EDI-BD)		
Grade 9	5.04 (4.34)	5.22 (4.60)
Grade 10	5.28 (4.86)	5.25 (4.66)
Grade 11	4.71 (4.74)	5.36 (4.66)
Depression (Grade 11)	12.72 (10.24)	12.03 (8.80)
PYD (Grade 11)	73.52 (11.92)	74.39 (11.63)
BMI-z (Grade 9)	.46 (.95)	.43 (.93)
Perceived overweight (%; Grade 9)	49.7%	50.3%
Self-worth (Grade 9)	3.24 (.60)	3.27 (.69)
Continuity of sports participation	.72 (.45)***	1.58 (.65)

Note: Sports participation was coded as a continuous variable (0 = *None*; 1 = *One year of participation*; 2 = *2 or more years of participation*). Independent samples t-tests were conducted for all continuous variable comparisons. Chi-square analyses were conducted for all categorical variable comparisons

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

Table 4

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Correlations among all study variables for the longitudinal sample of 1,050 adolescents

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Drive for Thinness (Grade 9)	----																
2. Bulimia (Grade 9)	.40***	----															
3. Body Dissatisfaction (Grade 9)	.65***	.42***	----														
4. Drive for Thinness (Grade 10)	.73***	.33***	.53***	----													
5. Bulimia (Grade 10)	.36***	.44***	.36***	.39***	----												
6. Body Dissatisfaction (Grade 10)	.62***	.35***	.69***	.63***	.38***	----											
7. Drive for Thinness (Grade 11)	.66***	.39***	.55***	.73***	.27***	.52***	----										
8. Bulimia (Grade 11)	.31***	.61***	.42***	.24***	.49***	.23***	.45***	----									
9. Body Dissatisfaction (Grade 11)	.57***	.42***	.65***	.52***	.33***	.66***	.66***	.39***	----								
10. PYD (Grade 11)	-.11	-.29***	-.25***	-.06	-.20***	-.13**	-.14***	-.25***	-.28***	----							
11. Depression (Grade 11)	.35***	.34***	.32***	.31***	.28***	.26***	.37***	.34***	.38***	-.48***	----						
12. BMI-z (Grade 9)	.25***	.13**	.34***	.18**	.11*	.29***	.24**	.20**	.36***	-.20**	.13	----					
13. Perceived overweight (Grade 9) ^a	.38**	.16**	.43***	.30***	.16*	.38***	.38***	.27**	.43***	-.15*	.21**	.51***	----				
14. Global self-esteem (Grade 9)	-.34***	-.37***	-.40***	-.32***	-.29***	-.36***	-.25**	-.34***	-.37***	.52***	-.45***	-.15**	-.18**	----			

Table 4 continued

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
15.Sports participation (Grades 9-11)	-.11*	-.16***	-.15**	-.06	-.04	-.08*	-.04	-.04	-.07	.12**	-.17***	-.07	-.11*	.23***	----		
16. Maternal education (Highest)	-.07	-.01	-.01	-.03	.09	-.02	.00	.05	.03	.09	-.09	-.10	.00	.14*	.13**	----	
17. SOC (Grade 9)	-.04	-.21***	-.15**	-.08	-.14**	-.16**	-.10	-.21**	-.18*	-.28***	-.17*	-.06	-.06	.34***	.20***	.05	----

Note: ^a Majority of correlations reflect the Pearson product moment correlations, with the exception of those that used point biserial correlations between dichotomous and continuous variables * $p < .05$; ** $p < .01$; *** $p < .001$

Table 5

Descriptive statistics for study variables by gender in the longitudinal sample

Study Variables	Boys (N= 336)		Girls (N=714)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Grade 9				
Perceived overweight (%) ^b	25.0%**		75.0%	
Age (in years)	14.89 (1.06)		14.91 (.96)	
Maternal education	14.62 (2.58)		14.55 (2.16)	
BMI-z	.48 (1.03)		.40 (.87)	
SOC	.59 (.16)		.58 (.16)	
Global self-esteem	3.35 (.65)		3.24 (.71)	
Drive for Thinness	3.94 (4.11)***		7.77 (6.81)	
Bulimia	2.56 (3.37)*		3.48 (4.33)	
Body Dissatisfaction	3.74 (3.67)***		5.99 (4.85)	
Grade 10				
Drive for Thinness	3.97 (5.05)***		5.99 (4.85)	
Bulimia	2.63 (3.40)**		3.48 (4.32)	
Body Dissatisfaction	3.76 (3.87)***		5.96 (4.84)	
Grade 11				
Drive for Thinness	3.59 (4.70)***		8.16 (7.12)	
Bulimia	2.70 (3.35)**		3.65 (4.59)	
Body Dissatisfaction	3.38 (3.45)***		6.24 (4.86)	
PYD	71.74 (11.71)***		75.57 (10.77)	
Depression	10.42 (7.88)**		12.75 (9.09)	

Note: ^aIndependent sample *t*-tests were conducted to test for sex differences in continuous variables; ^bChi-Square analyses were conducted to test for sex differences in dichotomous variables

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

Table 6

Descriptive statistics for study variables after imputation for the longitudinal sample by gender (N = 1,050)

Measures	Total sample		Boys (N = 336)		Girls (N = 714)		Possible range
	Mean	SD	Mean	SD	Mean	SD	
Grade 9							
Actual weight (BMI-z)	.48	.97	.50	1.01	.47	.96	-2- ⁺ 2
Perceived overweight	.29	.46	.26	.44	.31	.47	0-1
Global self-esteem	3.28	.69	3.28	.70	3.28	.69	0-4
Youth Goal Orientation (SOC)	.60	.16	.59	.15	.60	.16	0-1
Grades 9 through 11							
Sports participation ^a	1.58	.65	1.66	.61	1.54	.67	0-2
Maternal education ^b	14.56	2.29	14.54	2.53	14.57	2.18	8-20
Grade 11							
Positive Youth Development (PYD)	73.50	11.73	70.12	11.83	75.10	11.34	0-100
Depression	12.25	8.97	10.85	8.26	12.90	9.22	0-60

Note: ^a Sports participation based on a composite that ranged from 0 = None to 2 = 2 or more years of sports involvement at least a couple times/month

^b Mother's Education is a composite index of the highest scores reported across all study time points

Table 7

Bayesian Information Criterion (BIC) scores, changes in BIC, and percentages of participants in the smallest group for trajectory models of Drive-for-Thinness, Bulimia, and Body Dissatisfaction (N=1,050)

	<i>BIC</i>	Change in BIC	<i>AIC</i>	Size of smallest group (%)
Drive-for-Thinness (DT)				
One group model	-7399.79	--	-7388.44	100.00
Two groups	-7056.06	-343.73	-7033.34	31.11
Three groups	-6991.60	-64.46	-6957.53	20.44
Four groups	-6983.37	-8.23	-6937.95	13.38
Five groups	-6985.30	1.93	-6928.52	8.33
Six groups	-6979.64	-5.66	-6911.50	4.63
Seven groups	-6985.71	6.07	-6906.21	3.64
Bulimia (BN)				
One group model	-8819.99	--	-8811.47	100.00
Two groups	-6830.15	-1989.84	-6810.27	38.94
Three groups	-6434.57	-395.58	-6403.33	21.48
Four groups	-6302.92	-131.65	-6260.33	6.67
Five groups	-6237.99	-64.93	-6184.04	5.99
Six groups	-6169.19	-68.80	-6103.88	5.25
Seven groups	-6160.40	-8.79	-6083.73	4.27

Table 7 continued

	<i>BIC</i>	Change in BIC	<i>AIC</i>	Size of smallest group (%)
Body Dissatisfaction (BD)				
One group model	-6672.76	--	-6661.40	100.00
Two groups	-6443.00	-229.76	-6420.28	39.57
Three groups	-6376.47	-66.53	-6342.40	12.88
Four groups	-6360.38	-16.09	-6314.95	6.83
Five groups	-6355.49	-4.89	-6298.71	4.14
Six groups	-6366.79	11.30	-6298.65	1.13
Seven groups	-6374.71	7.92	-6295.22	0.80

Table 8

Actual percentages of the sample assigned to each trajectory group and average posterior probability for trajectory assignment

Trajectory groups	% Participants	Average posterior probability for trajectory assignment
Drive-for-Thinness (DT)		
Very low stable	13.31	0.77
Low stable	36.63	0.78
Increasing	9.64	0.70
Decreasing	21.45	0.71
Increasing/decreasing	13.50	0.75
High stable	5.46	0.81
Bulimia (BN)		
Very low stable	18.83	0.86
Increasing	34.27	0.82
Decreasing/increasing	5.33	0.81

Table 8 continued

Trajectory groups	% Participants	Average posterior probability for trajectory assignment
Decreasing	12.87	0.70
Increasing/decreasing	23.55	0.87
High stable	5.15	0.90
Body Dissatisfaction (BD)		
None stable	4.57	0.84
Very low stable	36.58	0.82
Low stable	33.37	0.74
Moderate stable	21.15	0.78
High stable	4.32	0.85

Table 9

Sex, maternal education, perceived and actual weight, self-esteem, and sports participation for each trajectory group of eating pathology and body dissatisfaction and significance of effects of covariates as predictors of trajectory group membership

	% Girls	Maternal education	BMI-z	Weight status % Perceived overweight	Self-esteem	Sports participation
Drive-for-Thinness (DT) ^a						
Very low stable	40.63 (0.10)***	14.48	-.05	8.05 (0.24)***	3.50 (2.37)*	1.67
Low stable	59.21 (0.25)***	14.63	.37	20.65 (0.19)***	3.34	1.60
Increasing	85.94	14.55	.51	28.75 (0.23)*	3.31	1.58
Decreasing	77.39	14.54	.73	46.39	3.16	1.51
Increasing/decreasing ^b	84.21	14.17	.53	49.15	3.11	1.57
Bulimia (BN)						
Very low stable	58.88 (0.18)***	14.08	.42	23.51 (0.29)*	3.49 (3.97)***	1.62
Increasing	69.65 (0.28)**	14.48	.44	30.73	3.40 (3.12)***	1.55
Decreasing/increasing	65.31 (0.27)*	14.93	.50	23.67 (0.13)*	3.06	1.65
Decreasing	62.39 (0.20)**	14.48	.29	31.54	3.29	1.72

Table 9 continued

	% Girls	Maternal education	BMI-z	Weight status % Perceived overweight	Self-esteem	Sports participation
Increasing/decreasing	72.40 (0.35)*	14.89	.52	33.20 (0.32)*	2.98	1.52
High stable ^b	88.24	14.35	1.01	63.34	2.85	1.51
Body Dissatisfaction (BD)						
None stable	20.51 (0.01)***	14.66	-.27 (0.08)***	2.82	3.74 (25.00)***	1.85
Very low stable	59.85 (0.03)***	14.52	.14 (0.14)***	13.52 (0.26)*	3.49 (8.97)***	1.60
Low stable	68.41 (0.06)***	14.43	.60 (0.25)**	34.23	3.10 (3.09)***	1.57
Moderate stable	86.18 (0.19)*	14.50	.78 (0.25)***	56.40	3.16 (3.41)***	1.53
High stable ^b	93.02	15.17	1.56	72.09	2.60	1.37

Note. * $p < 0.05$; ** $p < 0.01$; *** $p < .001$; ^aThese analyses included comparisons among five of the six DT groups given that the *high stable* group ($n = 47$) included only females, which introduced the issue of quasi-separated data and invalid parameter estimates.

^bReference category for multinomial logit analyses. Only significant odds ratios are shown and appear in parentheses.

Confidence intervals of odds ratios for the 10 imputed datasets are available upon request

Table 10

OLS regression analyses describing relations among trajectories of drive-for-thinness (DT), bulimic thoughts and behaviors (BN), and body dissatisfaction (BD; Grades 9 to 11) and PYD and depression (Grade 11) in middle adolescent females (n = 714)

Variables	Outcome Variables					
	PYD			Depression		
	DT Trajectories	BN Trajectories	BD Trajectories	DT Trajectories	BN Trajectories	BD Trajectories
	<i>B(SEB)</i>	<i>B(SEB)</i>	<i>B(SEB)</i>	<i>B(SEB)</i>	<i>B(SEB)</i>	<i>B(SEB)</i>
Constant	51.93 (5.18)***	47.09 (5.16)***	50.64 (4.90)***	37.02 (4.33)***	36.44 (4.17) ***	38.42 (4.37)***
Covariates						
Self-worth	5.25 (1.12)***	4.52 (1.26)***	4.65 (1.17)**	-3.33 (.93)**	-2.95 (.97)	-2.88 (1.07)*
Maternal education	.26 (.28)	.39 (.28)	.34 (.28)	-.31 (.19)	-.44 (.20)*	-.43 (.19)*
BMI-z	-.96 (.85)	-.70	-.33 (.93)	-0.1 (.71)	.28 (.60)	-.40 (.74)
DT Trajectory groups						
Very low stable	3.03 (3.09)			-10.39 (2.91)**		
Low stable	4.07 (2.19)			-11.44 (1.95)***		
Increasing	-.50 (2.54)			-6.00 (2.09)*		
Decreasing	3.44 (2.16)			-8.77 (1.73)***		
Increasing/decreasing	1.95 (2.24)			-8.76 (-5.37)***		
BN Trajectory groups						
Very low stable		10.71 (2.09)***			-11.71 (1.72) ***	

Table 10 continued

Variables	Outcome Variables					
	PYD			Depression		
	DT Trajectories	BN Trajectories	BD Trajectories	DT Trajectories	BN Trajectories	BD Trajectories
	<i>B(SEB)</i>	<i>B(SEB)</i>	<i>B(SEB)</i>	<i>B(SEB)</i>	<i>B(SEB)</i>	<i>B(SEB)</i>
Increasing		7.89 (2.08)***			-7.35 (1.60) ***	
Decreasing/increasing		2.23 (2.80)			-3.88 (2.23)	
Decreasing		13.08 (2.47) ***			-10.88 (2.01) ***	
Increasing/decreasing		7.12 (2.03) ***			-6.27 (1.59) ***	
BD Trajectory groups						
None stable			11.16 (4.93)*			-11.07 (4.62)*
Very low stable			6.48 (3.15)			-11.85 (2.49)***
Low stable			5.29 (2.45)*			-10.41 (1.94)***
Moderate stable			2.04 (2.53)			-7.89 (1.95)***
R ² minimum	.11***	.16***	.11***	.18***	.17***	.15***
R ² maximum	.21***	.27***	.21***	.26***	.28***	.24***
R ² average	.16	.22	.18	.21	.21	.19

Note. * $p < .05$; ** $p < .01$; *** $p < .001$; Covariates were assessments taken at Grade 9, with the exception of maternal education which is an overall composite of the highest level of education reported. Reference category in all models was the *High Stable* group.

Table 11

OLS regression analyses describing relations among trajectories of drive-for-thinness (DT), bulimic thoughts and behaviors (BN), and body dissatisfaction (BD; Grades 9 to 11) and PYD and depression (Grade 11) in middle adolescent males (n = 336)

Variables	Outcome Variables					
	PYD			Depression		
	DT Trajectories	BN Trajectories	BD Trajectories	DT Trajectories	BN Trajectories	BD Trajectories
	<i>B(SEB)</i>	<i>B(SEB)</i>	<i>B(SEB)</i>	<i>B(SEB)</i>	<i>B(SEB)</i>	<i>B(SEB)</i>
Constant	47.15 (7.71)***	44.13 (7.90)***	45.45 (9.04)***	27.83 (5.63) ***	29.22 (5.39) ***	26.71 (6.38)***
Covariates						
Self-worth	6.35 (1.36)***	5.52 (1.49)**	5.22 (1.48)**	-2.76 (1.20)*	-2.39 (1.28)	-2.36 (1.41)
Maternal education	.34 (.34)	.45 (.34)	.37 (.32)	-.19 (.24)	-.32 (.25)	-.27 (.24)
BMI-z	-.79 (.94)	-.73 (.93)	-.26 (.10)	-.37 (.53)	-.10 (.57)	-.58 (.68)
DT Trajectory groups^a						
Very low stable	-1.37 (2.74)			-6.32 (2.01)**		
Low stable	-1.59 (2.47)			-5.84 (1.93)**		
Increasing	-.48 (4.94)			2.58 (3.29)		
Decreasing	-3.20 (2.91)			-3.36 (2.03)		
BN Trajectory groups						
Very low stable			4.06 (5.19)			-7.78 (3.67)*
Increasing			3.18 (5.13)			-6.35 (3.72)
Decreasing/increasing			-2.70 (6.03)			-2.51 (4.20)

Table 11 continued

Variables	Outcome Variables					
	PYD			Depression		
	DT Trajectories	BN Trajectories	BD Trajectories	DT Trajectories	BN Trajectories	BD Trajectories
	<i>B(SEB)</i>	<i>B(SEB)</i>	<i>B(SEB)</i>	<i>B(SEB)</i>	<i>B(SEB)</i>	<i>B(SEB)</i>
Decreasing		4.56 (5.55)			-5.65 (3.87)	
Increasing/decreasing		-.78 (5.06)			-3.66 (3.52)	
BD Trajectory groups						
None stable			8.02 (7.62)			-6.79 (6.02)
Very low stable			3.97 (7.04)			-4.66 (5.20)
Low stable			.35 (6.91)			-2.70 (4.93)
Moderate stable			2.63 (6.97)			-.68 (5.04)
R ² minimum	.11***	.14***	.13***	.11***	.10***	.08***
R ² maximum	.26***	.30***	.27***	.29***	.24***	.22***
R ² average	.18	.21	.20	.16	.14	.13

Note. * $p < .05$; ** $p < .01$; *** $p < .001$; Covariates were assessments taken at Grade 9, with the exception of maternal education which is an overall composite of the highest level of education reported. Reference category for DT model was *Increasing/decreasing*, and *High Stable* group was referent group for BN and BD models.

^aBased on a five-group model (compared to the six-group model for females) to accommodate the empty cell issue for the *High Stable* group

Table 12

OLS regression analyses describing relations among trajectories of eating pathology and body dissatisfaction, sports participation, and female adolescents' positive and problematic functioning (n = 714)

Variables	Outcome Variables				
	PYD			Depression	
	Bulimia ^b	Body Dissatisfaction ^c	Drive-for-Thinness ^d	Bulimia ^b	Body Dissatisfaction ^c
	<i>B(SEB)</i>	<i>B(SEB)</i>	<i>B(SEB)</i>	<i>B(SEB)</i>	<i>B(SEB)</i>
Constant	42.38 (6.20) ***	44.02 (5.97) ***	43.24 (5.14)***	44.90 (5.15)***	46.87 (4.63) ***
Block 1: Covariates and Trajectory					
Groups^a					
Self-worth	3.91 (1.17)**	3.88 (1.07)**	-2.88 (.97)*	-2.59 (1.01)*	-2.39 (1.12)
Maternal education	.32 (.29)	.27 (.27)	-.24 (.20)	-.39 (.20)	-.37 (.19)
BMI-z	-.68 (.80)	-.22 (.93)	-.11 (.73)	.19 (.63)	-.53 (.73)
Youth goal orientation (SOC)	6.79 (4.77)	9.19 (4.70)	-4.50 (2.84)	-1.75 (2.75)	-4.91 (2.63)
Group 1	12.28 (4.89)*	-8.90 (2.08)	-15.98 (6.18)*	-19.28 (4.72)***	-28.73 (17.28)
Group 2	7.25 (4.48)	7.39 (4.49)	-14.95 (5.26)*	-13.16 (4.25)**	-17.15 (4.27) ***
Group 3	-2.26 (5.68)	9.56 (4.25)*	-9.12 (5.64)	-6.97 (5.93)	-17.16 (3.80) ***
Group 4	12.80 (5.99)*	1.92 (4.26)	-13.16 (4.61)*	-19.07 (5.27)***	-11.98 (3.88)**
Group 5	11.20 (4.76)*	-----	-7.52 (5.03)	-15.03 (4.15)**	-----

Table 12 continued

Variables	Outcome Variables				
	PYD			Depression	
	Bulimia ^b	Body Dissatisfaction ^c	Drive-for-Thinness ^d	Bulimia ^b	Body Dissatisfaction ^c
	<i>B(SEB)</i>	<i>B(SEB)</i>	<i>B(SEB)</i>	<i>B(SEB)</i>	<i>B(SEB)</i>
Duration of sports participation	2.68 (2.38)	3.04 (2.07)	-4.02 (2.51)	-6.15 (2.40)*	-5.39 (2.011)*
Block 3: Two-way interactions					
Group 1* Sports	-1.46 (2.78)	9.91 (11.00)	3.71 (3.40)	5.03 (2.63)	10.65 (9.05)
Group 2* Sports	.28 (2.60)	-.51 (2.26)	2.35 (2.68)	3.78 (2.54)	3.63 (2.15)
Group 3 *Sports	2.84 (3.33)	-2.84 (2.27)	2.05 (3.05)	2.08 (3.46)	4.69 (2.16)*
Group 4 *Sports	-.30 (3.32)	.09 (2.39)	2.96 (2.56)	5.45 (2.97)	2.91 (2.14)
Group 5 *Sports	-2.97 (2.70)	-----	.48 (2.73)	5.80 (2.53)*	-----
R ² minimum	.19***	.15***	.21***	.21***	.19***
R ² maximum	.31***	.28***	.28***	.30***	.26***
R ² average	.26	.22	.25	.24	.22

Note. * $p < .05$; ** $p < .01$; *** $p < .001$; Covariates were assessments taken at Grade 9, with the exception of maternal education which is an overall composite of the highest level of education reported.

^a High Stable group was referent category for all models.

^bBN: Group 1: Very low stable; Group 2: Increasing; Group 3: Decreasing/increasing; Group 4: Decreasing; Group 5: Increasing/decreasing

^cBD: Group 1: None stable; Group 2: Very low stable; Group 3: Low stable; Group 4: Moderate stable

^dDT: Group 1: Very low stable; Group 2: Low stable; Group 3: Increasing; Group 4: Decreasing; Group 5: Increasing/decreasing

Table 13

OLS regression analyses describing relations among trajectories of eating pathology and body dissatisfaction, sports participation, and male adolescents' depressive symptoms (n = 336)

Variables	Outcome Variable	
	Depression	
	Drive-for-Thinness ^b	Bulimia ^c
	<i>B(SEB)</i>	<i>B(SEB)</i>
Constant	36.93 (6.56)***	35.75 (7.80)***
Block 1: Covariates and Trajectory		
Groups^a		
Self-worth	-2.32 (1.25)	-2.08 (1.32)
Maternal education	-.21 (.24)	-.29 (.25)
BMI-z	-.45 (.53)	-.19 (.56)
Youth goal orientation (SOC)	-2.20 (3.24)	-1.04 (3.18)
Group 1	-7.40 (5.50)	-10.03 (8.23)
Group 2	-14.39 (4.49)**	-10.36 (8.03)
Group 3	-16.51 (12.87)	1.47 (15.17)
Group 4	-8.39 (5.02)	-15.89 (8.66)
Group 5	-----	-8.16 (8.00)
Block 2: Sports participation		
Duration of sports participation	-5.59 (2.29)*	-4.76 (4.42)
Block 3: Two-way interactions		
Group 1* Sports	1.29 (3.03)	1.76 (4.56)
Group 2* Sports	5.62 (2.53)*	2.72 (4.40)
Group 3 *Sports	11.69 (7.00)	-1.44 (8.17)
Group 4 *Sports	3.27 (2.83)	6.43 (4.73)

Table 13 continued

Variables	Outcome Variable	
	Depression	
	Drive-for-Thinness ^b	Bulimia ^c
	<i>B(SEB)</i>	<i>B(SEB)</i>
Group 5 *Sports	-----	3.01 (4.62)
R ² minimum	.18***	.14***
R ² maximum	.35***	.26***
R ² average	.23	.18

Note. * $p < .05$; ** $p < .01$; *** $p < .001$; Covariates were assessments taken at Grade 9, with the exception of maternal education which is an overall composite of the highest level of education reported.

^a *Increasing/decreasing group* was reference group for DT trajectories; *High Stable* group was referent category for BN trajectories

^b DT: Group 1: *Very low stable*; Group 2: *Low stable*; Group 3: *Increasing*; Group 4: *Decreasing*

^c BN: Group 1: *Very low stable*; Group 2: *Increasing*; Group 3: *Decreasing/increasing*; Group 4: *Decreasing*; Group 5: *Increasing/decreasing*

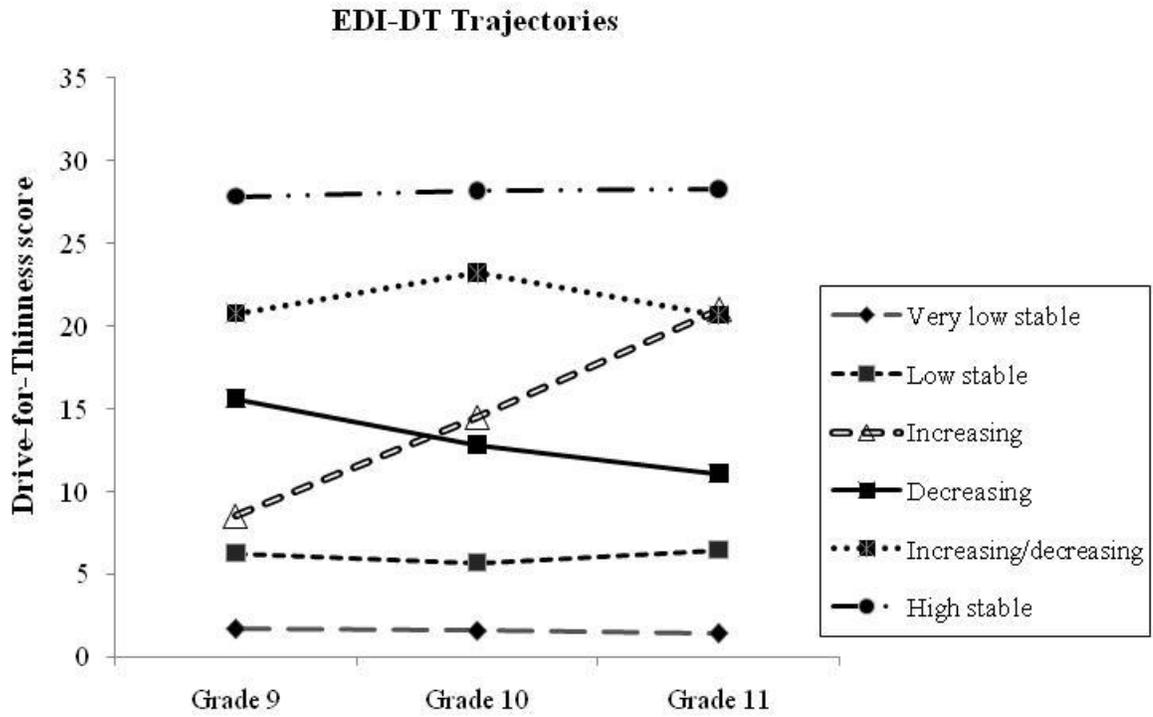


Figure 1. The developmental trajectories of drive-for-thinness across middle adolescence

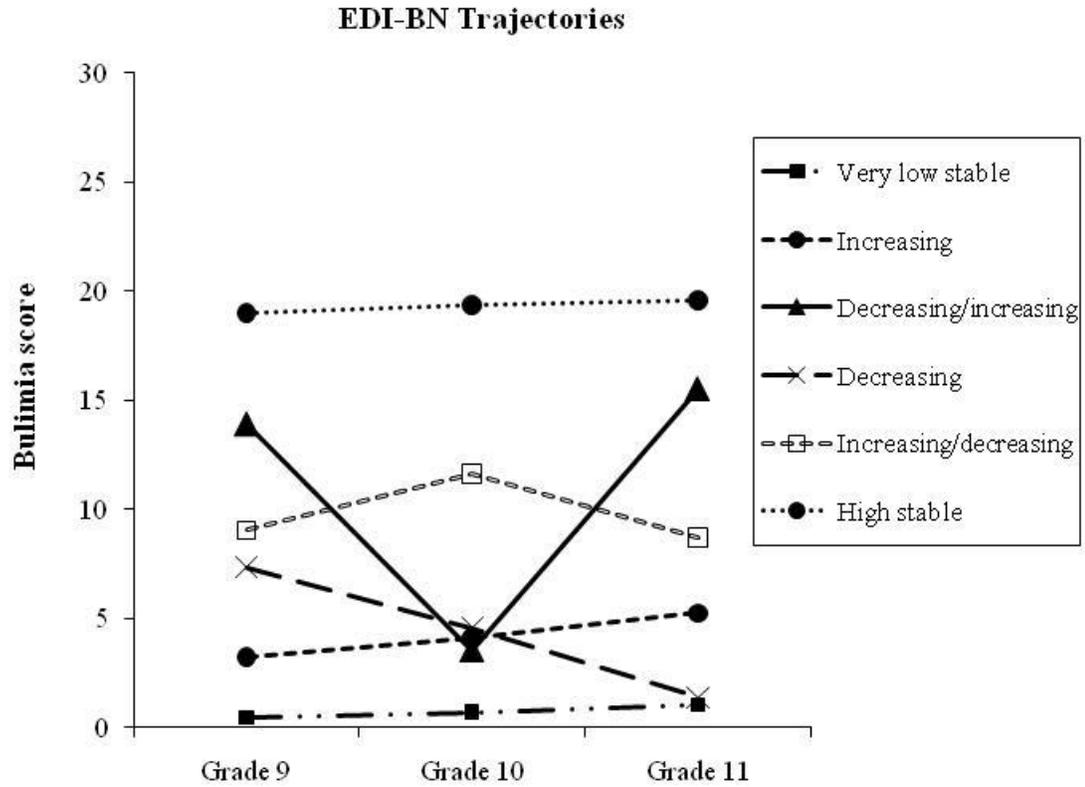


Figure 2. The developmental trajectories of bulimic thoughts and behaviors across middle adolescence

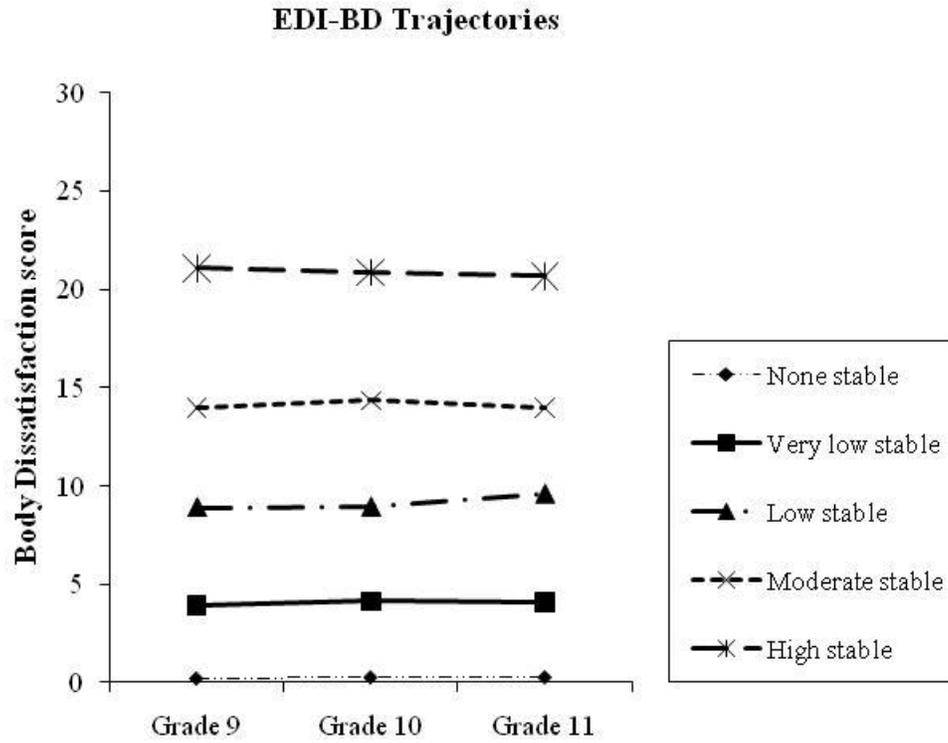


Figure 3. The developmental trajectories of body dissatisfaction across middle adolescence

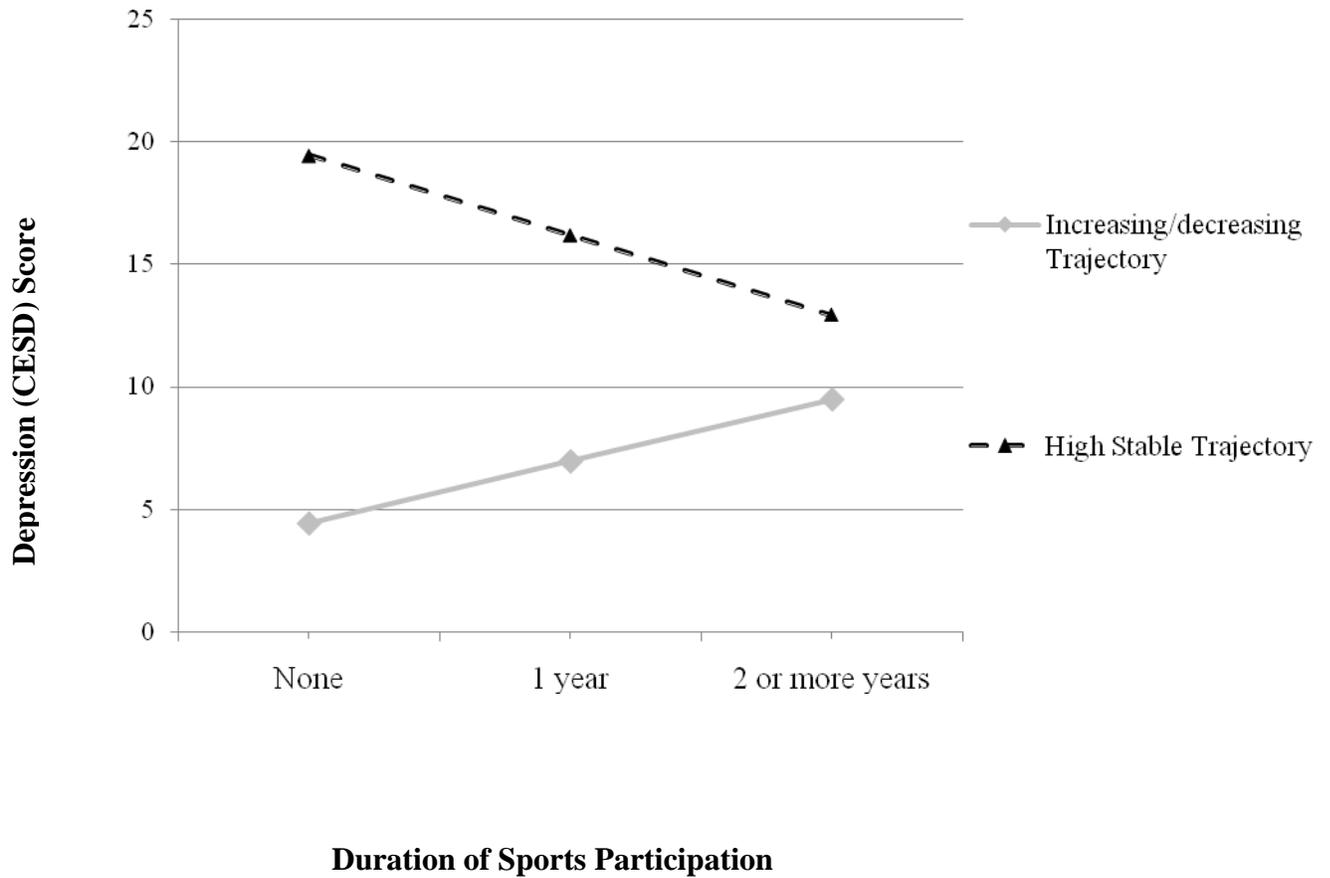


Figure 4. Prototypical bar chart that shows the interaction between membership in the increasing/decreasing (versus high stable) bulimic thoughts and behaviors trajectory group and duration of sports participation in predicting females' depression scores

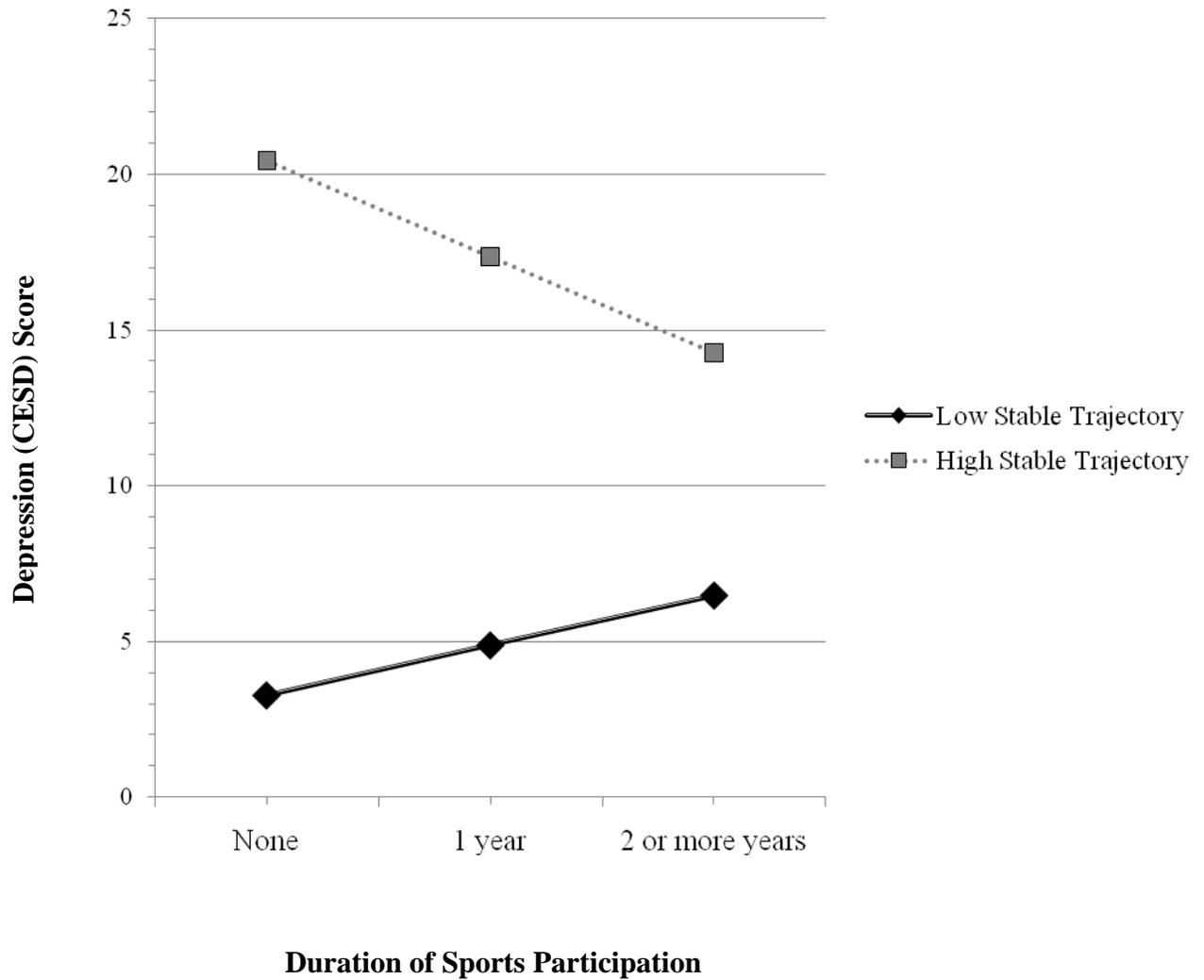


Figure 5. Prototypical bar chart that shows the interaction between membership in the low stable (versus high stable) body dissatisfaction trajectory group and duration of sports participation in predicting females' depression scores

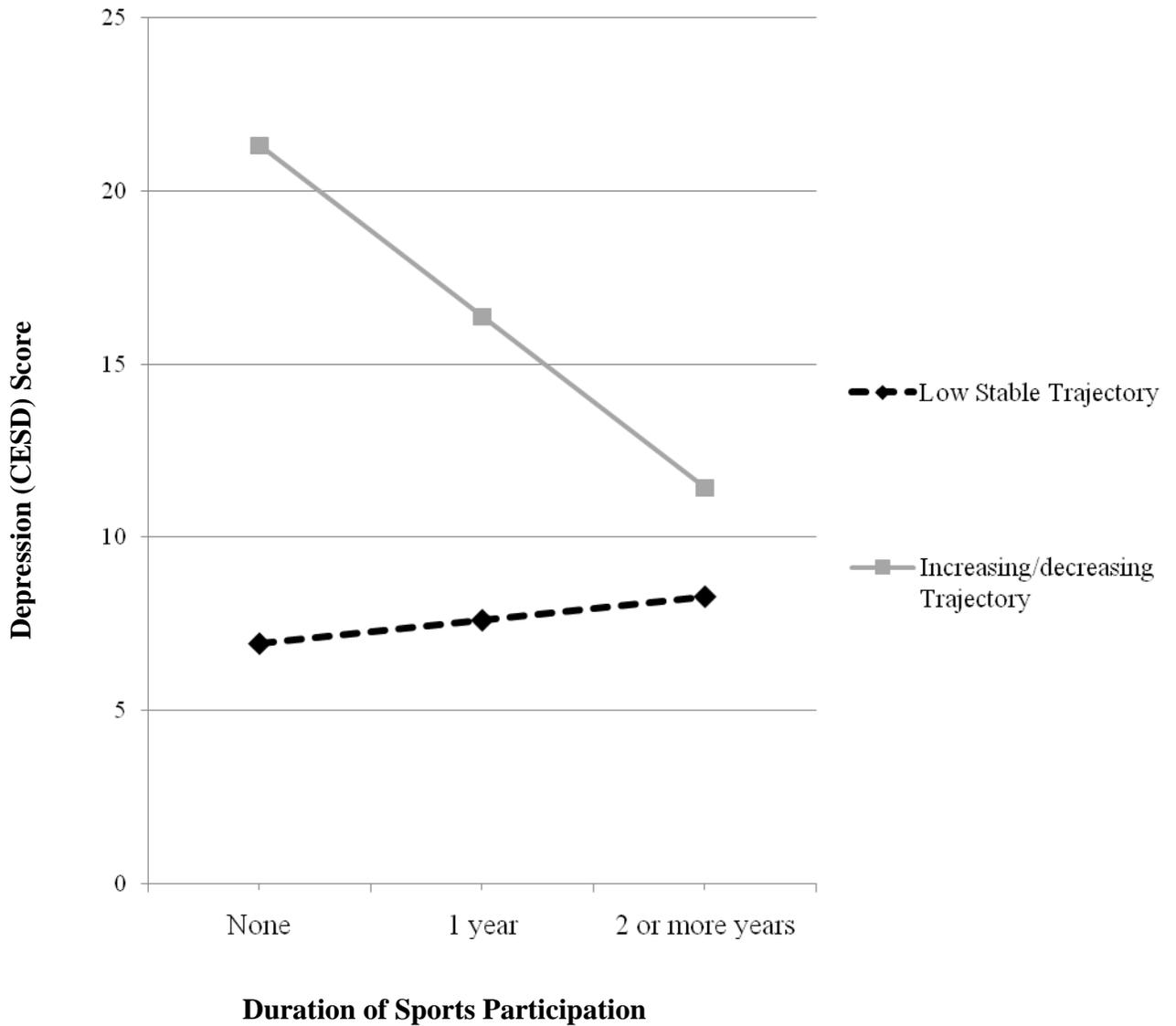


Figure 6. Prototypical bar chart that shows the interaction between membership in the low stable (versus increasing/decreasing) drive-for-thinness trajectory group and duration of sports participation in predicting males' depression scores