Intersections of Education and Resilience: How Contexts Operate in the Protection of At-Risk Adolescents

by

Bridget V. Dever

A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
(Education and Psychology)
in The University of Michigan
2009

Doctoral Committee:

Professor John E. Schulenberg, Co-Chair
Professor Emeritus Martin L. Maehr, Co-Chair
Associate Professor Kai S. Cortina
Assistant Professor Elisabeth A. M. V. DeGroot
Research Scientist Stuart A. Karabenick

Acknowledgements

No piece of work is ever the product of one person alone. I am eternally indebted to a large number of people who helped me with, and through, this dissertation and the preceding years. First and foremost, I am thankful for the support and assistance of my parents. Mom and dad, you've been there since day one of my educational career, and here we are at the finish line together, 24 years later. Thanks for the encouragement, words of wisdom, and just for being on my team no matter what. Thanks also to Denny and Sean -- I couldn't ask for better big brothers, despite any complaints I might pretend to have. I'd also like to thank my Gram – I know you're proud of me, and I miss you every day.

To the friends who knew me before this adventure and stuck by me through my panic attacks and mood swings, there are so many, but I'd like to call some of you out by name anyway. Stephanie, Christopher, Dane, Betsy, Leslie, Maureen, Chuck, Laura, Stacy, Meghan, Joy, and Annie – Thanks for being the best support system ever, even long distance.

To the friends I have made at Michigan, thanks for the smiles and I hope there are many more to come. To Pam, you've been a fantastic friend since my first days in Ann Arbor, thank you so much for everything. To Fani, you had better stay in touch, and good luck on your own journey through CPEP. And to good ol' cohort '04 – thanks for being fabulous, I'm sure I'll be seeing each of you for years to come in this small world we've all joined.

Thanks to my dissertation committee – John, Marty, Stuart, Liz, and Kai – you're all indispensible friends and mentors. I have learned so much from each of you, and am sure I will continue to do so. To Janie and Marie – your knowledge of CPEP, the University of Michigan, Ann Arbor, and pretty much everything else continues to astound me. Thanks for filling in so many blanks for me. To everyone who helped collect data and stack boxes with MSP-MAP – including Jeanne, Melissa G., Christina B., Julie, AnneMarie, Lauren M., Sonya, Andrea, Christina M., Jo, Melissa K., and Lauren F. – I will miss you all and will remember each of you every time I see a Kinko's. Thanks also to everyone involved with MTF; this dissertation would not be possible without the hard work of each and every one of you.

The work in Chapters II and III was made possible thanks in part to a grant from the National Institute on Drug Abuse (Grant DA001411) to the Monitoring the Future Project. The work in Chapter IV was made possible thanks in part to a grant from the National Science Foundation (EHR No. 0335369) to the Math and Science Partnership-Motivation Assessment Program (MSP-MAP).

And of course, there are so many others I am not able to mention by name here, but who have made this dissertation possible through their mentorship, friendship, and support both before and during (and hopefully after) this dissertation. My sincerest gratitude goes to each and every one of you.

Table of Contents

List of Tables

List of Figures

Chapter I

Introduction

Research on risk and resilience has its roots in the study of medicine. In 1949, Thomas R. Dawber and his colleagues began a longitudinal study of heart disease in Framingham, MA, known now as the landmark Framingham Study. The intention of this study was to follow participants over time in order to understand how those who developed heart disease differed from those who did not (Dawber & Kannel, 1966). This prospective study of heart disease development had its highest value not in curing those diagnosed with the disease, but in being able to predict others who were *most likely to develop the disease later*, thereby offering suggestions for prevention. In this same research, Dawber instituted the modern use of the term *risk factor*, defined as a variable or attribute that is associated with greater statistical probability of some undesirable or maladaptive outcome.

As the value of risk and prevention research became clear in the mid part of the 20th century, researchers both within and outside of the medical community began to consider the wide applicability and utility of such research. In 1955, Emmy Werner began the Kauai study, which followed individuals living in situations of poverty, stress, and family disruption from prenatal development through adulthood (Werner, 1994). Werner found that these conditions operated as risk factors for a host of physical,

psychological, and social difficulties; however, the most striking finding from this study was that 33% of those who were considered to be "at high risk" due to great adversity actually grew to be well-functioning, competent individuals through adolescence and adulthood. Thus, it became clear that some people could not only survive, but *thrive* despite strong conditions of risk for maladaptive outcomes; this marked the birth of resilience research.

Resilience has a very intuitive appeal to it, as it offers an optimistic outlook on development and complements the somewhat negative tone of risk research. In resilience research, it is still necessary to first identify risk factors that increased the likelihood of undesirable outcomes. However, if some people who experienced these risk factors developed into high-functioning individuals, the second step becomes the identification of what it was about these cases that predicted their resilient outcomes. In other words, research has moved toward understanding attributes that could *protect* at-risk individuals from the development of later difficulties (e.g. Rutter, 1987).

Protective factors are defined as attributes and resources that interact with risk level such that those who are at higher levels of risk are more likely to experience beneficial, competence-supporting effects from these resources (Masten, Best, & Garmezy, 1990). In some instances, protective factors can signify the opposite pole of a risk factor; for example, for some people low socioeconomic status can operate as a risk, whereas for others high socioeconomic status is protective. However, not all protective factors are the opposite of or the absence of risk (Rutter, 1987). As Rutter explains from his research, within at-risk families a positive marital relationship had a protective effect. If the lack of this positive marital relationship was a risk, one would expect single-parent

households (which by definition lack a marital relationship) to exhibit poorer outcomes. However, poor outcomes were just as likely within two- and single-parent households, although a positive marital relationship served a protective function within some two-parent households. In this research, it was the addition of the protective factor that had the unique effect, whereas the absence of it was neutral. Protective factors in resilience must be distinguished from *promotive factors*, which exhibit a main effect on competence such that they benefit all individuals in the same way, regardless of risk (e.g. Luthar, Cicchetti, & Becker, 2000; Masten, Best, & Garmezy, 1990). In order to design interventions and preventative efforts to close the gaps between at-risk and low risk individuals in various developmental domains, the identification of uniquely beneficial protective factors is imperative.

Resilience in Psychology

It is not surprising that the concepts of risk and resilience quickly made their way into psychological research; since much of what is known about the development of psychological disorder involves multiple correlations rather than a single unique cause, identifying risk and protective factors offered an empirical pathway toward effective psychological prevention and intervention. Garmezy (1974) applied the principles from medical risk and resilience research to better understand how schizophrenia was transmitted (or avoided) between generations. Although the mothers he studied were all diagnosed with the disorder, and despite shared genetic and environmental factors, most of the children studied never developed schizophrenia. Both Garmezy (1974) and Werner (e.g. Werner & Smith, 1992) had come to two general conclusions: 1) risk does

not equate to fate, and 2) protective factors associated with the individual, family, and context can operate to produce resilient outcomes.

As Luthar, Cicchetti, and Becker (2000) note, this triarchic theory of protection within the individual, family, and context has served to guide most of the resilience research from the work of Garmezy and Werner until the present. It is through this seminal research that ideas of resilience as a personally trait resembling invincibility were quashed; complex arrays of risk and protective factors such as intelligence, temperament, parenting quality, maternal monitoring, and support from adults outside of one's family made it clear that *resilience is an interactive process of successful development despite adversity*.

Unfortunately, the use of the word "resiliency," the practice of labeling individuals as "resilient," and intriguing studies that focus solely on individual-level resources such as coping and hardiness continue to perpetuate the myth that resilience is something that one either does or does not have. While it can be uplifting to think that some people have something special that makes them invulnerable to risk, this is not only a gross oversimplification but also a dangerous path of thinking. If resilience rests within the person, the implication is that those who are not resilient are somehow to blame for their "deficiency" and that nothing can be done by those around the non-resilient person to increase their chances of success. However, five decades of research provide evidence that parents, extended families, schools, and other contexts are not only involved in resilience, but that a supportive relationship with another person may actually be the most important part of the process (e.g. Masten, Best, & Garmezy, 1990; Werner & Smith, 1992).

Operationalizing Resilience as a Developmental Process

If resilience is a process, as opposed to a characteristic or a product, the question becomes, "what do we measure?" Based on the definition of resilience, there are at least three steps to capturing resilience empirically (Figure 1.1). First, one must establish some sort of adversity; without the presence of identified risk, common developmental processes other than resilience are operating. Poverty, disadvantaged minority status, living in a single parent home, and stressful life events are commonly studied risk factors that can be quantified and measured. Next, there must be evidence of successful development. In most instances, this is measured by meeting or exceeding developmental tasks (Masten & Coatsworth, 1998). For example, in adolescence, resilience researchers typically measure successful school transitions, academic performance, and social competence with peers. Finally, in order to measure the process itself, it is critical to study moderating variables (i.e. protective factors) and mediating mechanisms that explain *why* and *how* successful development was achieved in spite of risk. This last step, the delineation of the intervening processes between risk and outcome, is currently the most nebulous.

As resilience involves meeting developmental tasks, it is critical to consider the stage of development being studied in the design and implementation of research. Many researchers have suggested that although resilience can be evident across the lifespan, adolescence provides unique opportunities for both risk and resilience. Eccles and her colleagues (e.g. Eccles, Lord, & Midgley, 1991; Eccles et al., 1993a) conducted numerous studies to explore the decline in academic motivation and achievement commonly documented during early adolescence. These researchers found that middle

schools do not meet the developmental needs of adolescents. Just when adolescents desire autonomy and identity development, schools become more controlling, more anonymous, and more competitive. This stage-environment misfit, although common among adolescents in the U.S. public schooling system, serves as a risk factor for maladaptive academic and social behavior. Disadvantaged adolescents in particular show the most vulnerability to this person-environment misfit (Lepper, Sethi, Dialdin, & Drake, 1997).

However, not all is bleak during adolescence. As youth become more autonomous and self-reflective, it is also possible for resilience to surface where it was previously absent. Therefore, this three-study dissertation focuses on opportunities for resilience during the developmental period of adolescence. Adolescents have greater opportunities for niche-seeking, and with new social, academic, and extracurricular niches, new resources for competence development often follow. Transition is not always negative or stressful; in many instances, transitions operate as turning points from risk to protection due to the changes in process that can occur with a change in context. Therefore, for some youth, adolescence becomes a chance to reinvent and redefine themselves; the new opportunities can permit the "underachiever" to become "re-motivated" in an environmental science class, for the "introvert" to discover drama club, or for the "risk-taker" to consider study abroad programs.

Educational Psychology and Resilience: Opportunities for Cross-Disciplinary Study

Because the outcome of resilience is determined by the researcher, it is possible for resilience to be present in one domain but absent in another (Luthar, Doernberger, & Zigler, 1993). Therefore, it is critical for resilience researchers to methodically define the

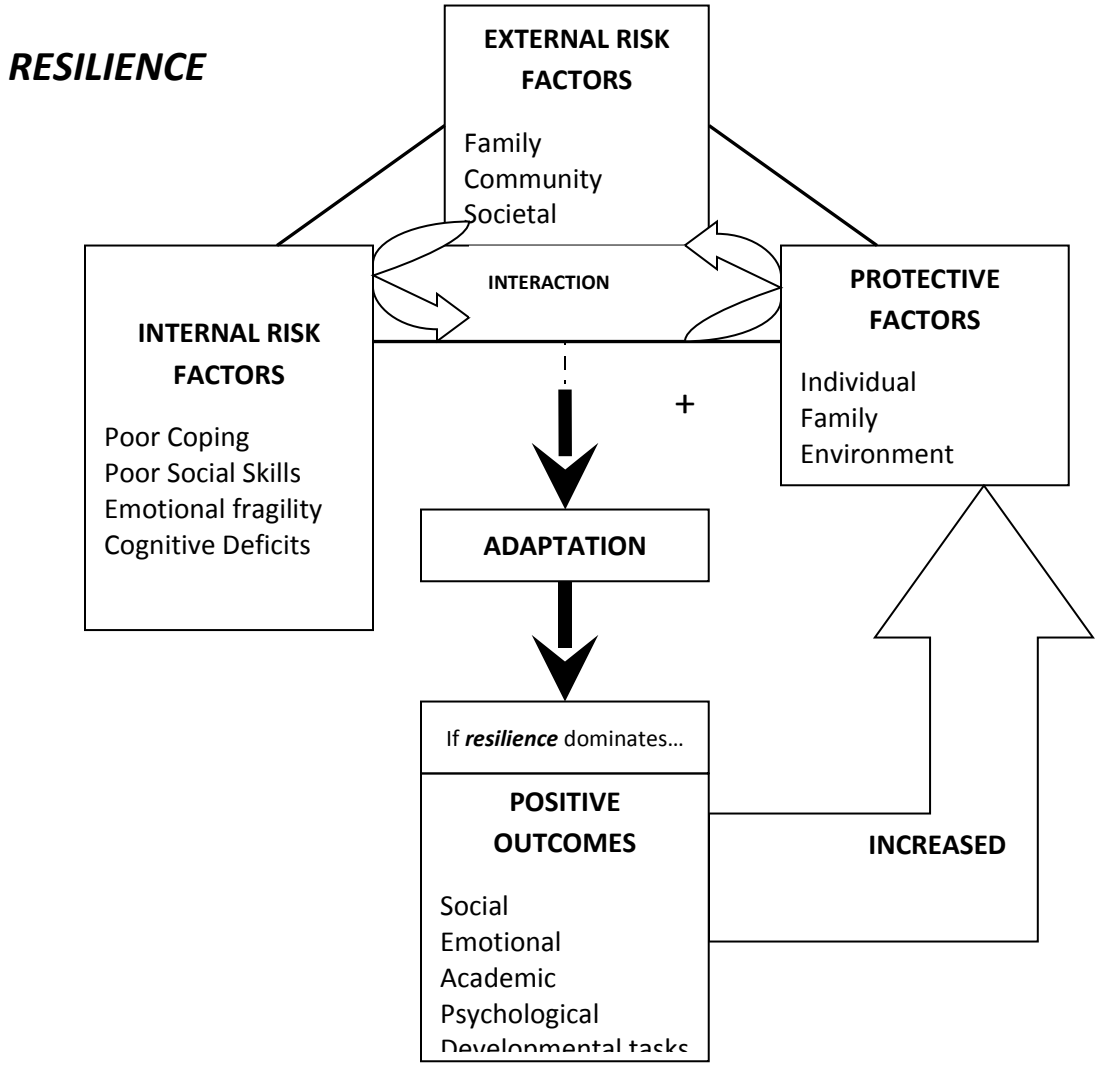
type of resilience studied. Once again, resilience research is moving from generality to specificity in understanding not just *that* risk, protection, and successful development are related but *how different types* of risk, protection, and competencies operate. Clarification regarding the domain of resilience should ultimately assist in dispelling the myth that resilience is invincibility; instead, domain-specificity will reveal the circumstances under which certain competencies are increased while other types of competency still suffer.

One type of resilience that is applicable to success during adolescence is educational resilience. Educational resilience focuses specifically on successful academic outcomes despite risk, as well as the protective mechanisms that assist in the prediction of those outcomes. Educational resilience provides an entry point for educational psychologists to incorporate resilience into their research agendas. As much as educational psychology can benefit from the preventative and intervention implications resilience offers, so too can resilience research benefit from the broader conceptualization of academic influences and outcomes that educational psychology offers. It is evident that most educational resilience literature has been interested in academic end-products, such as achievement test scores, college entry, and avoidance of drop out among at-risk students (e.g. Becker & Luthar, 2002; Catterall, 1998; Croninger & Lee, 2001; Randolph, Fraser, & Orthner, 2004).

However, if resilience researchers are to capture the process, it is necessary to study the intervening mechanisms between risk input and academic output. Some of these mechanisms may be found by turning to relevant variables often studied during adolescence. This three-study dissertation will focus most specifically on the protective

mechanisms provided by challenging extracurricular activities and a supportive classroom context. The following three studies consider the broader intersections of education and resilience as an attempt to provide a more comprehensive portrait of the mechanisms behind resilient outcomes related to education. In addition to educational outcomes, both motivational theory and recent studies on resilience provide evidence that contexts related to education could also work to promote successful social, psychological, and behavioral development. Therefore, the current dissertation consists of three studies that together highlight how characteristics of the at-risk individual and his/her educational context can interact, serving as a catalyst for both academic and behavioral competence development during adolescence. The intention of including outcomes and activities outside the academic arena is to show that the resources schools can offer to students are critical not only to academic outcomes, but to the process of resilience beyond the education domain as well.

Figure 1.1. Developmental Systems Perspective of Resilience



Chapter II

Linking Patterns of Sports Participation to Substance Use and Educational Outcomes

The study of adolescents' use of leisure time is undoubtedly important for understanding the rich and multiple contexts with which adolescents interact. Although school and academic work account for approximately 25% of adolescents waking hours (Larson, 2000), it is clear that adolescents engage in many other activities on a daily basis that are likely to shape them as individuals. Whether engaging in school or leisure activities, one thing has become evident regarding adolescents' use of time – adolescents often report high levels of boredom and low levels of challenge when asked to self-report their feelings about activities throughout the day (Larson, 2000; Larson & Richards, 1991). In response to the finding that adolescents have a good deal of leisure time that is often misused in boring and unchallenging activities, researchers have turned their attention to structured extracurricular activities as developmentally-appropriate ways for adolescents to spend their time.

Extracurricular Activities as Beneficial to Youth Development

Theoretically, extracurricular activities should benefit adolescents because they are often organized in ways that promote growth and prosocial involvement (e.g. Larson, 2000; Roth & Brooks-Gunn, 2003). According to Larson (2000), extracurricular activities are related to positive youth development because they permit the development

of initiative. In other words, these activities allow for: 1) intrinsic motivation because they are voluntary, 2) engagement because they are structured to meet the developmental needs of adolescents, and 3) a continuation of motivation and engagement over time because they involve regular participation.

The vast majority of research has provided evidence that extracurricular activities are beneficial to the development of adolescents. In terms of psychological benefits, extracurricular activities have been linked to higher levels of self-esteem, even several years after high school (Barber, Eccles, & Stone, 2001). Participation in such activities has also been related to lower levels of depressed affect (Mahoney, Schweder, & Stattin, 2002). Therefore, across activities it has been demonstrated that participation in extracurricular activities is associated with positive psychological functioning.

Extracurricular activities also have demonstrated academic benefits. On average, adolescents who participate in extracurriculars report higher grades in school, more positive attitudes about school, and higher academic aspirations when compared to nonparticipant peers (Darling, Caldwell, & Smith, 2005). Importantly, these effects remained even after controlling for potential selection effects. In a longitudinal study of the effects of extracurricular activities over time, participation in such activities was associated with both current academic adjustment and future educational status post-high school, including college attendance and college graduation (Eccles et al., 2003; Fredricks & Eccles, 2006). Although most studies consider extracurricular participation at one point in time, Mahoney, Cairns, and Farmer (2003) provided evidence that consistent participation throughout adolescence predicts educational aspirations and attainment longitudinally.

Finally, extracurricular activities have been associated with behavioral functioning as well. Mahoney (2000) conducted a longitudinal study of the links between patterns of antisocial behavior and extracurricular activities. Mahoney found that those who participated in extracurricular activities were less likely to drop out of high school and be arrested in young adulthood. This effect was strongest for youth who were at-risk for behavioral problems based on their patterns of behavior before engaging in extracurricular activities. In addition, extracurricular activities seemed to benefit both males and females in similar ways (Mahoney, 2000). Despite these behavioral benefits, the findings regarding substance use have been less clear. Darling, Caldwell, and Smith (2005) reported that adolescents in extracurricular activities demonstrated lower levels of marijuana use, yet larger increases in alcohol use over time, as compared to their nonparticipant peers. It appears that gender further complicates this relationship; Fredricks and Eccles (2006) found that activity participation was associated with lower levels of alcohol and marijuana use for boys only. The type of activity is also critical when studying the relationship between activity participation and substance use (e.g. Barber, Eccles, & Stone, 2001); because of differences according to the particular activity considered, the importance of teasing apart the effects of different activities is discussed throughout the current paper.

The Value of Considering Specific Types of Extracurricular Activities

Different types of extracurricular activities are related to often very different experiences and outcomes. For example, Larson, Hansen, and Moneta (2006) found that those in faith-based groups had the most positive experiences in terms of resources and personal growth; those in sports had the highest levels of both initiative and stress, which

might indicate a potential risk associated with sports participation. Eccles and her colleagues have also found significant differences in outcomes by activity (Barber, Eccles, & Stone, 2001; Eccles et al., 2003). In their research, students in prosocial activities demonstrated psychological and behavioral benefits, but not academic benefits. Adolescents in performing arts demonstrated academic benefits, but psychological and behavioral vulnerabilities. Finally, those in sports demonstrated academic benefits but behavioral vulnerabilities, especially in terms of alcohol use.

Although the majority of research on the effects of extracurricular activities has been variable-centered, pattern-centered approaches have added considerable information when understanding how extracurriculars are related to important developmental outcomes. Feldman and Matjasko (2007) found six distinct patterns of adolescent activity participation: Sports only, Academics only, School only, Performance only, Multiple activities, and Non-participation. Their findings indicated that most adolescents participate in multiple activities; therefore, research focusing on one activity at a time in the absence of the entire activity profile of the adolescent is likely to provide incomplete information. Adolescents in multiple activities and academic activities had the highest levels of academic performance. Furthermore, membership in each of the patterns was associated with both gender and grade-level; therefore, gender and grade-level differences in both mean levels of participation and effects of participation need to be considered in future research on extracurriculars.

In another pattern-centered approach to studying the effects of extracurricular activities, Linver, Roth, and Brooks-Gunn (2009) reported five clusters that emerged within a nationally-representative sample of adolescents: Sports-focused, Sports plus

other activities, Primarily school-based activities, Primarily religious youth groups, and Low activity involvement. In general, across a variety of outcomes, their results suggested that adolescents who participated in one activity showed more adaptive functioning than those who in the low activity cluster. Additionally, adolescents who participated in sports plus other activities reported the highest levels of functioning across various domains. Therefore, the effect of one activity is potentially influenced by simultaneous participation in other activities, thus making it important to study profiles of participation rather than participation in individual activities in isolation from one another.

The Sports Story: Linking Athletic Participation to Adolescent Outcomes

The present study focused on the relationship of structured participation in athletics with substance use and educational outcomes. Sports participation was chosen as the focal activity for two main reasons. First, as compared to other extracurriculars, on average adolescents spend the most leisure time in athletic activities (e.g. Larson & Seepersad, 2003; Linver, Roth, & Brooks-Gunn, 2009). Second, the outcomes of sports participation, especially in terms of substance use, have been the least consistent across and within extracurriculars (e.g. Eccles & Barber, 1999; Fredricks & Eccles, 2006).

Theoretically, two competing perspectives provide alternative points of view concerning the expected influences of athletic participation on educational and behavioral outcomes. According to the Zero-Sum Model of sports participation, adolescents have a limited amount of time they can devote to academic, social, and other leisure activities (e.g. Coleman, 1961). Therefore, time spent in athletics would necessarily detract from time spent in academics, potentially leading to declines in academic pursuits.

Participation in athletics may also shift attention to social and peer-oriented activities in general, which would influence behavioral outcomes such as substance use. A modification to the Zero-Sum Model, known as the Threshold Model (Marsh, 1991), states that participation in athletics up to a certain degree can be beneficial, but that extreme levels of participation are likely to detract from other areas and lead to less adaptive outcomes. In general, a Zero-Sum model suggests that sports participation will be linked to a higher likelihood of academic and other difficulties, therefore participation in sports would fit the definition of a risk factor during adolescence (e.g. Werner, 1994).

The Developmental Perspective, on the other hand, claims that participation in sports promotes adaptive growth and development for adolescents and should not be viewed as in competition with other domains of functioning (Holland & Andre, 1987). Marsh (1993) proposed that athletic participation could be developmentally beneficial in many domains, including academics, by providing adolescents with a means through which they could bond with their schools, become engaged in prosocial activity, and practice commitment to a particular activity. Barber, Eccles, and Stone (2001) reported that those who identified as "jocks" associated with peers who valued education, which also suggests that sports participation may be associated with norms that support adaptive functioning in domains other than athletics. According to the Developmental Perspective, sports participation serves the role of a promotive factor, or a variable that predicts better outcomes for all adolescents, regardless of risk level (e.g. Gutman, Sameroff, & Cole, 2003). Therefore, sports participation could be a source of educational resilience and adaptive developmental outcomes even for those at-risk, according to this perspective.

When considering the academic outcomes associated with sports participation, the results generally support the developmental perspective and suggest that sports participation is not a risk factor but rather is *promotive* of adaptive educational outcomes. In a nationally-representative sample of adolescents, Marsh and Kleitman (2003) found that participation in sports was positively related to academic performance, time spent on homework, educational aspirations, college enrollment, educational attainment, and other important academic outcomes. Additionally, the effects of amount of participation on academic outcomes were linear, suggesting that there is not a threshold effect of participation. Eccles and her colleagues provided evidence that sports participation is related to positive educational and occupational attainment longitudinally, even into adulthood (Barber, Eccles, & Stone, 2001; Fredricks & Eccles, 2006). However, some studies have found that although sports participation is related to better educational outcomes than no participation in extracurriculars, participation in non-sports extracurricular activities is related to the most adaptive educational outcomes (e.g. Darling, Caldwell, & Smith, 2005).

Athletic Participation and Substance Use

As previously stated, the relationship between sports participation and substance use has been inconsistent across studies (e.g. Eccles & Barber, 1999; Fredricks & Eccles, 2006). As reviewed below, some studies identify sports participation as risk factor for substance use, whereas others suggest sports participation promotes less substance use among adolescents. When considering this relationship, researchers have identified several factors that might account for these inconsistencies. First, the relationship between sports participation and substance use varies according to the substance

considered. Second, the particular sport in question often makes a difference when attempting to predict substance use. And finally, potential moderators such as gender and grade-level should be considered as levels and types of sports participation vary according to these variables.

Sports participation has been associated with the use of different substances in distinct ways. In general, a promotive effect has been found such that those involved in sports are less likely to smoke cigarettes than those who are not involved in sports (e.g. Castrucci et al., 2004; Naylor, Gardner, & Zaichkowsky, 2001; Tomori et al., 2001). In a nationally-representative sample of adolescents, the relationship between sports participation and lower rates of cigarette use remained even after controlling for background characteristics (Sabo et al., 2002). In one longitudinal study of sports participation and smoking, the results indicated that changes in sports participation over time actually predicted changes in cigarette smoking, such that those whose participation decreased demonstrated an increase in smoking behavior (Rodriguez & Audrain-McGovern, 2004). This relationship may be moderated by gender, as some research has suggested that athletic participation is particularly protective against smoking for females (Aaron et al., 1995).

Although athletic participation is associated with lower levels of smoking tobacco in general, the results have been different when smokeless tobacco use has been studied. On average, participation in organized athletics is associated with higher levels of smokeless tobacco use, which implicates sports participation as a risk factor for this type of tobacco use (e.g. Castrucci et al., 2004; Sabo et al., 2002). However, this effect has not been found in all studies, suggesting an inconsistency in the relationship (Naylor,

Gardner, & Zaichkowsky, 2001). Some research has suggested that the correlation between sports participation and smokeless tobacco use is strongest among males and those who participate in particular sports, including baseball and softball (Cohen-Smith & Severson, 1999).

The relationship between sports participation and alcohol use has varied across studies. In many studies, athletic participation has been a risk factor associated with higher levels of drinking (e.g. Barber, Eccles, & Stone, 2001). This finding has been seen even after demographic characteristics are controlled (e.g. Darling, Caldwell, & Smith, 2005). However, the link between sports and alcohol is inconsistent at best. Many studies have found no significant association between sports participation and alcohol use among adolescents (e.g. Naylor, Gardner, & Zaichkowsky, 2001; Sabo et al., 2002). In one pattern-centered approach to understanding the complexities of this relationship, Peck, Vida, and Eccles (2008) found that sports and drinking were linked when other behaviors, such as aggression and illicit drug use, were also present. Some researchers have suggested a U-shaped function, such that the heaviest levels of drinking are seen among those who do not participate in sports and those who participate excessively, supporting a threshold hypothesis (Peretti-Watel, Beck, & Legleye, 2002). Others have claimed that gender is an important moderator of this relationship; however, even these results have conflicted with one another, with some studies linking sports and drinking among males only (Aaron et al., 1995; Eitle, Turner, & Eitle, 2003; Jerry-Szpak & Brown, 1994; Mays & Thompson, 2009) and other studies suggesting that sports may be protective against drinking for males only (Fredricks & Eccles, 2006). Finally, some researchers have pointed to gender by sport interactions, such that the sports associated

with higher levels of drinking among males differ from the sports associated with higher levels of drinking among females (Ford, 2007; Jerry-Szpak & Brown, 1994; Moore & Werch, 2005). These inconsistencies call for additional research to consider patterns of participation, participation in particular sports, and gender simultaneously.

The results concerning marijuana use have generally been consistent. On average, athletes report lower levels of marijuana use than nonathletes, again suggesting a promotive effect of sports against smoking (e.g. Barber, Eccles, & Stone, 2001). However, some studies have not found differences in marijuana use by athletic participation (Naylor, Gardner, & Zaichkowsky, 2001). Much like the findings for alcohol use, the specific sport considered may be important, with informal athletic activities such as skateboarding and surfing predicting higher levels of marijuana use (Moore & Werch, 2005; Peretti-Watel & Lorente, 2004). Also, gender may play a role, as some evidence suggests that males in football, swimming, and hockey are at-risk for marijuana use, whereas among females those who play soccer are the most at-risk (Ford, 2007; Moore & Werch, 2005).

Finally, research has provided evidence that athletes who train frequently and adopt stereotypical body image beliefs are at-risk for anabolic steroid use (e.g. Goldfield, 2009). Some researchers suggest that anabolic steroid use is linked to the use of other illicit drugs (Bahrke et al., 2000; Durant et al., 1993), whereas others claim that those who use anabolic steroids show a unique use of only those substances that would improve physical performance (Komoroski & Rickert, 1992). However, not all studies have found a significant relationship between sports and anabolic steroid use (Naylor, Gardner, &

Zaichowsky, 2001); therefore, additional research is necessary to understand the moderators and processes behind this association.

The Importance of Gender and Grade-Level When Studying Athletic Participation

As reviewed above, many of the relationships between substance use and sports participation have been moderated by gender. In addition, mean levels of participation in sports differ by gender also, with males participating to a greater extent, and with males and females participating in specific sports to different degrees (e.g. Kirshnit, Ham, & Richards, 1989). Therefore, research concerning the links between athletic participation and particular outcomes could be strengthened by considering gender as a potential differentiating factor.

In addition, rates of participation in sports decline over time, perhaps most markedly after school transitions (e.g. Kirshnit, Ham, & Richards, 1989; Rodriguez & Audrain-McGovern, 2004). This decline has been attributed to several factors, including less enjoyment over time and less competence concerning one's performance, which may be in part due to increases in competitiveness as school grade-levels increase. Therefore, as fewer adolescents participate in organized sports in the higher grade-levels, both patterns of sports participation and the relationships of these patterns to important developmental outcomes are likely to differ according to the grade-level studied.

The Present Study

The present study contributes to the literature concerning sports participation and important developmental outcomes during adolescence in several ways. First, the present study uses a pattern-centered approach to classifying adolescents according to sports participation, which acknowledges that many adolescents participate in constellations of

sports rather than one sport in isolation. Second, the present study considers both educational and substance use outcomes in order to provide a more complete picture of the outcomes associated with particular patterns of sports participation. Third, the present study uses a nationally-representative sample of adolescents, which increases the generalizability of the results. Fourth, the present study identifies patterns of participation separately by gender, as this has been found to be an important factor to consider when studying sports participation. Finally, the present study identifies patterns of participation separately for 8th and 10th grade samples, in order to determine whether different levels of participation over time also lead to different patterns of participation by grade level.

Although this study was largely exploratory in nature, several outcomes were expected. First, distinct patterns of sports participation (and non-participation) were anticipated to emerge. It was hypothesized that these patterns would differ by gender and grade-level. More specifically, it was expected that patterns of participation would be more differentiated in the 10th grade, as participation in multiple sports was expected to be lower in 10th as compared to 8th grade. These patterns of sports participation were anticipated to be associated with educational and substance use outcomes in distinct ways, contributing to researchers' understanding of the complex relationships between sports participation and developmental outcomes in adolescence. More specifically, it was hypothesized that clusters involved in athletics would show better educational outcomes, as suggested by previous research (e.g. Marsh & Kleitman, 2003). In terms of substance use, however, the relationships were expected to be more complex. It was hypothesized that clusters with a large proportion of runners would show low levels of

substance use due to the cardiovascular and weight demands of the sport, as demonstrated in past research (e.g. Ford, 2007). Clusters of baseball and softball players were anticipated to be higher in smokeless tobacco use (e.g. Cohen-Smith & Severson, 1999). Finally, clusters with a large proportion of those involved in contact sports, such as basketball, football, and ice hockey, were expected to have higher levels of substance use (e.g. Ford, 2007; Moore & Werch, 2005).

Method

Procedure

The present study draws upon a nationally-representative sample of adolescents from the Monitoring the Future Study (Bachman et al., 2008; Johnston et al., 2008). The larger study has sampled nationally-representative samples of 12th grade students each year, beginning in 1975. In 1991, the study began sampling students in the 8th and 10th grades as well. Each year approximately 18,000 8th grade students in about 150 schools and approximately 17,000 10th grade students in about 140 schools are sampled. Both public and private schools are included in the samples. All adolescents completed self-report questionnaires in their classrooms. These questionnaires are delivered in multiple forms and focus on a variety of variables, including substance use, educational attitudes, psychological adaptation, internalizing and externalizing behavior, and leisure activities. Complete descriptions of the Monitoring the Future study design and procedure are available in other publications (Bachman et al., 2008; Johnston et al., 2008).

Cross-sectional data from two sequential cohorts of 8th and 10th grade adolescents (2006-2007) from the Monitoring the Future study were used for the present analyses. The current sample is limited to the 2006-2007 cohorts because data on individual sports

were added in 2006. In addition, variables of interest were included on only one of the four questionnaire forms distributed randomly in each classroom in each school during the focal study years.

Measures

Means and standard deviations of all study variables are presented by gender and grade-level in Table 2.1. The complete items used in the present study can be found in the Appendix.

Sports Participation. Sports participation was measured with 16 dichotomous items (0 = no, 1 = yes) that indicated whether or not students had participated in specific organized competitive sports (either in-school or out-of-school) over the preceding 12 month period. The specific sports considered were: baseball/softball, basketball, cross country, field hockey, football, gymnastics, ice hockey, lacrosse, swimming, soccer, tennis, track, volleyball, weightlifting, wrestling, and other. In addition, a sum of these 16 variables was included to indicated the total number of organized sports in which an adolescent participated over the preceding 12 month period.

Cigarette Use. Cigarette use was measured with one item that indicated the frequency of smoking cigarettes in the past 30 days on a scale from 1 (not at all) to 7 (two packs or more per day).

Smokeless Tobacco Use. Smokeless tobacco use was measured with one item that indicated the frequency of using smokeless tobacco in the past 30 days on a scale from 1 (Not at all) to 6 (More than once a day).

Alcohol Use. Alcohol use was measured with one item that indicated the frequency of drinking alcohol in the past 30 days on a scale from 1 (0 occasions) to 7 (40+ occasions).

Marijuana Use. Marijuana use was measured with one item that indicated the frequency of using marijuana or hashish in the past 30 days on a scale from 1 (0 occasions) to 7 (40+ occasions).

Steroid Use. Steroid use was measured with one item that indicated the frequency of using steroids in the past 30 days on a scale from 1 (0 occasions) to 7 (40+ occasions).

Academic Behaviors and Outcomes. Students' average grades were measured with one item, scaled from (1) D – 69 or below to (9) A – 93-100. Skipping school was measured with one item that indicated the frequency of days the student missed school in the past four weeks because of cutting/skipping on a scale from (1) None to (7) 11 or more days. Skipping class was measured with one item that indicated the frequency of times the students missed a class in the past four weeks because of cutting/skipping on a scale from (1) Not at All to (6) More Than 20 Times. Students also indicated whether they had been suspended and/or expelled on a scale from (1) No to (3) Yes, Two or More Times. These variables have been used as indicators of academic achievement and school misbehavior in other studies (e.g. Bryant et al., 2003).

Demographics. Students self-reported their gender, race/ethnicity, and education levels of their parents. Race/ethnicity was classified as: White, African American, Hispanic, Asian, or Other (which included students who indicated multiple races/ethnicities). Parental education was measured by the average of two questions, which asked students to indicate the highest levels of school completed by their mother

and their father. Parental education was scaled from (1) Completed Grade School or Less to (6) Graduate or Professional School After College.

Sample

Overall, 123 males in the 8th grade, 112 females in the 8th grade, 556 males in the 10th grade, and 467 females in the 10th grade were excluded from the study based on missing data, although they were given the appropriate form of the survey during the focal years. Eighth grade males who were excluded due to missing data had higher levels of 30-day smoking, smokeless tobacco, and marijuana use, lower grades in school, and were more likely to have been suspended as compared to 8th grade males included in the present study. Eighth grade females with insufficient data reported higher levels of 30-day smoking, lower school grades, and were less likely to be White as compared to the 8th grade females in the present study.

Tenth grade males who were excluded due to missing data had higher levels of 30-day smoking, were more likely to have been suspended from school, were less likely to be White, were more likely to be African American or Hispanic, and reported lower levels of parental education as compared to 10th grade males in the present study. Tenth grade females who were missing sufficient data reported higher levels of 30-day smoking and drinking, lower levels of 30-day smokeless tobacco use and grades in school, were less likely to be White, were more likely to be African American or Hispanic, and reported lower levels of parental education as compared to 10th grade females in the present study.

After excluding cases based on missing data, the present study included 5230 male adolescents in grade 8, 5414 female adolescents in grade 8, 4764 male adolescents

in grade 10, and 5038 female adolescents in grade 10. Among 8th grade males, 58% were Caucasian, 12% were African American, 17% were Hispanic, 4% were Asian, and 9% were of other or mixed racial or ethnic backgrounds. Among 8th grade females, 58% were Caucasian, 12% were African American, 18% were Hispanic, 3% were Asian, and 9% were of other or mixed racial or ethnic backgrounds. Among 10th grade males, 69% were Caucasian, 10% were African American, 10% were Hispanic, 3% were Asian, and 8% were of other or mixed racial or ethnic backgrounds. Finally, among 10th grade females, 66% were Caucasian, 11% were African American, 12% were Hispanic, 3% were Asian, and 8% were of other or mixed racial or ethnic backgrounds.

Results

Preliminary Analyses

Correlations of study variables are presented in Table 2.2 (grade 8) and Table 2.3 (grade 10).

Cluster Formation

Hierarchical cluster analysis was conducted to identify clusters of adolescents according to their patterns of sports participation. Therefore, responses for each adolescent regarding the 16 individual sports and the total number of sports played were entered into the analysis and formed the basis for the clusters. The Ward's linkage method was used; the measure of proximity used was squared Euclidian distance. Data were standardized prior to cluster analysis to account for the different response scales used across items (Everitt, Landau, & Leese, 2001).

In order to verify that the clusters formed could be duplicated, each of the four subsamples (8th grade males, 8th grade females, 10th grade males, and 10th grade females)

was split into three random subsets of equal number. The same hierarchical cluster analysis procedure was conducted on each third, and the cluster solution was compared across the three subsamples to verify consistency (e.g. Crockett et al., 2006). An examination of the incremental changes in variance explained, pseudo-F and t^2 statistics provided by SAS 9.1.3, theoretical meaningfulness, and duplication of the clusters across subsample were used as criteria for selecting the final cluster solution. In the final step, the hierarchical cluster analysis was conducted on each complete subsample of adolescents. Therefore, individual cluster solutions were derived for 8th grade males, 8th grade females, 10th grade males, and 10th grade females.

Males, 8th grade. The results from all three of the subsamples suggested 3 clusters as the best solution. This solution was examined for similarities across subsamples as well as theoretical interpretability. The 3-cluster solution was replicated across subsamples and theoretically meaningful. An examination of the clusters across the three subsamples and the full sample of 8th grade males suggested the same 3 clusters. Means and standard deviations of the clustering variables by cluster across the full sample are presented in Table 2.4.

Based on the characteristics of the clusters, they were named the following: Non-Participants, General Participants, and Jocks. A series of ANOVA tests was conducted to determine significant differences across clusters on the clustering variables (Table 2.4). For each significant ANOVA test, post-hoc least significant difference (LSD) comparisons were conducted for pairwise differences between clusters (see Table 2.4). Figure 2.1 illustrates differences in the proportion of the cluster membership the participated in each sport.

The Non-Participants cluster (n = 721; 13.79%) participated in no sports in the preceding 12 month period.

The General Participants cluster (n = 2972; 56.83%) participated a moderate amount in baseball, basketball, football, soccer, track, weightlifting, wrestling, and other sports. On average, they participated in a total of 2 sports each.

The Jocks cluster (n = 1537; 29.38%) exhibited the highest levels of participation in all 16 sports measured. They also participated in the highest number of sports, between 4 and 5 on average.

Females, 8th grade. Similar to 8th grade males, the results from all three of the subsamples of 8th grade females suggested 3 clusters as the best solution. This solution was examined for similarities across subsamples as well as theoretical interpretability. The 3-cluster solution was replicated across subsamples and theoretically meaningful. An examination of the clusters across the three subsamples and the full sample of 8th grade females suggested the same 3 clusters. Means and standard deviations of the clustering variables by cluster across the full sample are presented in Table 2.4.

Based on the characteristics of the clusters, they were given the same names as the clusters of males in the 8th grade: Non-Participants, General Participants, and Jocks. A series of ANOVA tests was conducted to determine significant differences across clusters on the clustering variables (Table 2.4). For each significant ANOVA test, post-hoc least significant difference (LSD) comparisons were conducted for pairwise differences between clusters (see Table 2.4). Figure 2.2 illustrates differences in the proportion of the cluster membership the participated in each sport.

The Non-Participants cluster (n = 999; 18.45%) participated in no sports in the preceding 12 month period.

The General Participants cluster (n = 3178; 58.70%) was similar in level of participation to the cluster of 8th grade males with the same name, but the type of participation differed. These 8th grade females participated a moderate amount in baseball, basketball, gymnastics, swimming, soccer, tennis, track, volleyball, and other sports. On average, they participated in 2 sports each.

The Jocks cluster (n = 1237; 22.85%) exhibited the highest levels of participation in all 16 sports measured, similar to their male peers in the 8th grade. They also participated in the highest number of sports, between 4 and 5 on average.

Males, 10th grade. The results from all three of the subsamples suggested between 4 and 7 clusters as the best solution, suggesting further differentiation of clusters as compared to males in the 8th grade. These solutions were examined for similarities across subsamples as well as theoretical interpretability. The 5-cluster solution was replicated across subsamples and theoretically meaningful. An examination of the clusters across the three subsamples and the full sample of 10th grade males suggested the same 5 clusters. Means and standard deviations of the clustering variables by cluster across the full sample are presented in Table 2.5.

Based on the characteristics of the clusters, they were named the following: Non-Participants, General Participants, Runners, Jocks, and Gymnasts. Therefore, only 2 clusters (Runners and Gymnasts) emerged as different from those seen among 8th grade males. A series of ANOVA tests was conducted to determine significant differences across clusters on the clustering variables (Table 2.5). For each significant ANOVA test,

post-hoc least significant difference (LSD) comparisons were conducted for pairwise differences between clusters (see Table 2.5). Figure 2.3 illustrates differences in the proportion of the cluster membership the participated in each sport.

The Non-Participants cluster (n = 782; 16.41%) participated in no sports in the preceding 12 month period.

The General Participants cluster (n = 3463; 72.69%) resembled the general participant males in 8th grade; they participated a moderate amount in baseball, basketball, football, soccer, weightlifting, and other sports. They also participated to a smaller extent in ice hockey, lacrosse, swimming, tennis, track, and wrestling. On average, they participated in 2 sports each.

The Runners cluster (n = 195; 4.09%) was composed entirely of adolescents who participated in cross-country running. Most members of this cluster also participated in track. No members of this cluster were in gymnastics or field hockey during the preceding 12 months, but some did participate in each of the other sports measured. On average, these adolescents participated in 3 or 4 sports each.

The Jocks cluster (n = 289; 6.07%) exhibited high levels of participation in baseball, basketball, football, swimming, soccer, tennis, volleyball, weightlifting, and other sports. Some jocks also participated in each of the other sports measured to a less extent, with the exception of gymnastics. On average, they participated in 5 sports each.

The Gymnasts cluster (n = 35; 0.73%) was composed entirely of adolescents who participated in gymnastics. This cluster also had the highest representation of participants in baseball, field hockey, football, ice hockey, swimming, soccer, tennis,

weightlifting, and wrestling. Overall, all of the sports were represented in this cluster; on average, gymnasts played 6 sports each, the most of any cluster.

Females, 10th grade. Similar to the males in the 10th grade, the results from all three of the subsamples of 10th grade females suggested between 4 and 7 clusters as the best solution. These solutions were examined for similarities across subsamples as well as theoretical interpretability. As with 10th grade males, the 5-cluster solution was replicated across subsamples and theoretically meaningful. An examination of the clusters across the three subsamples and the full sample of 10th grade females suggested the same 5 clusters. Means and standard deviations of the clustering variables by cluster across the full sample are presented in Table 2.5.

Although the number of clusters was the same when compared to 10th grade males, the types of clusters by gender in the 10th grade differed. Based on the characteristics of the clusters of 10th grade females, they were named the following: Non-Participants, General Participants, Lacrosse/Field Hockey, Football/Basketball, and Ice Hockey. A series of ANOVA tests was conducted to determine significant differences across clusters on the clustering variables (Table 2.5). For each significant ANOVA test, post-hoc least significant difference (LSD) comparisons were conducted for pairwise differences between clusters (see Table 2.5). Figure 2.4 illustrates differences in the proportion of the cluster membership the participated in each sport.

The Non-Participants cluster (n = 1351; 26.82%) participated in no sports in the preceding 12 month period.

The General Participants cluster (n = 3178; 63.08%) resembled the cluster of the same name among 8th grade females; these adolescents participated a moderate amount in

baseball, basketball, cross-country, gymnastics, swimming, soccer, tennis, track, volleyball, weightlifting, and other sports. On average, they participated in 1 or 2 sports each.

The Lacrosse/Field Hockey cluster (n = 223; 4.43%) exhibited high levels of participation in lacrosse, field hockey, and soccer. No members of this cluster were in wrestling or ice hockey during the preceding 12 months, but some did participate in each of the other sports measured. On average, they participated in 2 or 3 sports each.

The Football/Basketball cluster (n = 239; 4.74%) exhibited high levels of participation in basketball, baseball, football, soccer, volleyball, and wrestling. No members of this cluster were in ice hockey during the preceding 12 months, but some did participate in each of the other sports measured. On average, they participated in 3 or 4 sports each.

The Ice Hockey cluster (n = 47; 0.93%) was composed entirely of adolescents who participated in ice hockey. This cluster also had the highest representation of participants in gymnastics, tennis, weightlifting, and other sports. Overall, all of the sports were represented in this cluster; on average, members of this cluster played 4 or 5 sports each, the most of any cluster.

Demographic Characteristics by Cluster

The demographic characteristics of each cluster are presented in Table 2.6 (Grade 8) and Table 2.7 (Grade 10). A series of chi-square tests was conducted to determine differences in demographic characteristics across the clusters. Post-hoc least significant difference (LSD) comparisons were conducted to determine pairwise differences in demographics between clusters.

Males, 8th Grade. Cluster membership was significantly associated with parental education, χ^2 (20) = 207.92, $p < .001$. Those in the Jocks cluster had the highest levels of parental education. Adolescents in the Non-Participants cluster reported the lowest levels of parental education. Cluster membership was also significantly associated with being White, χ^2 (2) = 35.05, $p < .001$, African American, χ^2 (2) = 73.70, $p < .001$, Hispanic, χ^2 (2) = 11.32, $p < .01$, and Asian, χ^2 (2) = 14.81, $p < .001$. Adolescents in the General Participants cluster were least likely to be White or Asian, yet most likely to be African American or Hispanic. Cluster membership was not associated with being another race/ethnicity: χ^2 (2) = 3.76, $p = .15$.

Females, 8th Grade. Cluster membership was significantly associated with parental education, χ^2 (20) = 182.95, $p < .001$. Similar to the males in 8th grade, those in the Jocks cluster had the highest levels of parental education, whereas adolescents in the Non-Participants cluster reported the lowest levels of parental education. Cluster membership was also significantly associated with being White, χ^2 (2) = 87.09, $p < .001$, African American, χ^2 (2) = 27.23, $p < .001$, Hispanic, χ^2 (2) = 109.81, $p < .001$, Asian, χ^2 (2) = 6.30, $p < .05$, and other races, χ^2 (2) = 10.53, $p < .01$. Adolescents in the Non-Participants cluster were least likely to be White, whereas Jocks were most likely to be White. The opposite pattern was seen among African American and Hispanic students, which were overrepresented among Non-Participants and underrepresented among Jocks. Asian adolescents and those of other races were more likely to be Jocks than General participants.

Males, 10th Grade. Cluster membership was significantly associated with parental education, χ^2 (40) = 104.41, $p < .001$. Those in the Runners, Jocks, and Gymnasts

clusters had the highest levels of parental education. Once again, adolescents in the Non-Participants cluster reported the lowest levels of parental education. Cluster membership was also significantly associated with being African American, χ^2 (4) = 14.80, $p < .01$, Asian, χ^2 (4) = 16.53, $p < .01$, and other races, χ^2 (4) = 10.23, $p < .05$. Adolescents in the General Participants cluster were least likely to be Asian, yet most likely to be African American. Those of other races were overrepresented in the Jocks and Gymnasts clusters, and underrepresented in the Non-Participants and Runners clusters. Cluster membership was not associated with being White, χ^2 (4) = 3.84, $p = .43$, or Hispanic, χ^2 (4) = 6.18, $p = .19$.

Females, 10th Grade. Cluster membership was significantly associated with parental education, χ^2 (40) = 212.96, $p < .001$. Among 10th grade females, those in the Field Hockey/Lacrosse and Ice Hockey clusters had the highest levels of parental education, whereas adolescents in the Non-Participants and Football/Basketball clusters reported the lowest levels of parental education. Cluster membership was also significantly associated with being White, χ^2 (4) = 71.13, $p < .001$, African American, χ^2 (4) = 35.10, $p < .001$, Hispanic, χ^2 (4) = 49.46, $p < .001$, and other races, χ^2 (4) = 15.17, $p < .01$. Adolescents in the Non-Participants and Football/Basketball clusters were least likely to be White, whereas Lacrosse/Field Hockey players were most likely to be White. Students of other races were also less likely to be Non-Participants. The opposite pattern was seen among African American and Hispanic students, which were overrepresented among Non-Participants and Football/Basketball players and underrepresented among Lacrosse/Field Hockey Players. Cluster membership was not associated with being Asian, χ^2 (4) = 8.88, $p = .06$.

Substance Use Outcomes by Cluster

Tables 2.8 (Grade 8) and 2.9 (Grade 10) present the means and standard deviations of the substance use outcome variables by cluster. A series of ANOVA tests was conducted to determine significant differences across clusters on the academic outcomes. For each significant ANOVA test, post-hoc least significant difference (LSD) comparisons were conducted for pairwise differences between clusters (see Tables 2.8 and 2.9).

Males, 8th Grade. Cluster membership significantly predicted cigarette use, F (2, 5109) = 22.73, $p < .001$. Non-Participants had the highest levels of use, whereas the Jocks reported the lowest levels of use. Jocks also reported the lowest smokeless tobacco use, F (2, 4860) = 4.04, $p < .05$. Cluster membership also significantly predicted marijuana use, F (2, 5104) = 7.82, $p < .001$; again, the Jocks reported the lowest levels of use and Non-Participants reported the highest levels. Cluster membership did not significantly predict alcohol use, F (2, 4874) = 0.03, $p = .97$ or steroid use, F (2, 5160) = 1.67, $p = .19$.

Females, 8th Grade. Cluster membership significantly predicted cigarette use, F (2, 5319) = 11.95, $p < .001$, and similar to 8th grade males, the Non-Participants reported the highest levels of use. Unlike 8th grade males, the clusters of 8th grade females differed significantly in alcohol use. General Participants reported the lowest alcohol use, F (2, 5124) = 10.59, $p < .001$. Cluster membership also significantly predicted marijuana use, F (2, 5327) = 3.36, $p < .05$; the General Participants reported the lowest levels of use and Non-Participants reported the highest levels. Cluster membership did not significantly

predict smokeless tobacco use, F (2, 5128) = 1.48, p = .23 or steroid use, F (2, 5364) = 2.55, p = .08.

Males, 10th Grade. Cluster membership significantly predicted cigarette use, F (4, 4702) = 14.01, p < .001. As with the 8th grade samples, Non-Participants had the highest levels of use, whereas the Runners reported the lowest levels of use. Cluster membership also significantly predicted marijuana use, F (4, 4659) = 2.40, p < .05; again, the Runners reported the lowest levels of use. Cluster membership did not significantly predict smokeless tobacco use, F (4, 4698) = 2.08, p = .08, alcohol use, F (4, 4582) = 0.84, p = . 50 or steroid use, F (4, 4734) = 0.59, p = .67.

Females, 10th Grade. Cluster membership significantly predicted cigarette use, F (4, 4975) = 22.40, p < .001; General Participants and Lacrosse/Field Hockey players reported the lowest levels of use. Cluster membership also significantly predicted smokeless tobacco use, with Football/Basketball players reporting the highest levels, F (4, 5004) = 2.81, p < .05. Alcohol use also varied by cluster, with Ice Hockey and Football/Basketball players drinking the most over the preceding 30 days, F (4, 4864) = 8.60, p < .001. Marijuana use varied by cluster, F (4, 4970) = 16.74, p < .001; General Participants and Lacrosse/Field Hockey players reported the lowest levels of use, whereas Ice Hockey players reported the highest. Cluster membership did not significantly predict steroid use, F (4, 5019) = 1.33, p = .26.

Academic Outcomes by Cluster

Tables 2.8 (Grade 8) and 2.9 (Grade 10) present the means and standard deviations of the academic outcome variables by cluster. A series of ANOVA tests was conducted to determine significant differences across clusters on the academic outcomes.

For each significant ANOVA test, post-hoc least significant difference (LSD) comparisons were conducted for pairwise differences between clusters (see Tables 8 and 9).

Males, 8th Grade. Cluster membership significantly predicted grades, F (2, 5132) = 76.85, $p < .001$. Non-Participants had the lowest grades, whereas the Jocks reported the highest average grades. Cluster membership did not significantly predict either cutting school, F (2, 4864) = 2.61, $p = .07$ or skipping individual classes, F (2, 5088) = 0.86, $p = .42$. Finally, cluster membership significantly predicted instances of suspension and expulsion, F (2, 5092) = 16.07, $p < .001$; the Jocks were the least likely to have been suspended and expelled across the clusters.

Females, 8th Grade. Cluster membership significantly predicted grades, F (2, 5294) = 70.46, $p < .001$. Similar to the findings among 8th grade males, Non-Participants had the lowest grades, whereas the Jocks reported the highest average grades. Cluster membership also significantly predicted cutting school among 8th grade females, F (2, 5115) = 5.75, $p < .01$; Non-Participants were the most likely to have cut school. Membership did not, however, predict skipping individual classes, F (2, 5293) = 2.48, $p = .08$. Finally, cluster membership significantly predicted instances of suspension and expulsion, F (2, 5291) = 16.38, $p < .001$; the Jocks were the least likely to have been suspended and expelled across the clusters, whereas Non-Participants were the most likely.

Males, 10th Grade. Cluster membership significantly predicted grades, F (4, 4722) = 32.28, $p < .001$. Once again, Non-Participants had the lowest grades, whereas the Runners and the Gymnasts reported the highest average grades. Cluster membership

did not significantly predict either cutting school, F (4, 4579) = 1.16, p = .33 or skipping individual classes, F (4, 4740) = 0.90, p = .46. Finally, cluster membership significantly predicted instances of suspension and expulsion, F (4, 4736) = 6.77, p < .001; similar to the results in the 8th grade samples, the Non-Participants were the most likely to have been suspended and expelled across the clusters.

Females, 10th Grade. Cluster membership significantly predicted grades, F (4, 5004) = 44.70, p < .001. Non-Participants and Football/Basketball players had the lowest grades, whereas Lacrosse/Field Hockey players reported the highest average grades. Cluster membership also significantly predicted cutting school, F (4, 4871) = 6.51, p < .001; Football/Basketball players were the most likely to have cut school, whereas General Participants and Lacrosse/Field Hockey players were the least likely. Membership did not, however, predict skipping individual classes, F (4, 5016) = 0.74, p = .57. Finally, cluster membership significantly predicted instances of suspension and expulsion, F (4, 5019) = 10.65, p < .001; the Football/Basketball players and Non-Participants were the most likely to have been suspended and expelled across the clusters.

Discussion

The present study sought to classify adolescents according to sports participation in the 8th and 10th grades. These patterns of sports participation were expected to predict substance use and academic outcomes in meaningful ways. In addition, males and females were clustered separately within grade levels, in order to account for gender differences in the extent and type of sports participation (e.g. Kirshnit, Ham, & Richards, 1989). It was hypothesized that in alignment with a developmental perspective, sports participation would serve as a promotive factor for adolescents. However, relationships

between sports participation and substance use were expected to vary by sport participation profile, grade, and gender; more specifically, it was expected that clusters centered around running activities would show the least substance use whereas those centered around contact sports such as football and ice hockey would show the highest levels of use.

In the 8th grade, males and females separated into three distinct clusters: Non-Participants, General Participants, and Jocks. Among 8th grade males, Jocks showed the least amount of substance use and Non-Participants reported the highest levels of substance use. Those who participated in more sports were the least likely to smoke cigarettes and marijuana, which supports previous research (e.g. Barber, Eccles, & Stone, 2001; Naylor, Gardner, & Zaichkowsky, 2001); they were also least likely to use smokeless tobacco. However, among 8th grade males no significant differences were found in alcohol or steroid use. Other researchers have also called into question the link between alcohol use and sports participation (e.g. Sabo et al., 2002). Jocks also had the highest grades and were the least likely to have been suspended or expelled, as was expected based on past research. These findings lend some credit to the Developmental Perspective, which claims that sports participation is developmentally beneficial and that the relationship between participation and critical developmental outcomes is linear such that sports participation is promotive of positive developmental outcomes (e.g. Marsh, 1993).

Among 8th grade females, all sports participants (both General Participants and Jocks) were less likely to smoke cigarettes than Non-Participants, which is again consistent with previous research (e.g. Naylor, Gardner, & Zaichkowsky, 2001). Overall,

General Participants appeared to have the most adaptive outcomes, as they also exhibited the lowest level of alcohol and marijuana use among 8th grade females. These findings provide support for the hypothesis that there is a threshold of participation in sports participation, above which the benefits of participation are no longer present (Peretti-Watel, Beck, & Legleye, 2002). However, in terms of academic outcomes, Jocks reported the highest grades and were the least likely to have been suspended or expelled; therefore, the Developmental Perspective on sports participation and educational benefits may also be plausible such that sports participation is generally promotive of educational adaptation.

In the 10th grade, males were members of 5 clusters: Non-Participants, General Participants, Runners, Jocks, and Gymnasts. General Participants had lower levels of participation as compared to the other participant clusters. In terms of substance use, Non-Participants had the highest levels of cigarette use. Runners reported the lowest levels of cigarette use and marijuana use, as was anticipated based on past research (Ford, 2007). However, there were no significant differences in smokeless tobacco use, alcohol use, or steroid use by cluster, which was not expected. The findings among academic outcomes were similar; Non-Participants reported the lowest grades and were the most likely to have been suspended or expelled. The Runners and Gymnasts, on the other hand, reported the highest average grades. These results imply that although participation is generally promotive and better than non-participation in general, 10th grade males benefit even more from participation in particular sports (i.e. running and gymnastics).

Females in the 10th grade also formed 5 clusters, although they were distinct from those of 10th grade males. These clusters included Non-Participants, General Participants,

Lacrosse/Field Hockey, Football/Basketball, and Ice Hockey. General Participants had lower levels of participation as compared to the other participant clusters. In terms of substance use, General Participants and Lacrosse/Field Hockey players had the lowest levels of cigarette use and marijuana. Football/Basketball players reported the highest use of smokeless tobacco use and drinking, along with Ice Hockey players, which supports the prediction that contact sports specifically may be a risk factor for substance use. However, there were no significant differences in steroid use by cluster. The findings among academic outcomes were similar; Non-Participants and Football/Basketball players reported the lowest grades and were the most likely to have been suspended or expelled. Lacrosse/Field Hockey players, on the other hand, reported the highest average grades. Lacrosse/Field Hockey participants, along with General Participants, were also the least likely to have cut school; Football/Basketball players were the most likely. These results imply that participation in typically male-gendered sports may be a risk factor for educational and substance use difficulties for females in particular. However, general lower-level participation and participation in particular sports (i.e. lacrosse/field hockey) appear to exert promotive effects.

Overall, these findings support the literature on sports participation. Interestingly, as participation in sports decreases over time (e.g. Rodriguez & Audrain-McGovern, 2004), clusters of participation become more differentiated and specialized. Although the patterns of participation were generally the same for males and females in the 8th grade, important differences were present when comparing the cluster solutions of 10th grade males and females. As found in past research, the present study provides evidence that the sports that are associated with lower levels of substance use are different for males

and females (e.g. Ford, 2007; Moore & Werch, 2005). The present study provides evidence that efforts to understand the processes behind the relationship between sports involvement and positive youth development need to take both gender and grade-level differences into account.

In general, the results of this study support the Developmental Perspective on sports participation; in most instances sports participation was related to lower levels of substance use and better academic outcomes, suggesting a promotive effect relating sports participation to positive developmental outcomes. Previous research has suggested that sports participation is a risk factor for educational and substance use difficulties (see Marsh, 1991); however, in general this study suggested that sports participation serves as a resource for adaptive development, not a risk. The present study focused on a diverse, nationally-representative sample of adolescents. Therefore, although protective effects among specific at-risk groups were not considered in the present study, it will be possible to explore sports participation as a protective resource for educational and behavioral resilience in future work. Chapter III of the current dissertation begins to explore the potential protective effects of sports participation, along with other extracurricular activities.

Among females in high school, however, the exception appears to be that those females who are typically involved in male-gendered sports are at-risk for higher levels of substance use and poorer educational outcomes. This pattern may be indicative of a constellation of other behaviors, such as aggression (e.g. Peck, Vida, & Eccles, 2008). Future research should further explore this small but meaningful group of females. In addition, females in 8th grade display a U-shaped relationship between sports participation

and substance use, such that the most adaptive pattern was seen among those participated in athletics, but at low to moderate levels. Therefore, the role of sports participation as a promotive factor may be at a lesser magnitude among females than males in general, and the type of sports participation may matter more for the positive development of females as compared to males.

Limitations and Future Directions

The present study was limited to study self-reports of their own sports participation, substance use, and academic outcomes. Future studies might benefit from the inclusion of reports from others such as coaches, parents, and teachers. In addition, measures of sports participation used a dichotomous response scale; therefore, the present study had a limited portrait of the extent to which adolescents invested themselves in each sport. Future research could add further information to the current knowledge base by asking students to rank or rate their relative participation in each sport. Another limitation is the inclusion of an "other sports" category in the present study. A fair number of students endorsed participation in other sports; however, it is difficult to draw conclusions concerning which sports those were and how they might differentially relate to the outcomes of interest. Future studies should also attempt to replicate these findings using other methodologies, including latent class analysis.

Finally, the cross-sectional design of this study is a limitation. Although the findings suggest developmental changes in patterns of sports participation and how those patterns might relate to critical developmental outcomes, any developmental conclusions are speculative at best. For example, although the clusters in 10th grade are more differentiated than those in the 8th grade, it is uncertain whether the "new" clusters in 10th

grade truly emerged from the broad Jock clusters in the 8th grade. Future research should study changes in sports participation over time and how those changes predict change in substance use and academic outcomes. This research would provide an understanding of cluster membership changes over time, as well as better knowledge regarding the differentiation of clusters in the higher grades.

Implications

Despite the limitations of the present study, there are important theoretical and practical implications. Theoretically, the results of the current study generally sport the notion that sports participation promotes growth and prosocial development within a nationally-representative sample of adolescents (Larson, 2000; Marsh, 1993). Although females in generally male-oriented contact sports such as football and ice hockey have higher levels of substance use than other groups, as Marsh and Kleitman (2003) so aptly put it, sports participation is related to "mostly gain with little pain" (p. 205). A substantial amount of the evidence provided in the current study suggests that sports participation is related to positive developmental outcomes, both in terms of education and lower levels of substance use. Therefore, the Zero-Sum model of sports participation during adolescence has not been supported by these findings.

Practically speaking, it is important to remember there are likely selection effects regarding the types of sports, if any, in which adolescents participate. That being said, participation in sports even broadly speaking appears to promote positive youth development. Therefore, those interested in schools generally speaking, prevention researchers, and those invested in the study of educational resilience should continue to explore the promotive and potentially protective effects of sports participation. For

prevention and resilience researchers, the present findings offer promising evidence that the context in which an adolescent participates can be critical to promoting adaptive development; future studies (including the following Chapter) will continue to apply this perspective across samples of at-risk adolescents.

Conclusion

The present study utilized nationally-representative samples of 8th and 10th grade adolescents in order to examine patterns of sports participation and their relative relationships to substance use and academic outcomes. Overall, sports participation predicted more adaptive outcomes both in terms of lower levels of substance use and better academic outcomes, providing evidence that in general sports participation has a promotive effect for the development of adolescents. However, there were important exceptions to this generality in which sports participation actually served as a risk factor for substance use and poorer educational outcomes; this finding supports evidence in past research asserting that gender and grade-level serve as moderators in the relationship between sports participation and critical developmental outcomes during adolescence. Future research should continue to explore these complex relationships; longitudinal research is particularly important in understanding the developmental processes behind these results.

Appendix

Sports Participation

In which competitive sports (if any) did you participate during the last 12 months? Include school, community, and other organized sports. (Mark all that apply)

None, Baseball/Softball, Basketball, Cross country, Field hockey, Football, Gymnastics, Ice hockey, Lacrosse, Swimming/Diving, Soccer, Tennis, Track & Field, Volleyball, Weight lifting, Wrestling, Other

Cigarette Use

How frequently have you smoked cigarettes during the past 30 days?

Smokeless Tobacco Use

How often have you taken smokeless tobacco during the past 30 days?

Alcohol Use

On how many occasions have you had alcoholic beverages to drink – more than just a few sips – during the last 30 days?

Marijuana Use

On how many occasions (if any) have you used marijuana (weed, pot) or hashish (hash, hash oil) during the last 30 days?

Steroid Use

On how many occasions (if any) have you taken steroids on your own – that is, without a doctor telling you to take them – during the last 30 days?

Academic Behaviors and Outcomes

Which of the following best describes your average grade in school this year?
During the last four weeks, how many whole days of school have you missed because you skipped or "cut"?
During the last four weeks, how often have you gone to school, but skipped a class when you weren't supposed to?
Have you ever been suspended or expelled from school?

Table 2.1. Descriptive Statistics for Clustering Variables, by Grade-Level and Gender

	8th Grade		10th Grade	
	Males n=5230	Females n=5414	Males n=4764	Females n=5038
Variable	*Mean(SD)*	*Mean(SD)*	*Mean(SD)*	*Mean(SD)*
Baseball	0.27(0.45)	0.22(0.41)	0.21(0.41)	0.14(0.35)
Basketball	0.48(0.50)	0.35(0.48)	0.34(0.47)	0.18(0.39)
Cross Country	0.05(0.21)	0.06(0.23)	0.04(0.21)	0.04(0.20)
Field Hockey	0.02(0.15)	0.04(0.20)	0.01(0.10)	0.03(0.16)
Football	0.48(0.50)	0.09(0.28)	0.36(0.48)	0.05(0.21)
Gymnastics	0.01(0.11)	0.10(0.30)	0.01(0.09)	0.06(0.24)
Ice Hockey	0.04(0.20)	0.01(0.09)	0.04(0.20)	0.01(0.10)
Lacrosse	0.05(0.22)	0.03(0.18)	0.05(0.21)	0.03(0.16)
Swimming	0.11(0.31)	0.16(0.36)	0.08(0.27)	0.09(0.29)
Soccer	0.23(0.42)	0.21(0.41)	0.16(0.37)	0.13(0.34)
Tennis	0.09(0.29)	0.10(0.31)	0.08(0.28)	0.08(0.27)
Track	0.19(0.40)	0.21(0.41)	0.15(0.36)	0.14(0.35)
Volleyball	0.09(0.28)	0.29(0.45)	0.06(0.24)	0.16(0.37)
Weightlifting	0.25(0.43)	0.07(0.26)	0.29(0.45)	0.09(0.29)
Wrestling	0.10(0.31)	0.02(0.12)	0.08(0.27)	0.01(0.11)
Other	0.22(0.41)	0.32(0.47)	0.23(0.42)	0.30(0.46)
Number of Sports	2.69(2.30)	2.28(2.10)	2.19(1.92)	1.55(1.55)

Table 2.2. Correlations of Study Variables, 8th Grade.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. 30-Day Cigarette	--	.28	.44	.58	.13	.00	-.0	-.0	-.0	.00	.	.03	.03	-.0
2. 30-Day Smokeless	.26	--	.17	.16	.10	.03	-.0	.00	-.0	-.0	.	-.0	.04	.01
3. 30-Day Alcohol	.44	.26	--	.47	.10	-.0	-.0	-.0	-.0	.04	.	.03	.04	.02
4. 30-Day Marijuana	.45	.12	.46	--	.14	.01	-.0	-.0	-.0	.01	.	-.0	.02	-.0
5. 30-Day Steroid	.06	.13	.08	.07	--	-.0	-.0	-.0	-.0	-.0	.	.01	.02	-.0
6. Baseball	-.0	.07	.00	-.0	.01	--	.23	.05	.12	.19	.	.06	.05	.13
7. Basketball	-.0	-.0	-.0	-.0	.02	.28	--	.10	.11	.26	.	.05	.06	.13
8. Cross Country	-.0	-.0	.02	.00	.07	.10	.08	--	.01	.03	.	.03	.04	.10
9. Field Hockey	-.0	.00	-.0	-.0	.01	.11	.11	.07	--	.16	.	.09	.19	.09
10.Football	-.0	.05	.06	.02	.03	.24	.34	.06	.09	--	.	.07	.11	.19
11.Gymnastics	.04	.02	.03	.05	.02	.09	.07	.10	.14	.07	--	.04	.02	.14
12.Ice Hockey	-.0	.01	.00	.02	-.0	.07	.02	.10	.18	.05	.	--	.12	.06
13.Lacrosse	-.0	.01	.01	.00	-.0	.09	.08	.11	.20	.08	.	.24	--	.09
14.Swimming	-.0	-.0	.04	-.0	.02	.17	.15	.12	.14	.16	.	.10	.10	--
15.Soccer	-.0	-.0	.01	-.0	.01	.12	.14	.09	.15	.06	.	.07	.11	.16
16.Tennis	-.0	-.0	-.0	-.0	.05	.16	.13	.12	.18	.08	.	.13	.13	.24
17.Track	-.0	-.0	.01	-.0	.05	.12	.19	.28	.07	.22	.	.07	.08	.11
18.Volleyball	-.0	-.0	.00	-.0	.01	.16	.22	.05	.24	.15	.	.05	.14	.20
19.Weightlifting	.01	.07	.08	.00	.04	.22	.23	.08	.12	.36	.	.09	.10	.20
20.Wrestling	.01	.07	.03	.02	.03	.07	.03	.06	.08	.17	.	.08	.05	.10
21.Other	-.0	-.0	.04	.03	.00	.10	.04	.06	.10	.05	.	.11	.08	.16
22.Number of Sports	-.0	-.0	.05	-.0	.06	.52	.55	.31	.34	.56	.	.27	.32	.47
23.Grades	-.1	-.0	-.1	-.1	-.0	.10	.10	.08	.02	-.0	.	.03	.07	.07
24.Cut School	.22	.16	.21	.25	.10	-.0	-.0	.00	.02	.03	.	.02	-.0	.02
25.Skip Class	.16	.13	.19	.20	.10	-.0	.03	-.0	.01	.04	.	.01	.00	.01
26.Suspended/Expelled	.22	.11	.23	.24	.05	-.0	.01	-.0	.01	.10	.	-.0	-.0	-.0

Note. Values for Males are below the diagonal. Values for Females are above the diagonal.
All correlations greater than 0.03 are significant, $p < .05$.

Table 2.2 (continued). Correlations of Study Variables, 8th Grade.

	15	16	17	18	19	20	21	22	23	24	25	26
1. 30-Day Cigarette	-.0	-.0	-.0	-.0	.02	.04	-.0	-.0	-.2	.30	.18	.28
2. 30-Day Smokeless	.00	.00	-.0	.01	.01	.05	-.0	.01	-.0	.24	.18	.15
3. 30-Day Alcohol	-.0	.00	-.0	-.0	.01	.07	-.0	.00	-.2	.30	.19	.26
4. 30-Day Marijuana	-.0	-.0	-.0	-.0	-.0	.02	-.0	-.0	-.1	.29	.19	.28
5. 30-Day Steroid	-.0	.01	-.0	-.0	.01	.00	-.0	-.0	-.0	.07	.09	.07
6. Baseball	.13	.10	.10	.19	.17	.04	.05	.46	.08	.01	.00	-.0
7. Basketball	.21	.12	.24	.32	.16	.08	.02	.57	.09	-.0	.00	-.0
8. Cross Country	.10	.10	.27	.07	.10	.03	.07	.30	.08	-.0	-.0	-.0
9. Field Hockey	.14	.10	.08	.09	.06	.05	.03	.30	.04	-.0	-.0	-.0
10.Football	.22	.16	.12	.24	.18	.23	.12	.51	-.0	-.0	.00	.06
11.Gymnastics	.04	.05	.07	.08	.09	.06	.16	.31	.04	.01	-.0	-.0
12.Ice Hockey	.08	.05	.02	.03	.08	.07	.01	.16	-.0	-.0	-.0	.01
13.Lacrosse	.12	.13	.04	.08	.12	.03	.01	.25	.03	.03	.01	-.0
14.Swimming	.14	.22	.12	.18	.17	.14	.08	.47	.07	-.0	.01	-.0
15.Soccer	--	.13	.13	.17	.12	.09	.04	.47	.08	-.0	.03	-.0
16.Tennis	.19	--	.09	.18	.12	.08	.09	.41	.09	-.0	-.0	-.0
17.Track	.09	.12	--	.20	.16	.03	.03	.46	.13	-.0	-.0	-.0
18.Volleyball	.26	.28	.09	--	.16	.06	.04	.55	.11	-.0	-.0	-.0
19.Weightlifting	.09	.13	.18	.13	--	.11	.08	.42	.04	.01	-.0	.01
20.Wrestling	.03	.04	.11	.07	.21	--	.04	.23	-.0	.02	.05	.05
21.Other	.08	.15	.04	.14	.12	.08	--	.35	.10	-.0	-.0	-.0
22.Number of Sports	.42	.44	.45	.47	.55	.32	.37	--	.17	-.0	-.0	-.0
23.Grades	.10	.13	.13	.06	.05	-.0	.05	.15	--	-.2	-.1	-.3
24.Cut School	-.0	-.0	.01	.00	.04	.03	.00	.01	-.1	--	.41	.23
25.Skip Class	-.0	-.0	.01	.00	.03	.01	.01	.02	-.1	.41	--	.20
26.Suspended/Expelled	-.0	-.0	-.0	-.0	.04	.06	-.0	-.0	-.3	.21	.16	--

Note. Values for Males are below the diagonal. Values for Females are above the diagonal.
All correlations greater than 0.03 are significant, $p < .05$.

Table 2.3. Correlations of Study Variables, 10th Grade.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. 30-Day Cigarette	--	.17	.40	.51	.00	-.0	-.0	-.0	-.0	.05	.00	.03	-.0	-.0
2. 30-Day Smokeless	.36	--	.15	.15	-.0	.04	.01	-.0	-.0	.05	-.0	.01	-.0	.03
3. 30-Day Alcohol	.39	.30	--	.43	.04	.02	-.0	-.0	.05	.05	.07	.04	.04	.03
4. 30-Day Marijuana	.45	.21	.39	--	.03	-.0	-.0	-.0	-.0	.04	.01	.06	.01	.01
5. 30-Day Steroid	.05	.06	.04	.01	--	-.0	-.0	-.0	-.0	-.0	.08	.02	.01	-.0
6. Baseball	-.0	.04	.04	-.0	.00	--	.16	.02	.03	.12	.00	.01	-.0	.06
7. Basketball	-.0	-.0	-.0	.01	.05	.26	--	.06	.12	.23	-.0	.04	.05	.11
8. Cross Country	-.0	-.0	-.0	-.0	-.0	.00	-.0	--	-.0	.03	-.0	.02	.02	.05
9. Field Hockey	-.0	-.0	.00	.02	-.0	.10	.12	.05	--	.09	-.0	.05	.17	.05
10.Football	-.0	.04	.07	.03	.02	.22	.28	-.0	.07	--	.05	.05	.01	.18
11.Gymnastics	-.0	.01	-.0	.00	-.0	.03	.03	.04	.19	.02	--	.05	-.0	.11
12.Ice Hockey	.00	.03	.03	.03	-.0	.07	.01	.06	.12	.03	.09	--	.07	.05
13.Lacrosse	-.0	.03	.07	.04	.07	.01	.04	.08	.11	.04	.05	.17	--	.02
14.Swimming	-.0	-.0	-.0	.01	.00	.06	.12	.07	.15	.07	.08	.04	.09	--
15.Soccer	-.0	-.0	.00	-.0	.03	.06	.12	.05	.12	.03	.04	.03	.09	.15
16.Tennis	-.0	-.0	.01	-.0	-.0	.11	.13	.07	.15	.05	.05	.12	.11	.19
17.Track	-.0	-.0	-.0	-.0	.00	-.0	.06	.28	.09	.17	.05	-.0	.03	.06
18.Volleyball	-.0	-.0	.01	.01	.01	.15	.23	.04	.21	.14	.06	.06	.03	.16
19.Weightlifting	-.0	.04	.09	.02	.01	.15	.19	-.0	.07	.40	.05	.05	.10	.13
20.Wrestling	.02	.06	.03	.04	-.0	.05	-.0	.03	.06	.17	.09	.03	.09	.10
21.Other	.01	-.0	.01	.03	.00	-.0	.02	.02	.08	-.0	.02	.04	.05	.10
22.Number of Sports	-.0	.01	.06	.02	.03	.44	.53	.20	.31	.55	.16	.22	.27	.39
23.Grades	-.2	-.1	-.1	-.1	-.0	.08	.05	.08	.01	.00	.01	.02	.06	.01
24.Cut School	.23	.15	.28	.26	.04	-.0	.01	-.0	-.0	.02	-.0	-.0	-.0	-.0
25.Skip Class	.20	.14	.25	.27	.03	-.0	.01	-.0	-.0	.00	.01	.03	.03	.02
26.Suspended/Expelled	.25	.15	.19	.25	.02	-.0	.01	-.0	-.0	.06	-.0	-.0	-.0	-.0

Note. Values for Males are below the diagonal. Values for Females are above the diagonal.
All correlations greater than 0.03 are significant, $p < .05$.

Table 2.3 (Continued). Correlations of Study Variables, 10th Grade.

	15	16	17	18	19	20	21	22	23	24	25	26
1. 30-Day Cigarette	-.0	-.0	-.0	-.0	.	.04	-.0	-.0	-.2	.20	.14	.22
2. 30-Day Smokeless	-.0	-.0	-.0	.01	.	.01	-.0	.02	-.0	.12	.06	.05
3. 30-Day Alcohol	.03	-.0	-.0	.04	.	.04	.03	.06	-.2	.24	.20	.19
4. 30-Day Marijuana	-.0	-.0	-.0	-.0	.	.01	-.0	-.0	-.2	.23	.19	.24
5. 30-Day Steroid	.03	-.0	-.0	-.0	.	.06	.02	.02	-.0	.09	.04	.06
6. Baseball	.02	.05	.00	.21	.	.02	-.0	.39	.04	-.0	-.0	-.0
7. Basketball	.10	.05	.14	.23	.	.06	-.0	.52	.07	.00	-.0	.03
8. Cross Country	.04	.02	.31	-.0	.	-.0	-.0	.25	.07	-.0	-.0	-.0
9. Field Hockey	.06	.03	.02	.02	.	.08	.02	.24	.02	-.0	-.0	-.0
10.Football	.13	.05	.04	.15	.	.18	.01	.40	-.0	.05	.02	.07
11.Gymnastics	.03	.02	.02	.03	.	.04	.15	.26	-.0	.02	.01	-.0
12.Ice Hockey	.03	.05	.02	.01	.	.05	.03	.16	-.0	.02	.01	-.0
13.Lacrosse	.08	.01	.02	.01	.	.01	.01	.19	.05	-.0	.01	-.0
14.Swimming	.06	.14	.02	.14	.	.10	.05	.42	.01	.01	.02	.01
15.Soccer	--	.04	.06	.04	.	.04	-.0	.35	.06	.02	.01	-.0
16.Tennis	.19	--	-.0	.05	.	.01	.01	.28	.08	-.0	-.0	-.0
17.Track	.06	.04	--	.08	.	.03	-.0	.37	.11	-.0	-.0	-.0
18.Volleyball	.20	.22	.07	--	.	.08	-.0	.46	.05	.01	.02	-.0
19.Weightlifting	.07	.08	.18	.11	--	.08	.04	.46	.05	.01	-.0	.00
20.Wrestling	.05	.06	.07	.07	.	--	.01	.21	-.0	.04	-.0	.04
21.Other	.07	.12	-.0	.09	.	.02	--	.30	.04	-.0	-.0	-.0
22.Number of Sports	.39	.41	.36	.43	.	.32	.29	--	.12	-.0	-.0	-.0
23.Grades	.11	.11	.13	.03	.	-.0	.06	.13	--	-.2	-.2	-.3
24.Cut School	.02	-.0	-.0	.00	.	.04	.01	.01	-.2	--	.50	.21
25.Skip Class	.03	-.0	-.0	.01	.	.03	.04	.03	-.1	.49	--	.23
26.Suspended/Expelled	-.0	-.0	-.0	-.0	.	.08	-.0	-.0	-.3	.20	.21	--

Note. Values for Males are below the diagonal. Values for Females are above the diagonal.
All correlations greater than 0.03 are significant, $p < .05$.

Table 2.4. Descriptive Statistics for Clustering Variables by Cluster, 8th Grade

	Males				Females			
	Non-Participants n=721	General Participants n=2972	Jocks n=1537		Non-Participants n=999	General Participants n=3178	Jocks n=1237	
Variable	*Mean(SD)*	*Mean(SD)*	*Mean(SD)*	F_1	*Mean(SD)*	*Mean(SD)*	*Mean(SD)*	F_2
Baseball	0.00(0.00)[a]	0.27(0.44)[b]	0.41(0.49)[c]	228.3	0.00(0.00)[a]	0.22(0.42)[b]	0.38(0.48)[c]	260.3
Basketball	0.00(0.00)[a]	0.51(0.50)[b]	0.64(0.48)[c]	495.8	0.00(0.00)[a]	0.37(0.48)[b]	0.58(0.49)[c]	545.4
Cross Country	0.00(0.00)[a]	0.00(0.00)[a]	0.16(0.37)[b]	373.5	0.00(0.00)[a]	0.00(0.00)[a]	0.24(0.43)[b]	655.5
Field Hockey	0.00(0.00)[a]	0.00(0.00)[a]	0.08(0.27)[b]	159.1	0.00(0.00)[a]	0.00(0.00)[a]	0.18(0.38)[b]	484.6
Football	0.00(0.00)[a]	0.53(0.50)[b]	0.60(0.49)[c]	455.0	0.00(0.00)[a]	0.00(0.00)[a]	0.38(0.49)[b]	1400.5
Gymnastics	0.00(0.00)[a]	0.00(0.00)[a]	0.04(0.21)[b]	82.7	0.00(0.00)[a]	0.12(0.32)[b]	0.14(0.35)[c]	72.8
Ice Hockey	0.00(0.00)[a]	0.00(0.00)[a]	0.14(0.35)[b]	267.9	0.00(0.00)[a]	0.00(0.00)[a]	0.04(0.20)[b]	85.2
Lacrosse	0.00(0.00)[a]	0.00(0.00)[a]	0.18(0.38)[b]	359.5	0.00(0.00)[a]	0.00(0.00)[a]	0.15(0.35)[b]	312.4
Swimming	0.00(0.00)[a]	0.00(0.00)[a]	0.38(0.49)[b]	1097.1	0.00(0.00)[a]	0.15(0.35)[b]	0.31(0.46)[c]	226.9
Soccer	0.00(0.00)[a]	0.20(0.40)[b]	0.40(0.49)[c]	248.3	0.00(0.00)[a]	0.21(0.41)[b]	0.38(0.49)[c]	284.0
Tennis	0.00(0.00)[a]	0.00(0.00)[a]	0.31(0.46)[b]	860.7	0.00(0.00)[a]	0.09(0.29)[b]	0.21(0.41)[c]	160.6
Track	0.00(0.00)[a]	0.18(0.39)[b]	0.31(0.46)[c]	157.3	0.00(0.00)[a]	0.21(0.41)[b]	0.40(0.49)[c]	284.5
Volleyball	0.00(0.00)[a]	0.00(0.00)[a]	0.29(0.45)[b]	846.9	0.00(0.00)[a]	0.31(0.46)[b]	0.48(0.50)[c]	379.6
Weightlifting	0.00(0.00)[a]	0.24(0.49)[b]	0.36(0.48)[c]	191.9	0.00(0.00)[a]	0.00(0.00)[a]	0.31(0.46)[b]	926.8
Wrestling	0.00(0.00)[a]	0.12(0.32)[b]	0.13(0.34)[c]	53.6	0.00(0.00)[a]	0.00(0.00)[a]	0.07(0.25)[b]	170.6
Other	0.00(0.00)[a]	0.21(0.41)[b]	0.33(0.47)[c]	172.5	0.00(0.00)[a]	0.38(0.49)[b]	0.42(0.49)[c]	331.6
Number of	0.00(0.00)[a]	2.26(1.31)[b]	4.78(2.56)[c]	2139.7	0.00(0.00)[a]	2.07(1.24)[b]	4.67(2.30)[c]	3018.3

Note. Within gender, groups with the same superscript were not significantly different from one another
All F-values significant at $p < .001$
[1]df = 2, 5227
[2]df = 2, 5411

Table 2.5. Descriptive Statistics for Clustering Variables by Cluster, 10th Grade

	Males					
	Non-Participants n=782	General Participants n=3463	Runners n=195	Jocks n=289	Gymnasts n=35	
Variable	*Mean(SD)*	*Mean(SD)*	*Mean(SD)*	*Mean(SD)*	*Mean(SD)*	F_1
Baseball	0.00(0.00)[a]	0.24(0.43)[b]	0.18(0.38)[b]	0.40(0.49)[c]	0.37(0.49)[bc]	82.11
Basketball	0.00(0.00)[a]	0.38(0.49)[c]	0.28(0.46)[b]	0.76(0.43)[d]	0.51(0.51)[c]	194.02
X-Country	0.00(0.00)[a]	0.00(0.06)[a]	1.00(0.00)[d]	0.01(0.10)[b]	0.14(0.36)[c]	9999.99
Field Hockey	0.00(0.00)[a]	0.00(0.00)[a]	0.00(0.00)[a]	0.15(0.35)[b]	0.26(0.44)[c]	216.75
Football	0.00(0.00)[a]	0.43(0.49)[c]	0.18(0.39)[b]	0.62(0.49)[d]	0.54(0.51)[cd]	177.53
Gymnastics	0.00(0.00)[a]	0.00(0.00)[a]	0.00(0.00)[a]	0.00(0.00)[a]	1.00(0.00)[b]	9999.99
Ice Hockey	0.00(0.00)[a]	0.05(0.21)[b]	0.03(0.16)[b]	0.08(0.27)[c]	0.26(0.44)[d]	21.33
Lacrosse	0.00(0.00)[a]	0.05(0.22)[b]	0.08(0.28)[c]	0.07(0.26)[b]	0.17(0.38)[c]	19.53
Swimming	0.00(0.00)[a]	0.07(0.26)[b]	0.12(0.33)[c]	0.24(0.43)[d]	0.34(0.48)[e]	56.50
Soccer	0.00(0.00)[a]	0.17(0.38)[b]	0.21(0.41)[c]	0.43(0.50)[d]	0.34(0.48)[cd]	86.82
Tennis	0.00(0.00)[a]	0.08(0.26)[b]	0.17(0.38)[c]	0.31(0.46)[d]	0.29(0.46)[d]	78.25
Track	0.00(0.00)[a]	0.15(0.36)[b]	0.62(0.49)[e]	0.20(0.40)[c]	0.34(0.48)[cd]	132.45
Volleyball	0.00(0.00)[a]	0.00(0.04)[a]	0.07(0.25)[b]	0.91(0.29)[d]	0.26(0.44)[c]	5386.36
Weightlift	0.00(0.00)[a]	0.33(0.47)[c]	0.24(0.43)[b]	0.48(0.50)[d]	0.57(0.50)[d]	114.99
Wrestling	0.00(0.00)[a]	0.09(0.29)[b]	0.08(0.28)[bc]	0.12(0.33)[c]	0.37(0.49)[d]	31.87
Other	0.00(0.00)[a]	0.27(0.44)[b]	0.23(0.42)[b]	0.36(0.48)[c]	0.34(0.48)[bc]	80.12
# of Sports	0.00(0.00)[a]	2.32(1.41)[b]	3.50(2.36)[c]	5.13(2.47)[d]	6.11(4.65)[e]	819.21

Note. Within gender, groups with the same superscript were not significantly different from one another
All F-values significant at $p < .001$
[1]df = 2, 5227
[2]df = 2, 5411

Table 2.5 (continued). Descriptive Statistics for Clustering Variables by Cluster, 10th Grade

	Females					
	Non-Participants n=1351	General Participants n=3178	Lacrosse/ Field Hcky n=223	Football/ Basketball n=239	Ice Hockey n=47	
Variable	*Mean(SD)*	*Mean(SD)*	*Mean(SD)*	*Mean(SD)*	*Mean(SD)*	F_2
Baseball	0.00(0.00)[a]	0.19(0.39)[b]	0.16(0.36)[b]	0.32(0.47)[c]	0.21(0.41)[b]	91.52
Basketball	0.00(0.00)[a]	0.22(0.41)[b]	0.35(0.48)[c]	0.56(0.50)[d]	0.34(0.48)[c]	160.33
X-Country	0.00(0.00)[a]	0.06(0.23)[b]	0.07(0.26)[b]	0.06(0.24)[b]	0.11(0.31)[b]	21.41
Field Hockey	0.00(0.00)[a]	0.00(0.00)[a]	0.54(0.50)[d]	0.03(0.16)[b]	0.13(0.34)[c]	1186.99
Football	0.00(0.00)[a]	0.00(0.03)[a]	0.09(0.28)[b]	0.84(0.37)[d]	0.17(0.38)[c]	3553.86
Gymnastics	0.00(0.00)[a]	0.08(0.27)[c]	0.05(0.22)[b]	0.12(0.33)[c]	0.17(0.38)[d]	33.74
Ice Hockey	0.00(0.00)[a]	0.00(0.00)[a]	0.00(0.00)[a]	0.00(0.00)[a]	1.00(0.00)[b]	9999.99
Lacrosse	0.00(0.00)[a]	0.00(0.00)[a]	0.58(0.49)[c]	0.01(0.11)[a]	0.15(0.36)[b]	1452.35
Swimming	0.00(0.00)[a]	0.11(0.32)[b]	0.13(0.34)[b]	0.28(0.45)[c]	0.28(0.45)[c]	80.61
Soccer	0.00(0.00)[a]	0.17(0.37)[b]	0.25(0.43)[c]	0.26(0.44)[c]	0.26(0.44)[bc]	81.66
Tennis	0.00(0.00)[a]	0.10(0.31)[b]	0.11(0.32)[b]	0.12(0.32)[b]	0.26(0.44)[c]	41.08
Track	0.00(0.00)[a]	0.19(0.39)[b]	0.20(0.40)[b]	0.16(0.37)[b]	0.19(0.40)[b]	77.18
Volleyball	0.00(0.00)[a]	0.20(0.40)[b]	0.21(0.41)[b]	0.44(0.50)[c]	0.19(0.40)[b]	114.24
Weightlift	0.00(0.00)[a]	0.11(0.32)[b]	0.18(0.38)[c]	0.18(0.39)[c]	0.40(0.50)[d]	62.42
Wrestling	0.00(0.00)[a]	0.00(0.00)[a]	0.00(0.00)[b]	0.23(0.42)[c]	0.06(0.25)[b]	374.24
Other	0.00(0.00)[a]	0.43(0.49)[c]	0.29(0.46)[bc]	0.31(0.46)[b]	0.40(0.50)[c]	235.73
# of Sports	0.00(0.00)[a]	1.88(1.12)[b]	3.21(2.10)[c]	3.91(1.81)[d]	4.32(3.16)[e]	1173.04

Note. Within gender, groups with the same superscript were not significantly different from one another
All F-values significant at $p < .001$
[1]df = 2, 5227
[2]df = 2, 5411

Table 2.6. Descriptive Statistics for Demographic Variables by Cluster, 8th Grade

	Males			Females		
	Non-Participants[a] n=721	General Participants[b] n=2972	Jocks[c] n=1537	Non-Participants[a] n=999	General Participants[b] n=3178	Jocks[c] n=1237
Parent Education						
Grade School	3.19%	2.87%	1.94%	8.08%	3.79%	2.41%
Some High School	15.13%	11.83%	6.40%	20.15%	12.47%	10.34%
High School Graduate	30.02%	27.71%	19.14%	32.95%	26.03%	25.66%
Some College	26.42%	26.78%	24.21%	19.98%	26.09%	24.63%
College Graduate	17.91%	23.84%	33.30%	13.56%	22.55%	25.32%
Graduate School	7.33%	6.97%	15.01%	5.27%	9.08%	11.66%

	Males			Females		
	Non-Participants	General Participants	Jocks	Non-Participants	General Participants	Jocks
Race/Ethnicity						
White	62.21%[b]	54.49%[a]	62.90%[b]	45.77%[a]	58.83%[b]	65.31%[c]
African American	8.56%[c]	15.49%[d]	7.25%[c]	15.87%[f]	13.16%[e]	8.64%[d]
Hispanic	15.76%[ef]	18.39%[f]	14.54%[e]	28.34%[i]	16.89%[h]	11.38%[g]
Asian	4.76%[h]	2.72%[g]	4.71%[h]	2.89%[jk]	2.22%[j]	3.57%[k]
Other	8.70%[i]	8.92%[i]	10.59%[i]	7.13%[l]	8.90%[l]	11.10%[m]

Note. Within each characteristic by gender, groups with the same superscript were not significantly different from one another

Table 2.7. Descriptive Statistics for Demographic Variables by Cluster, 10th Grade

	Males					Females				
	Non-Participants[a] n=782	General Participants[b] n=3463	Runners[c] n=195	Jocks[bc] n=289	Gymnasts[bc] n=35	Non-Participants[a] n=1351	General Participants[b] n=3178	Lacrosse/ Fld Hcky[c] n=223	Football/ Basketball[a] n=239	Ice Hockey[bc] n=47
Parent Education										
Grade School	2.59%	1.87%	2.04%	2.15%	3.03%	4.10%	2.01%	0.75%	1.81%	0.00%
Some High School	12.15%	8.17%	5.21%	7.52%	1.82%	16.02%	9.20%	3.03%	18.18%	6.03%
HS Graduate	33.50%	25.57%	22.40%	24.93%	21.25%	32.13%	26.88%	24.44%	36.22%	14.87%
Some College	28.01%	26.85%	23.04%	23.31%	22.95%	25.90%	27.63%	23.27%	18.53%	31.10%
College Grad	19.69%	29.33%	33.82%	31.23%	34.51%	16.59%	26.44%	35.29%	19.52%	43.17%
Graduate School	4.06%	8.20%	13.48%	10.86%	16.44%	5.26%	7.84%	13.21%	5.72%	4.83%

	Males					Females				
	Non-Participants	General Participants	Runners	Jocks	Gymnasts	Non-Participants	General Participants	Lacrosse/ Fld Hcky	Football/ Basketball	Ice Hockey
Race/Ethnicity										
White	69.55%[a]	68.54%[a]	74.21%[a]	69.12%[a]	61.88%[a]	59.27%[a]	67.39%[b]	84.52%[c]	58.02%[a]	79.52%[bc]
Afr. American	8.30%[a]	10.78%[b]	6.19%[a]	5.74%[a]	4.98%[ab]	13.93%[c]	9.82%[b]	2.75%[a]	9.49%[b]	1.87%[ab]
Hispanic	11.88%[a]	10.21%[a]	6.43%[a]	9.39%[a]	6.82%[a]	15.97%[c]	10.87%[b]	2.93%[a]	17.87%[c]	3.88%[ab]
Asian	4.36%[b]	2.65%[a]	4.03%[ab]	5.52%[b]	9.67%[b]	4.45%[a]	3.01%[a]	2.49%[a]	2.23%[a]	0.00%[a]
Other	5.90%[a]	7.83%[ab]	9.13%[a]	10.23%[b]	16.66%[b]	6.37%[a]	8.91%[b]	7.30%[ab]	12.38%[b]	14.73%[ab]

Note. Within each characteristic by gender, groups with the same superscript were not significantly different from one another

Table 2.8. Descriptive Statistics for Outcome Variables by Cluster, 8th Grade

	Males			Females		
	Non-Participants n=721	General Participants n=2972	Jocks n=1537	Non-Participants n=999	General Participants n=3178	Jocks n=1237
Variable	*Mean(SD)*	*Mean(SD)*	*Mean(SD)*	*Mean(SD)*	*Mean(SD)*	*Mean(SD)*
30-day Cigarette	1.25(0.88)[c]	1.14(0.56)[b]	1.08(0.39)[a]	1.21(0.71)[b]	1.11(0.47)[a]	1.12(0.50)[a]
30-day Smokeless Tobacco	1.14(0.71)[b]	1.13(0.63)[b]	1.08(0.53)[a]	1.04(0.34)[a]	1.03(0.27)[a]	1.04(0.30)[a]
30-day Alcohol	1.26(0.79)[a]	1.27(0.77)[a]	1.27(0.81)[a]	1.35(0.88)[b]	1.23(0.67)[a]	1.30(0.74)[b]
30-day Marijuana	1.21(0.88)[c]	1.18(0.81)[b]	1.12(0.62)[a]	1.18(0.78)[b]	1.10(0.58)[a]	1.11(0.57)[ab]
30-day Steroids	1.00(0.06)[a]	1.02(0.25)[a]	1.02(0.26)[a]	1.01(0.21)[a]	1.00(0.05)[a]	1.01(0.13)[a]
Average Grades	5.30(2.45)[a]	5.87(2.27)[b]	6.56(2.20)[c]	5.71(2.34)[a]	6.58(2.16)[b]	6.73(2.12)[c]
Cutting School	1.29(0.99)[a]	1.23(0.84)[a]	1.18(0.77)[a]	1.32(0.97)[b]	1.20(0.70)[a]	1.22(0.78)[a]
Skipping Class	1.19(0.75)[a]	1.21(0.73)[a]	1.16(0.60)[a]	1.20(0.69)[a]	1.15(0.58)[a]	1.17(0.61)[a]
Suspension/Expulsion	1.49(0.76)[b]	1.53(0.77)[b]	1.38(0.69)[a]	1.34(0.67)[c]	1.21(0.55)[b]	1.24(0.56)[a]

Note. Within each characteristic by gender, groups with the same superscript were not significantly different from one another

Table 2.9. Descriptive Statistics for Outcome Variables by Cluster, 10th Grade

	Males					Females				
	Non-Participants n=782	General Participants n=3463	Runners n=195	Jocks n=289	Gymnasts n=35	Non-Participants n=1351	General Participants n=3178	Lacrosse/ Field Hcky n=223	Football/ Basketball n=239	Ice Hockey n=47
Variable	*Mean(SD)*	*Mean(SD)*	*Mean(SD)*	*Mean(SD)*	*Mean(SD)*	*Mean(SD)*	*Mean(SD)*	*Mean(SD)*	*Mean(SD)*	*Mean(SD)*
30-day Cigarette	1.45(1.05)^{c}	1.23(0.72)^{b}	1.09(0.36)^{a}	1.23(0.81)^{b}	1.33(1.19)^{abc}	1.38(0.96)^{b}	1.20(0.62)^{a}	1.13(0.49)^{a}	1.43(0.96)^{b}	1.40(0.92)^{b}
30-day Smokeless	1.28(0.99)^{a}	1.27(0.94)^{a}	1.11(0.56)^{a}	1.18(0.78)^{a}	1.57(1.54)^{a}	1.02(0.24)^{a}	1.02(0.23)^{a}	1.02(0.18)^{a}	1.07(0.41)^{b}	1.04(0.20)^{ab}
30-day Alcohol	1.62(1.17)^{a}	1.69(1.18)^{a}	1.57(1.16)^{a}	1.71(1.28)^{a}	1.71(1.27)^{a}	1.54(1.05)^{a}	1.58(1.01)^{a}	1.74(1.09)^{b}	1.87(1.25)^{bc}	2.11(1.18)^{c}
30-day Marijuana	1.54(1.44)^{b}	1.44(1.24)^{b}	1.23(0.86)^{a}	1.43(1.30)^{b}	1.57(1.48)^{ab}	1.39(1.16)^{b}	1.23(0.80)^{a}	1.23(0.83)^{a}	1.50(1.30)^{b}	1.72(1.53)^{c}
30-day Steroids	1.01(0.23)^{a}	1.02(0.28)^{a}	1.01(0.07)^{a}	1.03(0.28)^{a}	1.09(0.51)^{a}	1.00(0.11)^{a}	1.00(0.08)^{a}	1.00(0.00)^{a}	1.02(0.32)^{a}	1.02(0.15)^{a}
Average Grades	5.08(2.40)^{a}	5.95(2.16)^{b}	6.61(2.06)^{c}	6.25(2.16)^{b}	6.14(2.53)^{bc}	5.67(2.36)^{a}	6.51(2.05)^{b}	6.84(1.86)^{c}	5.71(2.18)^{a}	6.26(1.92)^{abc}
Cutting School	1.37(1.01)^{a}	1.33(0.96)^{a}	1.20(0.77)^{a}	1.32(0.97)^{a}	1.53(1.56)^{a}	1.44(1.13)^{b}	1.31(0.88)^{a}	1.24(0.70)^{a}	1.58(1.21)^{c}	1.53(1.25)^{abc}
Skipping Class	1.36(0.86)^{a}	1.34(0.84)^{a}	1.23(0.62)^{a}	1.28(0.79)^{a}	1.71(1.47)^{a}	1.34(0.82)^{a}	1.31(0.76)^{a}	1.33(0.78)^{a}	1.41(0.88)^{a}	1.38(0.95)^{a}
Suspension/ Expulsion	1.53(0.77)^{c}	1.44(0.72)^{b}	1.29(0.59)^{a}	1.29(0.62)^{a}	1.49(0.78)^{abc}	1.30(0.62)^{c}	1.22(0.53)^{b}	1.09(0.37)^{a}	1.39(0.65)^{d}	1.15(0.42)^{abc}

Note. Within each characteristic by gender, groups with the same superscript were not significantly different from one another

Figure 2.1. Profiles of Clusters by Sports Participation, 8th Grade Males

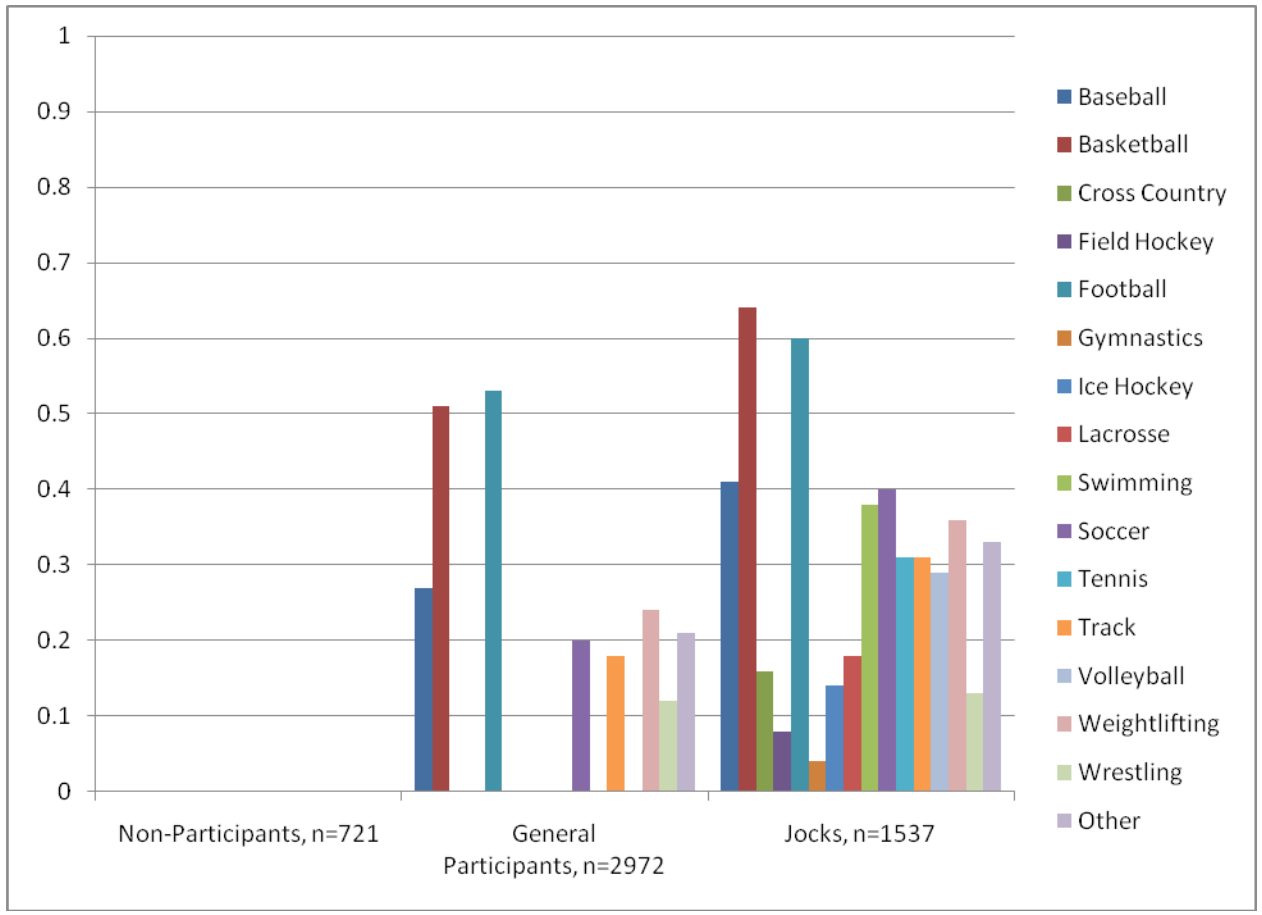


Figure 2.2. Profiles of Clusters by Sports Participation, 8th Grade Females

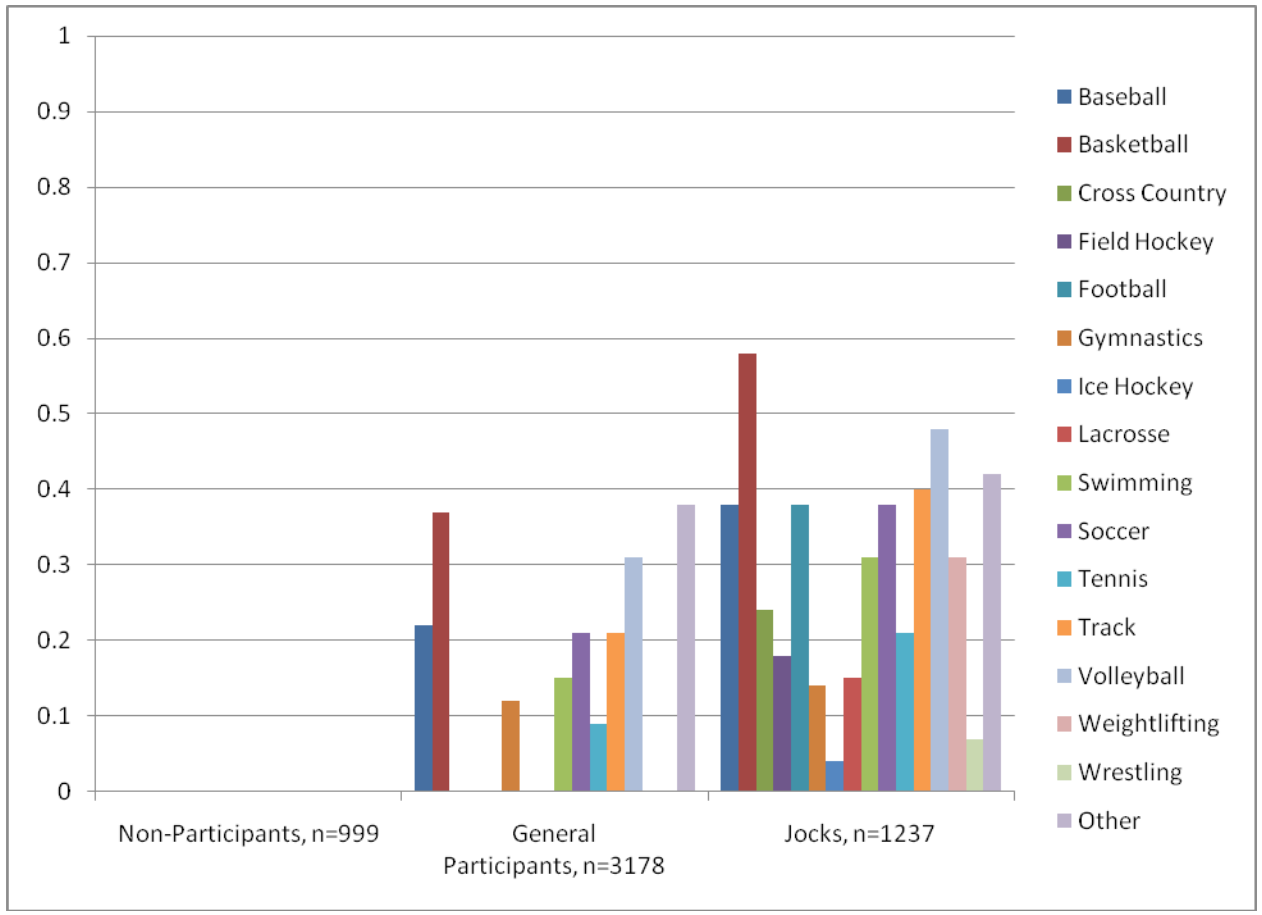


Figure 2.3. Profiles of Clusters by Sports Participation, 10th Grade Males

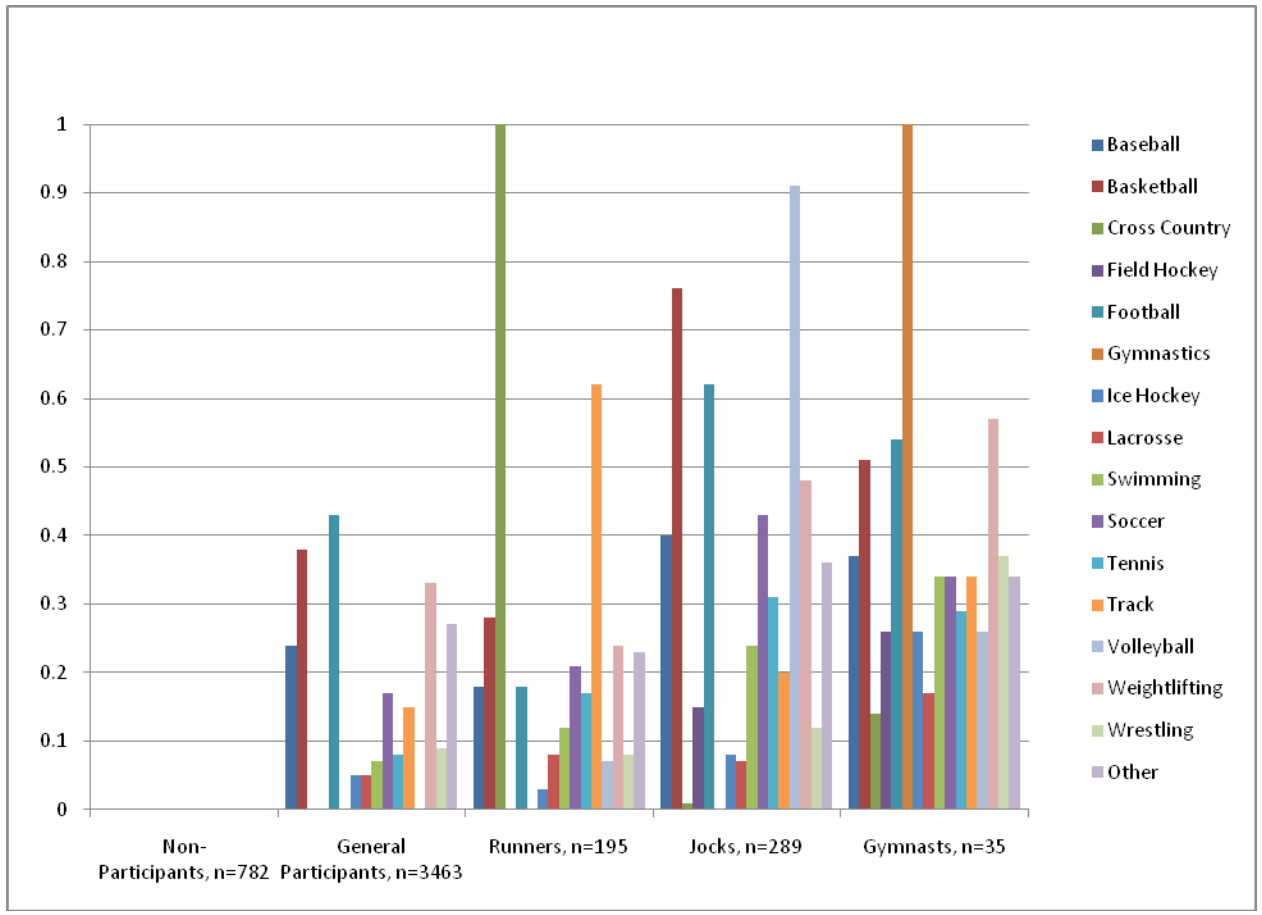
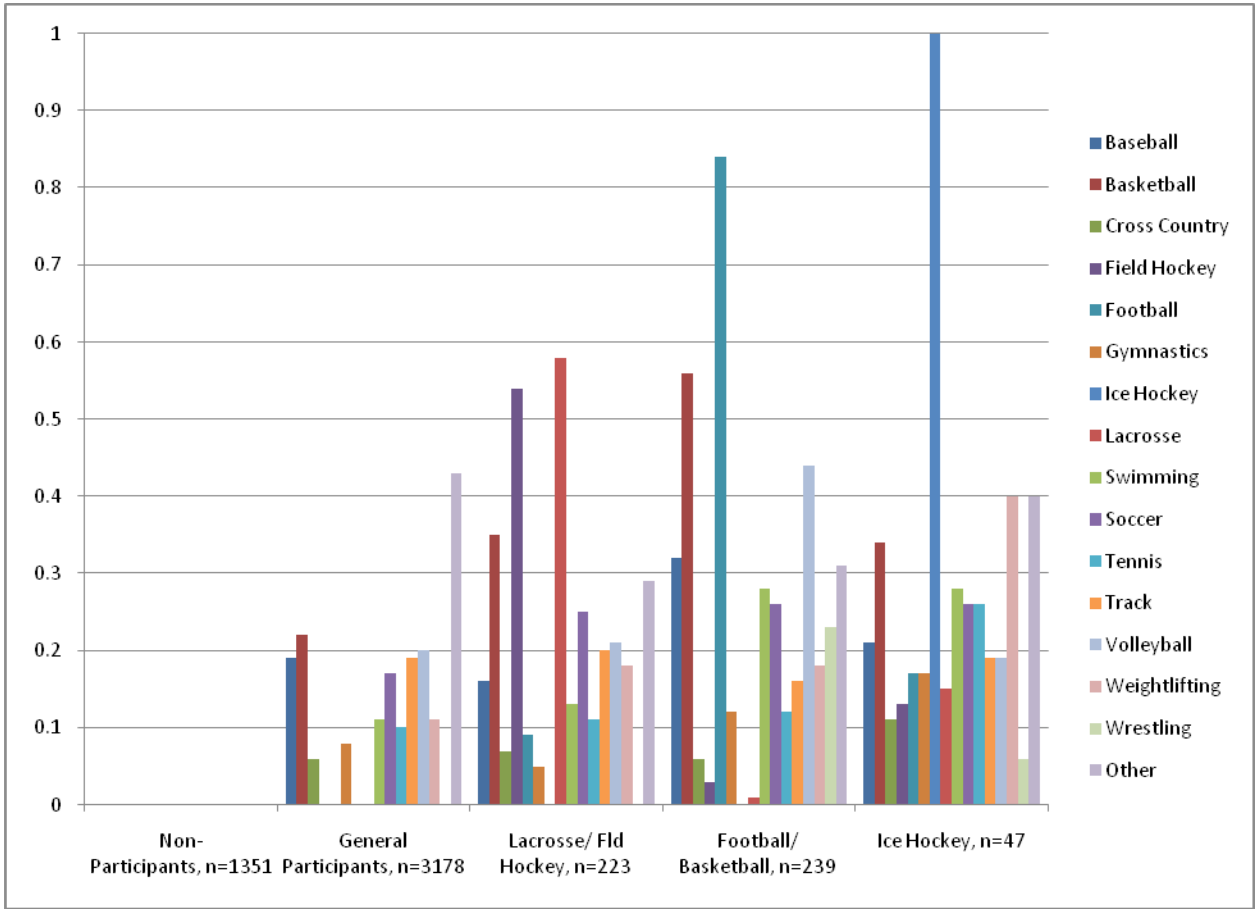


Figure 2.4. Profiles of Clusters by Sports Participation, 10th Grade Females



Chapter III

Risk-Taking in Adolescence: One Size Does Not Fit All

Statistically speaking, risk-taking behavior is normative during adolescence (Arnett, 1992; Zoccolillo, Vitaro, & Tremblay, 1999). Due to the frequency of risk-taking behaviors during adolescence, special attention should be given to the predictors and consequences of risk-taking during this developmental period (Arnett, 1992; Jessor, 1992; Steinberg, 2005). As risk-taking peaks during middle adolescence (see Boyer 2006 for a review), the present study focused on the group of highest risk-takers during this critical period.

Risk-taking has been defined in terms of potential consequences; Boyer (2006) claimed that risk-taking is present when an individual makes a choice or takes part in an activity that could have negative consequences. However, due to the broad definition of risk-taking, adolescents engage in a wide variety of risk-taking behaviors, some of which may be viewed as adaptive despite the potential for negative consequences (e.g. Spear, 2000). This study utilized a person-oriented approach to understanding risk-taking in adolescence, in order to provide evidence that at the individual level risk-taking may be developmentally-appropriate despite associations between risk-taking and potentially devastating behaviors such as substance use, unprotected sex, and criminal activity (e.g.

Arnett, 1992; Pilgrim, Schulenberg, O'Malley, Bachman & Johnston, 2006; Zuckerman 2007).

The Role of Sensation Seeking

In order to understand adolescent risk-taking, it is critical to consider the likely causal mechanisms behind the behavior. One explanation for the frequency of adolescent risk-taking is the increase in sensation seeking evident during adolescence (Spear, 2000). Sensation seeking is "defined by the need of experiences and complex, new, varied sensations, and the wish to take physical and social risks through each experience" (Zuckerman, 1979 p.10). Individual differences in sensation seeking are often linked to similar differences in risk-taking behavior. In other words, when an individual needs a particularly high level of stimulation and novelty to meet their activation level of sensation seeking, he or she is more likely to take part in risk-taking behavior. In the present study, sensation seeking is conceptualized as a broader personality construct, with risk-taking as a more specific behavioral indicator under the umbrella of sensation seeking.

The biological underpinnings of sensation seeking are of great interest, especially with the possibility of linking brain changes during adolescence to corresponding changes in sensation seeking and risk-taking. Adolescents often have higher levels of negative affect and experience less positive affect when engaging in pleasurable activities, as compared to any other developmental group (Spear, 2000). During adolescence, brain areas related to behavioral regulation, emotional regulation, and the ability to weigh consequences all undergo extensive change and development (Steinberg, 2005). Changes in the connectivity and function of the prefrontal cortex and limbic

system during adolescence are also related to the increased propensity to seek novelty and sensation (Casey, Getz, & Galvan, 2008; Spear, 2000). Therefore, sensation seeking in particular, and adolescent risk-taking in general, appear to be related to normative brain restructuring that unfolds during this period of development.

The Role of Contextual Influences

Differences in individual-level variables such as timing of brain development and sensation seeking tendencies are no doubt important. However, it is critical to also consider the broader social and environmental context within which an adolescent is developing to gain a better understanding of risk-taking. The risk and resilience framework offers a valuable theoretical consideration of how the individual and the environment interact to predict behavioral outcomes such as risk-taking in general, and the way risk-taking manifests itself more specifically.

According to a developmental systems perspective, resilience is a dynamic process involving favorable outcomes despite severe or chronic stressors (e.g. Luthar, Cicchetti, & Becker, 2000; Pianta & Walsh, 1998). An individual experiences environmental stressors, also known as *risk factors*, which make him or her more susceptible to undesirable outcomes. These risk factors, for example an enjoyment of risk-taking behavior, are often considered to be beyond the control of the individual (Doll & Lyon, 1998). In addition to being detrimental singularly, evidence suggests that risk effects are cumulative (Gutman, Sameroff, & Cole, 2003; Loukas & Prelow, 2004; Prelow & Loukas, 2003).

Although the study of risk factors is important in understanding why adolescents choose or do not choose to take certain risks, research has begun to move to a resilience-

oriented focus on protective factors (e.g. Gutman, Sameroff, & Cole, 2003; Jessor et al., 1995). Researchers such as Garmezy (1991) have pointed out that not all children who are at-risk for difficulties actually experience these problems; this observation has led to the study of the factors that contribute to the resilience of adolescents in the face of adversity.

Protective factors are those variables that have a larger impact on the success of those who are labeled at-risk for an undesirable outcome than those who are not at-risk, therefore demonstrating an interaction with risk level in predicting outcomes (e.g. Gutman, Sameroff, & Cole, 2003). For example, it is important to look for environmental influences that act to buffer those who demonstrate a propensity toward risk-taking from taking reckless risks. In many ways, the shift in focus to protective factors and building resilience is encouraging because it contributes to understanding the best methods for successful intervention. The present study focuses solely on an at-risk sample of adolescents; therefore, although interactions with risk level cannot be detected, the results of the present study are important for identifying potential protective effects to be examined further in future research.

Although often conceptualized as a period of increased risk, it is important to remember that adolescence is also a time of plasticity and potential (Keating, 2004). Jessor (1992) called for researchers interested in studying and preventing risk-taking behavior among adolescents to consider a "web of causation" of reckless risk-taking. In accord with the suggestions of the developmental systems perspective on resilience, Jessor explains that most adolescents do not engage in risk-taking behavior solely for the thrill of it, or because their individual characteristics lead them to do so. Rather, it is

important to consider biological, social, environmental, personality, and behavioral factors associated with the prediction of risk-taking.

When looking at individual and contextual antecedents of behavior, one must focus on those that both encourage and discourage reckless risk-taking in order to arrive at a complete picture of the underlying processes. For example, an adolescent's friends may engage in reckless risks, leading toward more reckless risk-taking for the individual of interest (e.g. Henry, Slater, & Oetting, 2005). In addition, a social orientation in general may predispose those who enjoy risk-taking to engage in reckless but social risks, including substance use (Rhoades & Maggs, 2006). Contextual influences, however, may also protect adolescents from taking reckless risks; therefore, research on resilience and contextual protective factors is critical to understanding the mechanisms behind risk-taking.

Leisure Time as a Venue for Understanding the Mechanisms of Risk-Taking

Adolescents spend a great deal of time in leisure; therefore, the use of that leisure time is important for understanding what it is that risk-takers who are, and are not, resilient are doing. Larson (2000) in particular reviews the positive outcomes associated with structured extracurricular activities that allow for the development of initiative. Therefore, the present study focused on both structured and unstructured leisure activities in order to determine how these activities predicted critical outcomes among adolescents.

As most adolescents participate in patterns of leisure activities rather than single activities in isolation, many researchers have pointed to the utility of person-centered approaches to understanding extracurricular activities. Feldman and Matjasko (2007) found that adolescents participated in portfolios of activities including Sports Only,

Academics Only, School Only, Performance Only, Multiple Activities, and Non-Participation. In an attempt to relate activity clusters to critical outcomes, Linver, Roth, and Brooks-Gunn (2009) identified Sports Focused, Sports Plus, School Based, Religious Youth Groups and Low Activity clusters and used these patterns to predict competence, confidence, connections, character, and caring. Their research suggested that participation in any activity is better than no participation, but the most adaptive outcomes were seen among those in multiple activities. Thus far these studies have not been conducted among a group of very high risk-takers; the present study aimed to replicate and expand upon these studies by applying a similar approach to understanding risk-takers' use of both structured and unstructured leisure time.

Among all of the extracurricular activities, sports participation was expected to be especially important for high risk-takers as sensation seeking and risk-taking are often linked with sports participation (e.g. Chirivella & Martinez, 1994; Franques et al., 2003; Jack & Ronan, 1998; Schroth, 1995). An adolescent's involvement in sports may discourage him or her from taking part in more reckless risks and serve as an outlet for individual risk-taking propensities (e.g. Fredricks & Eccles, 2006). Sports participation is often related to lower levels of marijuana use and better academic outcomes (e.g. Darling, Caldwell, & Smith, 2005; Hoffman, 2006). However, research concerning the association between sports and substance use indicated that adolescents involved in athletics are more likely to use alcohol than their peers (e.g. Eccles & Barber, 1999; Hoffman, 2006). As Linver, Roth, and Brooks-Gunn (2009) suggested, adolescents may show the most positive adaptation when they participate in a wide variety of organized activities, rather than sports alone.

Another potential buffer against substance use among risk-takers is an academic orientation (Rhoades & Maggs, 2006); strong endorsement of academic goals could reflect the ability to meet risk-taking needs through intellectual challenge as well as engagement in social norm systems that encourage the avoidance of reckless risks that might threaten academic performance. To consider all of the influences on adolescents' decision to take risks, it is necessary to acknowledge the complexities both of the individual and the contexts with which that individual interacts.

Risk-Taking as Developmentally-Appropriate in Adolescence

Although risk-taking undoubtedly has a strong link with potentially harmful behaviors in adolescence, risk-taking may also serve a critical purpose during this developmental period. As reviewed, normative biological changes likely predispose adolescents to increased levels of risk-taking and sensation seeking behavior (Spear, 2000; Steinberg, 2005). During adolescence, independence (Casey, Getz, & Galvan, 2008), identity formation (Erikson, 1970; Marcia, 1980) and advanced decision-making (Reyna & Farley, 2006; Steinberg, 2005) are salient developmental tasks. These tasks inherently involve some level of risk-taking as adolescents and emerging adults are challenged with exploring their own potential, separating from their parents, and understanding the complexities of their own actions and interactions; therefore, some amount of risk-taking is necessary for navigating through adolescence and into adulthood successfully (Dworkin, 2005; Maggs & Schulenberg, 2005; Schulenberg & Zarrett, 2006; Spear, 2000).

Risk-taking does not necessarily imply reckless or destructive behaviors; rather, risk-taking can also present itself in the form of adaptive behaviors. It is likely that the

type of risk-taking and the motivation behind the risk-taking matters when distinguishing among types of risk-taking. In general, sensation seeking is linked to positive risk-taking in the same ways that it is linked to reckless risk-taking. In fact, adolescents who are high in sensation seeking are more likely to participate in sports than to engage in reckless behaviors such as substance use (Hansen & Breivik, 2001). Adolescents who enjoy taking risks are also more likely to study abroad as compared to peers who report less enjoyment of risk-taking, which suggests a potential link between risk-taking and intellectual challenge (Schroth & McCormack, 2000). Kloep and colleagues (2009) found that it was possible to distinguish among thrill-seeking, audience-controlled (social), irresponsible, and calculated motivations behind risk-taking. Research elucidating differences in motivations for risk-taking helps make the case that the behaviors of the individuals are likely to also vary greatly. The present study aimed to highlight critical differences in behavioral profiles among risk-takers in order to determine the various outlets that exist for adolescent risk-taking, and how these profiles differentially predict salient developmental tasks.

Studying Those Who Are Resilient to Understand Those Who Are Not

In order to understand how some adolescents avoid reckless risk-taking whereas others do not, it is important to identify and study resilient adolescents. It may prove useful to conduct research with adolescents who would be thought of as at-risk for reckless behavior due to reporting high levels of risk-taking behavior, yet avoid more maladaptive risk behaviors such as heavy substance use. It is critical to remember that not all adolescents who claim to enjoy taking risks use drugs (e.g. Hansen & Breivik, 2001); therefore, close study of this "at-risk" group of risk-taking adolescents could assist

in determining the differences between those who do and do not take reckless risks. Through this type of research, protective factors could be identified, which would provide strong implications for intervention and prevention for reckless risk-taking.

An Interest in Behavioral Resilience Among Risk-Takers

During adolescence, researchers have noted a peak in reckless risk-taking behaviors, including unprotected sex, dangerous driving behaviors, and the use of illegal substances, which is related to the simultaneous increase in sensation seeking and risk-taking behaviors (e.g. Casey, Getz, & Galvan, 2008). Of particular interest in the present study is the association between risk-taking and substance use in adolescence (e.g., Crawford, Pentz, Chou, Li, & Dwyer, 2003; Pilgrim, Schulenberg, O'Malley, Bachman & Johnston, 2006; Schulenberg, Merline, Johnston, O'Malley, Bachman & Laetz, 2005; Zuckerman, 1994). In fact, approximately 80% of adolescent substance users identify themselves as being high in sensation-seeking and enjoyment of risk-taking (Donohew et al., 1990). Evidence suggests that risk-taking is linked with smoking (Frankenberger, 2004; Lejuez et.al, 2005) and the use of multiple drugs (Hansen & Breivik, 2001) in adolescence and early adulthood. Henry, Slater, and Oetting (2005) found that changes in enjoyment of risk-taking over time predicted changes in alcohol use over time, as well as increased susceptibility to peer influences on their drinking. In addition to mean level differences in substance use, those high in sensation seeking tend to begin using substances at an earlier age (Martin et al., 2002).

Despite the strong link between risk-taking and substance use, resilience research provides strong evidence that those who are at-risk for difficulties such as substance use often thrive and avoid such difficulties (e.g. Werner, 1994). By identifying resilient

adolescents who are at-risk due to their high risk-taking propensities yet thrive, it is possible to study the protective factors that might predict their success (e.g. Masten, Best, & Garmezy, 1990). Therefore, the present study sought to identify those high risk-takers who were able to avoid excessive use of substances.

An Interest in Educational Resilience among Risk-Takers

As previously noted, some risk-takers engage themselves in academic challenges, such as study abroad (Schroth & McCormack, 2000), which might be classified as a calculated risk due to the strengths of the potential benefits when compared to the potential negative consequences (Kloep and colleagues, 2009). However, some types of risk-taking are associated with negative academic outcomes. For example, adolescents who use substances exhibit lower levels of academic performance (Paulson, Coombs, & Richardson, 1990; Sanders, Field, & Diego, 2001); in addition, substance use is strongly related to high school drop-out (Arellano, Chavez, & Deffenbacher, 1998). Resilience researchers have emphasized the importance of focusing on a particular type of resilience, as individuals may be resilient in one domain and not in another (e.g. Luthar, Cicchetti, & Becker, 2000). In general, academic motivation and performance declines as students move into and through adolescence (e.g. Eccles et al., 1993a). On an average level, these trends are likely to be exacerbated among those who enjoy risk-taking, due to the likelihood of involvement in reckless behaviors that interfere with educational success. As educational outcomes are salient developmental tasks during adolescence that might be linked to the behavioral profiles of adolescents, the present study focuses on the prediction of educational resilience among risk-takers.

The Present Study

The present study was designed to distinguish among the patterns of behaviors in which adolescent risk-takers engage. The study focused on high risk-takers in middle adolescence due to the peak in risk-taking around this time period. The majority of previous work on adolescent risk-taking has used variable-centered analyses. Although these are useful in examining important relationships among individual variables, this previous work has not been able to capture the wide array of activities and behaviors in which risk-takers partake. The present study used a person-centered approach to understanding the different behavioral profiles of high risk-taking adolescents. By utilizing a nationally-representative sample, this study was able to focus on the highest risk-takers to determine which patterns of activities predict resilient outcomes among this at-risk group.

The patterns considered by the present study included not only structured extracurricular activities, but also unstructured leisure activities, academic attitudes and behaviors, and frequency of substance use in order to accurately depict the complexity of the contexts and activities in which adolescents in general (and high risk-takers more specifically) participate. Although largely exploratory in nature, it was hypothesized that a person-centered analysis of high risk-takers would reveal distinct patterns of adolescents who do and do not use substances, suggesting that many under-studied opportunities for risk-taking exist. Finally, these patterns were expected to predict educational outcomes and behaviors in clear ways such that particular patterns could be considered as potentially more protective when educational resilience was the outcome of interest. Previous person-centered work in general populations of adolescents suggested that clusters involving sports, academics, multiple activities, and non-participation might

emerge (Feldman & Matjasko, 2007; Linver, Roth, & Brooks-Gunn, 2009). In addition, due to the link between the particularly high level of risk-taking observed in the present sample and substance use, several clusters of adolescents higher than average in substance use were expected to form.

Method

Procedure

The present study draws upon a nationally-representative sample of adolescents from the Monitoring the Future Study (Bachman et al., 2008; Johnston et al., 2008). The larger study has sampled nationally-representative samples of 12th grade students each year, beginning in 1975. In 1991, the study began sampling students in the 8th and 10th grades as well. Each year approximately 18,000 8th grade students in about 150 schools and approximately 17,000 10th grade students in about 140 schools are sampled. Both public and private schools are included in the samples. All adolescents completed self-report questionnaires in their classrooms. These questionnaires are delivered in multiple forms and focus on a variety of variables, including substance use, educational attitudes, psychological adaptation, internalizing and externalizing behavior, and leisure activities. Complete descriptions of the Monitoring the Future study design and procedure are available in other publications (Bachman et al., 2008; Johnston et al., 2008).

Cross-sectional data from eight sequential cohorts of 10th grade adolescents (1999-2006) from the Monitoring the Future study (Bachman et al., 2008; Johnston et al., 2008) were used. The focus on 10th grade was supported both by theoretical claims of a peak in risk-taking during middle adolescence and by previous work that suggested that the process linking risk-taking to critical variables such as activities is more evident in

grade 10 than at grade 8 (Dever et al., under review). Although the Monitoring the Future project has surveyed nationally-representative samples of 10th grade students since 1991, the current sample is limited to the 1999-2002 cohorts because of variable availability. In addition, variables of interest were included on only one of the four questionnaire forms distributed randomly in each classroom in each school during the focal study years.

Measures

Means and standard deviations of all study variables are presented in Table 3.1. The complete items can be found in the Appendix.

Risk-Taking. Risk-taking tendency was measured with two items regarding the adolescent's enjoyment of risks and danger. Each item was rated on a scale from 1 (Disagree) to 5 (Agree); the two items were summed to arrive at a total risk-taking score (e.g., see Pilgrim et al., 2006; Schulenberg et al., 2005), which formed the basis of categorizing adolescents as high in risk-taking. These risk-taking propensity items are distinct from sensation seeking; however, the two items used in the present study have been used as a proxy for sensation seeking in previous studies (Jackson, Sher, & Schulenberg, 2008). In addition, preliminary analyses to previous studies by Dever and colleagues have shown considerable correlations between these items and items from Zuckerman's (1994) Sensation Seeking Scale.

Those who scored the maximum of 10 on these two items were categorized as high risk-takers and included in the present study. Thus "10" constitutes the highest possible score reflecting the highest possible risk-taking status; the present study was able to focus on this subgroup given the large national sample. Justification for this cut point

was provided by Dever and colleagues (under review) based on exploratory analyses using various groupings in order to best isolate high risk-takers from other adolescents. Any adolescents who were missing data on the risk-taking scale were excluded from the study as they were not able to be classified as high risk-takers without these data.

Leisure Activities. The adolescents responded to one item each regarding 11 common leisure activities. These activities were going to movies, attending rock concerts, riding in cars for fun, participating in sports and exercise, visiting with friends, going shopping, spending leisure time alone, reading magazines, reading the newspaper, going to parties, and participating in community affairs. Each item was scaled from 1 (Never) to 5 (Almost Every Day).

School-based Extracurricular Participation. Four items measured the adolescents' extent of participation in school-based extracurricular activities. In particular, these items focused on participation in publications, performing arts, school athletics, and other school-based activities. Each item was scaled from 1 (Not at all) to 5 (Great).

Attitudes toward School. Three items measured the adolescents' attitudes toward school. Specifically, adolescents were asked about the extent to which they enjoyed school, hated school (reverse coded) and found their school work interesting over the past year. Each of these items was scaled from 1 (Never) to 5 (Almost Always). These variables have been used as indicators of adaptive attitudes towards school in other studies (e.g. Bryant et al., 2003).

Cigarette Use. Cigarette use was measured with one item that indicated the frequency of smoking cigarettes in the past 30 days on a scale from 1 (not at all) to 7 (two packs or more per day).

Alcohol Use. Alcohol use was measured with one item that indicated the frequency of drinking alcohol in the past 30 days on a scale from 1 (0 occasions) to 7 (40+ occasions).

Marijuana Use. Marijuana use was measured with one item that indicated the frequency of using marijuana or hashish in the past 30 days on a scale from 1 (0 occasions) to 7 (40+ occasions).

Academic Behaviors and Outcomes. Students' average grades were measured with one item, scaled from (1) D – 69 or below to (9) A – 93-100. Skipping school was measured with one item that indicated the frequency of days the student missed school in the past four weeks because of cutting/skipping on a scale from (1) None to (7) 11 or more days. Skipping class was measured with one item that indicated the frequency of times the students missed a class in the past four weeks because of cutting/skipping on a scale from (1) Not at All to (6) More Than 20 Times. Students also indicated whether they had been suspended and/or expelled on a scale from (1) No to (3) Yes, Two or More Times. These variables have been used as indicators of academic achievement and school misbehavior in other studies (e.g. Bryant et al., 2003).

Demographics. Students self-reported their gender, race/ethnicity, and education levels of their parents. Race/ethnicity was classified as: White, African American, Hispanic, Asian, or Other (which included students who indicated multiple races/ethnicities). Parental education was measured by the average of two questions,

which asked students to indicate the highest levels of school completed by their mother and their father. Parental education was scaled from (1) Completed Grade School or Less to (6) Graduate or Professional School After College.

Sample

The present study focused solely on high risk-takers in grade 10; 851 adolescents scoring the maximum of 10 in risk-taking and who completed the survey form of interest were identified as high risk-takers in the focal group. However, 103 adolescents were excluded from the final cluster analysis due to missing data on the clustering variables, leaving a total sample size of 748. Those excluded from the analysis had significantly higher levels of 30-day smoking yet significantly lower levels of 30-day marijuana use, had lower school grades, were less likely to cut school, but were suspended more often as compared to those who had sufficient data to be included in the analyses. In addition, those who were excluded from the analyses were more likely to be Hispanic compared to those who had sufficient data to be included in the analyses. However, no other differences by race/ethnicity, no gender differences, and no differences by 30-day alcohol use were found when comparing high risk-taking adolescents who were included and excluded from the analyses based on missing data.

On average the participants were 16 years old. Overall, 74% were Caucasian, 7% were African American, 11% were Hispanic, 2% were Asian, and 6% were of other or mixed racial or ethnic backgrounds. Approximately 35% of the participants were female, which is consistent with previous findings that females exhibit lower levels of risk-taking than males in adolescence (e.g. Vartanian, 2000).

Results

Preliminary Analyses

Before focusing on high risk-takers only, preliminary analyses were conducted to justify this decision. As can be seen in Table 3.1, high risk-takers differed significantly from other adolescents on all study variables with the exceptions of going to movies, alone leisure, sports/exercise in leisure time, and school athletics participation. These differences suggested that clusters would be different for high risk-takers as compared to everyone else; therefore, high risk-takers were an appropriate focal group separate from the rest of the 10th grade adolescents in the Monitoring the Future study. Additionally, previous research has indicated that the highest risk-takers are different from others not only in terms of mean-level variations but also in terms of processes and relationships of variables related to substance use, protective factors, and risk factors (Dever et al., under review).

Correlations of study variables are presented in Table 3.2. Cigarette use, alcohol use, and marijuana use were highly related with one another. In general, the use of each of these three substances was negatively associated with going to movies, participation in community affairs, sports/exercise activities, reading the newspaper, enjoyment of school, interest in school work, participation in school activities, and average academic grades. Substance use had a positive relationship with attendance at rock concerts, riding in cars for fun, visiting with friends, attending parties, cutting school, skipping class, and suspension/expulsion.

Cluster Formation

Hierarchical cluster analysis was conducted to identify clusters of risk-takers according to their activity participation, attitudes toward school, and substance use levels.

Therefore, responses for each adolescent regarding the 11 leisure activities, 4 extracurricular activities, 3 attitudes toward school, cigarette use, alcohol use, and marijuana use were entered into the analysis and formed the basis for the clusters. The Ward's linkage method was used; the measure of proximity used was squared Euclidian distance. Data were standardized prior to cluster analysis to account for the different response scales used across items (Everitt, Landau, & Leese, 2001).

In order to verify that the clusters formed could be duplicated, the sample of 748 risk-takers was split into three random subsets of equal number. The same hierarchical cluster analysis procedure was conducted on each third, and the cluster solution was compared across the three subsamples to verify consistency (e.g. Crockett et al., 2006). An examination of the incremental changes in variance explained, pseudo-F and t^2 statistics provided by SAS 9.1.3, theoretical meaningfulness, and duplication of the clusters across subsample were used as criteria for selecting the final cluster solution. The results from two of the subsamples suggested either 6 or 9 clusters as the best solution. The results from the remaining subsample suggested either a 6 or 8 cluster solution. Solutions of 6, 7, 8, and 9 clusters were examined for similarities across subsamples as well as theoretical interpretability. Only the 6-cluster solution was replicated across subsamples and theoretically meaningful.

In the final step, the hierarchical cluster analysis was conducted on the full sample of adolescents. The results indicated that the 6-cluster solution was in fact the best solution statistically. An examination of the clusters across the three subsamples and the full sample suggested the same 6 clusters. Means and standard deviations of the clustering variables by cluster across the full sample are presented in Table 3.3.

Based on the characteristics of the clusters, they were named the following: Athletics Only, School Oriented, Uninvolved Users, Involved Users, Uninvolved Non-users, and Club Members. A series of ANOVA tests was conducted to determine significant differences across clusters on the clustering variables (Table 3.3). For each significant ANOVA test, post-hoc least significant difference (LSD) comparisons were conducted for pairwise differences between clusters (see Table 3.3). Figures 3.1 through 3.4 show a graphical depiction of the differences by cluster in substance use, leisure activity participation, school attitudes, and extracurricular activity participation. A summary of these findings is presented in Figure 3.5

The Athletics Only cluster (n = 233; 31.1%) exhibited low levels of cigarette use and moderate levels of alcohol and marijuana use. These adolescents reported high levels of participation in sports and exercise-related activities. They generally liked school, although they did not find their school work particularly interesting. Finally, reported a fairly high level of participation in school-related sports.

The School Oriented cluster (n = 198; 26.8%) exhibited the lowest levels of cigarette, alcohol, and marijuana use across the clusters. They were highly involved in sports and exercise-related activities. In addition, these adolescents were among the highest in terms of reading magazines and newspapers. The School Oriented cluster enjoyed school and found their school work interesting. Finally, the School Oriented risk-takers were very involved in Performing Arts, school-related sports, other school activities, and community affairs.

The Uninvolved Users cluster (n = 121; 16.2%) exhibited the highest levels of cigarette use and moderately high levels of alcohol and marijuana use. They reported

low levels of rock concert attendance, movie attendance, sports and exercise, reading magazines and newspapers, and school-related activities. However, they reported the highest levels of riding in cars for fun, visiting friends, and attending parties across the clusters.

The Involved Users cluster (n = 79; 10.6%) exhibited moderately high levels of cigarette use and the highest levels of alcohol and marijuana use across the clusters. Like the Uninvolved Users, these adolescents reported the highest levels of riding in cars for fun, visiting friends, and party attendance. In addition, they also reported high levels of going to movies, going to rock concerts, participating in sports and exercise, and reading magazines. Finally, the Involved Users were moderately interested in school and were more likely to participate in school-related activities than the Uninvolved Users.

The Uninvolved Non-Users cluster (n = 77; 10.3%) exhibited the lowest levels of substance use, along with the School Oriented cluster. These adolescents were the least involved in the vast majority of the activities and enjoyed school the least. Their reported alone leisure time was similar to most of the other clusters, but they reported less time visiting friends as compared to the other five clusters.

Finally, the Club Members cluster (n = 40; 5.3%) exhibited moderate levels of cigarette and alcohol use, but among the lowest levels of marijuana use of the clusters. They reported relatively low levels of alone leisure time. These adolescents enjoyed school and found the work they did in school interesting. The defining feature of this cluster was their high levels of participation in all school-related activities and community affairs.

Demographic Characteristics by Cluster

The demographic characteristics of each cluster are presented in Table 3.4.

A series of chi-square tests was conducted to determine differences in demographic characteristics across the clusters. Post-hoc least significant difference (LSD) comparisons were conducted to determine pairwise differences in demographics between clusters. Cluster membership was significantly associated with parental education, χ^2 (50) = 123.08, $p < .001$. Those in the Athletics Only and School Oriented clusters had the highest levels of parental education. Adolescents in the Uninvolved Users cluster reported the lowest levels of parental education.

Cluster membership was also significantly associated with being White, χ^2 (5) = 20.64, $p < .001$ and Hispanic, χ^2 (5) = 24.99, $p < .001$. Adolescents in the Athletics Only, Uninvolved Users, and Involved Users clusters were most likely to be White, whereas those in the Club Members cluster were least likely to be White. Adolescents in the Athletics Only, Uninvolved Users, and Involved Users clusters were least likely to be Hispanic, whereas those in the Club Members cluster were most likely to be Hispanic. Cluster membership was not associated with being African American: χ^2 (5) = 3.55, $p = .62$, Asian: χ^2 (5) = 3.04, $p = .69$, or another race/ethnicity: χ^2 (5) = 2.32, $p = .80$. Finally, cluster membership was significantly associated with gender, χ^2 (5) = 21.65, $p < .001$. Those in the Athletics Only cluster were more likely to male, whereas those in the Uninvolved Users and Club Members clusters were more likely to be female.

Academic Outcomes by Cluster

Table 3.5 presents the means and standard deviations of the academic outcome variables, both across the full sample and by cluster. A series of ANOVA tests was conducted to determine significant differences across clusters on the academic outcomes.

For each significant ANOVA test, post-hoc least significant difference (LSD) comparisons were conducted for pairwise differences between clusters (see Table 3.4).

Average Grades. Cluster membership significantly predicted grades, F (5, 737) = 14.88, $p < .001$. Uninvolved Users, Involved Users, and Uninvolved Non-users had the lowest grades of all the clusters. The School Oriented and Club Members clusters reported the highest average grades.

Cutting School/Skipping Class. Cluster membership significantly predicted both cutting school, F (5, 716) = 14.89, $p < .001$ and skipping individual classes, (5, 741) = 8.44, $p < .001$. Involved Users were the most likely to both cut school and skip class across the clusters. Uninvolved Users were more likely to cut school and skip class than all of the remaining clusters.

Suspension and Expulsion. Cluster membership significantly predicted instances of suspension and expulsion, F (5, 741) = 14.09, $p < .001$. The School Oriented and Club Members clusters were the least likely to have been suspended and expelled across the clusters. The Involved Users and Uninvolved Users reported the highest levels of suspension and expulsion.

Discussion

The present study sought to identify meaningful patterns of activities and behaviors in which risk-takers engage, in order to distinguish among those patterns that do and do not involve reckless substance use. A person-centered hierarchical cluster analysis was conducted in order to capture these patterns. The results of the analyses revealed six meaningful clusters of high risk-takers: Athletics Only, School Oriented, Uninvolved Users, Involved Users, Uninvolved Non-Users, and Club Members, which is

similar to patterns identified in previous research (Feldman & Matjasko, 2007; Linver, Roth, & Brooks-Gunn, 2009).

After initial cluster formation, the defining behavior patterns of the clusters, the demographic characteristics of the clusters, and the relationships of the clusters to academic outcomes were examined. The Athletics Only cluster reported low levels of cigarette use, with moderate levels of alcohol and marijuana use. Although the results regarding low cigarette and moderate alcohol use are consistent with past research, the finding that athletes used marijuana at moderate levels is somewhat inconsistent with the literature (e.g. Darling, Caldwell, & Smith, 2005; Eccles & Barber, 1999; Hoffman, 2006). These adolescents generally enjoyed school, and participated in high levels of sports/exercise and school-related athletics. Those in the Athletics Only cluster were more likely to be male, to be white, and to have highly educated parents as compared to the other clusters. Students in the Athletics Only cluster were average in grades, frequency of cutting school, skipping classes, suspensions and expulsions. Overall, membership in the Athletics Only cluster was associated with approximately average outcomes, making it neither a clear protective factor nor risk factor when considering educational outcomes and substance use.

The School Oriented cluster reported among the lowest levels of use of all substances across the six clusters. This finding supports literature that suggests that an academic orientation serves a protective role against substance use (e.g. Bryant et al., 2003), extending this finding to apply to high risk-takers as well. These adolescents reported high levels of participation in reading activities, sports/exercise, school-related activities, and community affairs. In addition, those in the School Oriented cluster

enjoyed school and found school work to be interesting. Adolescents in this cluster were likely to have highly educated parents. Not surprising, these students had among the highest grades across clusters and were among the least likely to have been suspended or expelled.

Uninvolved Users exhibited relatively high levels of use of all substances, particularly cigarettes. These adolescents reported high levels of rather unorganized socialization such as riding in cars for fun, visiting with friends, and attending parties, yet low levels of more prosocial or organized activities such as going to movies, sports/exercise, reading, and school-related organizations. Uninvolved users were likely to have parents with low levels of education, be white, and be female as compared to the other clusters. On average, these adolescents had lower grades, were more likely to cut school and skip class, and had the highest rates of suspension and expulsion compared to the other clusters. Therefore, membership in this cluster was a further risk factor above and beyond being a high risk-taker in general.

Involved Users also reported rather high levels of use of all substances, particularly alcohol and marijuana. In addition to riding in cars for fun, visiting with friends, and attending parties, Involved Users were involved in sports/exercise, went to movies, went to rock concerts, were moderately interested in school, and participated in some school-related activities. As compared to the other clusters, the Involved Users were likely to be white, had low grades, and were the most likely to cut school, skip class, be suspended, and be expelled. Overall, this cluster showed a fairly social orientation, supporting previous research that suggested a focus on socialization with peers is associated with higher levels of use of social substances, such as alcohol (e.g.

Rhoades & Maggs, 2006). Therefore, even among the highest risk-takers as in this study, those with this pattern of activities were even more at-risk for troublesome educational and substance use outcomes.

Uninvolved Non-Users reported among the lowest levels of use of all substances. These adolescents had very low levels of involvement in activities and enjoyed school the least of all of the clusters. Although they reported similar amounts of alone leisure time, Uninvolved Non-Users reported the least amount of time spent visiting with friends. These adolescents had low grades, although they did not report school misbehavior any more frequently than the other clusters. In other words, although membership in this cluster was protective in terms of low levels of substance use, it also operated as a risk for lower academic achievement.

Club members reported moderate levels of cigarette and alcohol use, but among the lowest levels of marijuana use among the clusters. These adolescents had fairly little alone leisure time and were involved in school-related activities and community affairs. In addition, they enjoyed school and were interested in their work. These adolescents were more likely to be Hispanic as compared to the other clusters. Finally, they had among the highest average grades and were among the least likely to have been suspended or expelled from school. Therefore, participation in clubs exerted a protective effect, especially when considering academic outcomes.

Overall, the findings indicated that as expected, not all risk-takers were similarly high in substance use. More than one third of the sample, the School Oriented and Uninvolved Non-Users, had low levels of use of all of the substances. Despite low substance use, the Uninvolved Non-Users still showed signs of difficulty in school based

on grades. Therefore, risk-takers who were Uninvolved Non-Users were able to avoid substances, they still did not demonstrate educational resilience in terms of achievement. Risk-takers who used low to moderate levels of substances also accounted for more than a third of the sample. Those in Athletics Only and Club Members likely used substances socially, as they spent a great deal of time with friends and involved in organized activities. Based on grades and frequency of suspension/expulsion, Club Members were educationally resilient.

Approximately one quarter of the risk-takers used substances heavily. The Involved Users cluster reported particularly high levels of marijuana and alcohol use, whereas the Uninvolved Users cluster reported particularly high levels of cigarette use. However, compared to the other four clusters, both groups had relatively high levels of use of all substances. These two groups could be distinguished from each other by the participation of the Involved Users in some prosocial and organized activities in which the Uninvolved Users did not take part. Both groups of heavier substance users had low school grades, were most likely to cut school and skip class, and had the highest frequencies of suspensions and expulsions.

The results of this study support the findings of Linver, Roth, and Brooks-Gunn (2009) and extend them to high risk-taking adolescents. Although those who participated in Athletics Only were reporting more educationally-resilient outcomes than those who were completely Uninvolved, it appears that those who participated in a wide array of organized activities (such as the School Oriented and the Club Members) showed even better educational outcomes. Therefore, the study of the influences of sports in the

absence of information about the larger context may be limited in terms of the prediction of important developmental outcomes such as achievement and educational success.

In general, the present study contributed to the literature regarding the links among risk-taking, substance use, and educational outcomes during adolescence. Although risk-taking behavior has been related to poorer educational outcomes (e.g. Paulson, Coombs, & Richardson, 1990) and higher levels of substance use (e.g. Pilgrim et al., 2006), the current study provides evidence that this association is not pre-determined. Despite their high risk for educational and substance use difficulties, even the highest risk-takers have the opportunity to thrive and demonstrate resilient outcomes. Aspects of their context, such as participation in particular leisure and school-related activities, provide high risk-takers with opportunities to demonstrate behavioral and educational resilience.

More specifically, adolescents who are academically-oriented exhibit resilience in terms of substance use and educational outcomes, whereas those involved in school clubs, athletics, and even a subset of uninvolved adolescents display varying degrees of educational resilience. These findings support the claim that more research is needed considering a variety of outcomes when studying resilience (Luthar, Doernberger, & Zigler, 1993); a focus on a singular outcome in the present study would likely have overlooked the different types of, and venues for, resilience available to high risk-taking adolescents.

Limitations and Future Directions

Future studies should explore the unexpected finding that those in Athletics Only reported moderate levels of marijuana use, which is inconsistent with past work (e.g.

Eccles & Barber, 1999). The present study was limited to reports of participation in sports, exercise, and school-related athletics in general. However, the level of organization of the sport, or the particular sport in question, may be important in predicting substance use accurately among adolescents in general and risk-takers more specifically (e.g. Moore & Werch, 2005). This claim was also supported by the findings of Chapter II of the current dissertation; therefore, Chapters II and III can draw upon the strengths of one another to build a model of the protective influences of extracurricular activities during adolescence, for high risk-takers and other at-risk groups. The combination of findings from multiple studies is likely to be the best method to truly capture the nuanced processes behind resilience (Luthar, Cicchetti, & Becker, 2000).

In addition, future studies should examine the Uninvolved Non-User cluster more closely. As they had limited participation in academic, social, and extracurricular activities, it is difficult to determine how and when these adolescents are taking risks. In addition, this group did not have particularly high levels of externalizing behaviors such as cutting school, but had relatively low achievement. It is possible that these adolescents were expressing their propensity toward risk-taking virtually, such as through video games or other types of creative games. However, it could also be the case that these adolescents desired to engage in reckless risks such as substance use, but were deterred because of social constraints that limited opportunity (e.g. parental monitoring, narrow peer group, etc.). Further research would help to clarify the mechanisms that helped this group avoid substance use despite educational difficulties.

It should be noted that the present study was unable to determine the causal directions of the relationships studied. Although the findings suggest that involvement in

academics, athletics, and other prosocial activities are potentially protective against substance use and educational difficulties among risk-takers, it is important not to overemphasize the influence of the context at the expense of the individual. As always, risk and protection involves an interaction between the individual and the context such that a particular individuals' niche-seeking could be responsible for the contexts with which he or she interacts regularly. Further longitudinal work would be necessary to disentangle causal relationships and make stronger statements regarding the mechanisms that underlie the present findings. In addition, these findings should be validating with other methods, including latent class analysis, in order to provide further support for the clusters found.

Implications

Despite the inevitable limitations of the current study, there are both theoretical and practical implications that can be drawn from the findings. Theoretically, the present study provides evidence for both a level of risk (e.g. Arnett, 1992) and normative adaptation (e.g. Dworkin, 2005) associated with risk-taking behavior in adolescence. By considering a relatively large sample of the highest risk-takers, the current study offers strong support for the importance of the context when considering the relative impact of a singular risk factor, such as risk-taking propensity. Although all adolescents in this study reported the same level of risk-taking, very clear differences in educational and substance use outcomes emerged depending upon the activity profile of the adolescent. Therefore, although risk-taking has been clearly linked to problematic educational and substance use outcomes when using a variable-centered approach, the person-centered approach of the present study implicates the context as an important source of protection.

Practical applications follow from these theoretical implications. It appears that "idle hands" truly may be troublesome when considering how high risk-takers use their time; those who were not involved in activities were at-risk either educationally or both educationally and in terms of substance use. However, being involved in unstructured activities was not sufficient to promote resilience; instead, participation in structured prosocial activities such as clubs, athletics, and academic pursuits is critical in prevention and protection efforts (Larson, 2000). Therefore, risk-taking adolescents may be best served by school and extracurricular programs that offer opportunities to take risks in prosocial, developmentally-appropriate ways. Future studies should focus on programs that allow self-selection vs. random assignment in order to explore whether high risk-taking adolescents demonstrate resilience regardless of activity, or if the ability to choice is crucial to resilience.

Conclusion

The present study offered a unique distinction among different patterns of activity of high risk-takers to gain a better understanding of the adolescent risk-taker as a whole person within many complex contexts. In summary, the results supported the claim that even the highest risk-takers can avoid reckless risks such as substance use, demonstrate educational resilience, and channel their risk-taking behaviors into developmentally-appropriate activities such as academics and sports. This information can be helpful in developing appropriate protective mechanisms for high risk-takers who might otherwise be susceptible to substance use.

Appendix

Risk-Taking

I get a real kick out of doing things that are a little dangerous.
I like to test myself every now and then by doing something a little risky.

Leisure Activities

How often do you do each of the following?

Go to movies; Go to music concerts; Ride around in a car (or motorcycle) just for fun; Participate in community affairs or volunteer work; Actively participate in sports, athletics, or exercising; Get together with friends informally (in your free time); Go to a shopping mall; Spend at least an hour of leisure time (free time) alone; Read magazines; Read newspapers; Go to parties or other social affairs

School-Based Extracurricular Participation

To what extent have you participated in the following school activities during this school year?

School newspaper or yearbook; Music or other performing arts; Athletic teams; Other school clubs or activities

Attitudes Toward School

Now thinking back over the past year in school, how often did you…

Enjoy being in school
Hate being in school
Find your school work interesting

Cigarette Use

How frequently have you smoked cigarettes during the past 30 days?

Alcohol Use

On how many occasions have you had alcoholic beverages to drink – more than just a few sips – during the last 30 days?

Marijuana Use

On how many occasions (if any) have you used marijuana (weed, pot) or hashish (hash, hash oil) during the last 30 days?

Academic Behaviors and Outcomes

Which of the following best describes your average grade in school this year?
During the last four weeks, how many whole days of school have you missed because you skipped or “cut”?
During the last four weeks, how often have you gone to school, but skipped a class when you weren’t supposed to?
Have you ever been suspended or expelled from school?

Table 3.1. Descriptive Statistics for Clustering Variables, Full Sample

	High Risk-Takers	*Low/Moderate Risk-Takers*
Variable	*Mean(SD)*	*Mean(SD)*
30-day Cigarette Use***	1.92(1.36)	1.30(0.79)
30-day Alcohol Use***	2.45(1.59)	1.62(1.09)
30-day Marijuana Use***	2.21(1.93)	1.39(1.14)
Going to Parties***	3.50(0.99)	3.12(0.95)
Going to Movies	2.72(0.73)	2.75(0.69)
Going to Rock Concerts***	1.61(0.77)	1.47(0.65)
Riding for Fun***	4.26(1.11)	3.61(1.35)
Going Shopping/Mall***	3.09(1.03)	3.23(0.88)
Sports/Exercise	3.88(1.45)	3.93(1.36)
Alone Leisure	4.06(1.27)	4.05(1.16)
Visit with Friends***	4.42(0.87)	4.21(0.90)
Reading Magazines*	3.38(1.18)	3.32(1.07)
Reading Newspaper***	3.09(1.36)	3.16(1.28)
Enjoy School***	2.86(1.16)	3.18(1.00)
Hate School (Reversed)***	2.51(1.17)	2.90(1.06)
School Work Interesting***	2.54(1.02)	2.76(0.93)
School Publications***	1.23(0.77)	1.31(0.87)
School Performing Arts***	1.98(1.54)	2.19(1.61)
School Athletics	2.96(1.80)	2.95(1.77)
Other School Activities***	2.29(1.55)	2.54(1.55)
Community Affairs***	1.93(0.98)	2.17(0.99)

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

Table 3.2. Correlations of Study Variables.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. 30-Day Cigarette	--														
2. 30-Day Alcohol	.31	--													
3. 30-Day Marijuana	.46	.41	--												
4. Go to Movies	-.1	-.0	-.1	--											
5. Go to Rock Concerts	.05	.11	.13	.20	--										
6. Ride for Fun	.18	.25	.20	.17	.12	--									
7. Community Affairs	-.1	-.0	-.2	.14	-.0	.02	--								
8. Sports/Exercise	-.2	-.0	-.2	.18	.00	.07	.29	--							
9. Visit with Friends	.12	.18	.15	.14	.14	.28	.03	.14	--						
10.Go Shopping	.03	.07	.07	.26	.08	.24	.09	.08	.24	--					
11.Alone Leisure	-.0	-.0	-.0	.04	.04	.01	.08	.10	.10	.11	--				
12.Read Magazines	-.0	.02	-.0	.11	.04	.06	.14	.06	.10	.20	.23	--			
13.Read Newspaper	-.0	-.0	-.1	.07	-.0	-.0	.21	.19	.06	.10	.14	.45	--		
14.Go to Parties	.19	.36	.30	.24	.21	.35	.00	.16	.37	.25	-.0	.08	.03	--	
15.Enjoy School	-.1	-.0	-.1	.11	-.0	.04	.27	.20	.04	.19	.09	.19	.23	.06	--
16.Hate School (rev)	-.1	-.0	-.1	.07	-.0	-.0	.17	.09	.00	.07	.06	.11	.18	-.0	.66
17.School Interesting	-.1	-.1	-.1	.06	-.0	-.0	.21	.16	.03	.08	.06	.15	.21	-.0	.47
18.Publications	.00	.01	-.0	-.0	.01	-.0	.14	-.0	-.0	.01	-.1	.00	.11	-.0	.08
19.Performing Arts	-.1	-.0	-.1	.06	.06	-.0	.20	.11	-.0	.04	-.0	.01	.08	-.0	.18
20.School Athletics	-.2	-.0	-.2	.12	-.0	.01	.19	.55	.05	.01	.02	.06	.23	.15	.18
21.Other School	-.2	-.0	-.2	.04	-.0	-.0	.37	.30	.01	.02	-.0	.10	.16	.01	.25
22.Grades	-.1	-.0	-.1	.00	.01	-.0	.14	.21	-.0	-.0	-.0	.05	.13	-.0	.18
23.Cut School	.21	.35	.33	.02	.08	.17	-.1	-.1	.11	.10	-.0	.03	-.0	.20	-.0
24.Skip Class	.20	.29	.31	.07	-.0	.13	-.0	-.0	.02	.06	-.0	-.0	-.0	.15	-.0
25.Suspended/Expelled	.18	.24	.31	-.0	.07	.14	-.1	-.1	.09	.02	-.0	-.0	-.0	.07	-.1

Note. All correlations greater than 0.07 are significant, $p < .05$.

Table 3.2 (continued). Correlations of Study Variables.

	16	17	18	19	20	21	22	23	24	25
1. 30-Day Cigarette										
2. 30-Day Alcohol										
3. 30-Day Marijuana										
4. Go to Movies										
5. Go to Rock										
6. Ride for Fun										
7. Community Affairs										
8. Sports/Exercise										
9. Visit with Friends										
10.Go Shopping										
11.Alone Leisure										
12.Read Magazines										
13.Read Newspaper										
14.Go to Parties										
15.Enjoy School										
16.Hate School (rev)	--									
17.School Interesting	.40	--								
18.Publications	.08	.10	--							
19.Performing Arts	.12	.17	.22	--						
20.School Athletics	.15	.09	.13	.17	--					
21.Other School	.16	.20	.28	.31	.40	--				
22.Grades	.14	.12	.07	.15	.27	.19	--			
23.Cut School	-.12	-.05	.02	-.04	-.12	-.08	-.21	--		
24.Skip Class	-.07	-.03	.08	-.00	-.06	-.06	-.18	.55	--	
25.Suspended/Expelled	-.14	-.11	-.01	-.11	-.19	-.12	-.30	.23	.26	--

Note. All correlations greater than 0.07 are significant, $p < .05$.

Table 3.3. Descriptive Statistics for Clustering Variables by Cluster

	Athletics Only n=233	School Oriented n=198	Uninvolved Users n=121	Involved Users n=79	Uninvolved Non-users n=77	Club Members n=40	
Variable	*Mean(SD)*	*Mean(SD)*	*Mean(SD)*	*Mean(SD)*	*Mean(SD)*	*Mean(SD)*	*F*
30-day Cigarette Use	1.36(0.73)^{a}	1.43(0.86)^{a}	3.54(1.62)^{d}	2.47(1.42)^{c}	1.44(0.80)^{ab}	1.63(0.87)^{b}	93.02
30-day Alcohol Use	2.36(1.52)^{b}	1.93(1.17)^{a}	3.06(1.58)^{c}	3.86(1.54)^{d}	1.66(0.82)^{a}	2.53(1.91)^{bc}	30.90
30-day Marijuana Use	1.67(1.33)^{b}	1.31(0.80)^{a}	3.62(2.26)^{c}	4.44(2.07)^{d}	1.35(1.10)^{a}	1.83(1.43)^{ab}	85.42
Going to Parties	3.54(0.90)^{b}	3.49(0.80)^{b}	3.75(0.97)^{c}	3.90(0.76)^{c}	2.43(0.89)^{a}	3.48(1.20)^{b}	9.77
Going to Movies	2.91(0.73)^{c}	2.84(0.63)^{c}	2.46(0.74)^{a}	2.85(0.83)^{bc}	2.43(0.70)^{a}	2.60(0.78)^{ab}	13.61
Going to Rock Concerts	1.53(0.64)^{a}	1.61(0.70)^{a}	1.56(0.78)^{a}	2.30(1.05)^{b}	1.43(0.64)^{a}	1.68(0.83)^{a}	19.06
Riding for Fun	4.43(0.82)^{c}	4.01(1.33)^{b}	4.69(0.62)^{d}	4.53(0.86)^{cd}	3.43(1.32)^{a}	4.18(1.22)^{bc}	42.67
Going Shopping/to the Mall	3.31(0.89)^{b}	3.20(0.98)^{b}	3.23(1.03)^{b}	3.15(1.12)^{b}	2.51(0.91)^{a}	3.10(1.19)^{b}	91.93
Sports/Exercise	4.48(0.89)^{b}	4.44(0.95)^{b}	2.49(1.41)^{a}	4.31(1.03)^{b}	2.65(1.47)^{a}	4.43(1.24)^{b}	25.22
Alone Leisure	4.14(1.11)^{b}	4.24(1.07)^{b}	3.45(1.58)^{a}	4.34(1.12)^{b}	4.18(1.20)^{b}	3.40(1.58)^{a}	7.83
Visit with Friends	4.54(0.75)^{c}	4.35(0.79)^{b}	4.69(0.62)^{c}	4.77(0.48)^{c}	3.42(1.21)^{a}	4.40(1.08)^{bc}	8.15
Reading Magazines	3.46(1.20)^{bc}	3.68(0.92)^{d}	2.93(1.20)^{a}	3.57(1.16)^{cd}	3.18(1.24)^{ab}	3.30(1.20)^{bd}	7.93
Reading Newspaper	3.28(1.33)^{b}	3.57(1.15)^{c}	2.41(1.34)^{a}	2.87(1.31)^{a}	2.60(1.28)^{a}	3.78(1.21)^{c}	21.15
Enjoy School	2.78(1.06)^{c}	3.63(0.86)^{d}	2.37(1.10)^{b}	2.45(1.07)^{bc}	1.92(0.87)^{a}	3.25(1.21)^{d}	32.43
Hate School (Reversed)	2.48(1.11)^{c}	3.22(1.01)^{d}	2.12(1.09)^{b}	2.24(1.08)^{bc}	1.66(0.82)^{a}	2.93(1.29)^{d}	45.57
School Work Interesting	2.35(0.91)^{b}	2.99(0.87)^{d}	2.35(1.02)^{b}	2.52(1.00)^{c}	1.91(0.81)^{a}	2.85(1.08)^{d}	28.53
School Publications	1.03(0.20)^{a}	1.10(0.36)^{ab}	1.05(0.31)^{ab}	1.05(0.27)^{ab}	1.12(0.36)^{b}	4.08(1.02)^{c}	25.54
School Performing Arts	1.45(1.07)^{a}	3.17(1.75)^{c}	1.31(0.86)^{a}	1.95(1.40)^{b}	1.16(0.49)^{a}	3.15(1.73)^{c}	396.28
School Athletics	3.66(1.68)^{c}	3.61(1.62)^{c}	1.53(1.15)^{a}	2.59(1.64)^{b}	1.60(1.09)^{a}	4.33(1.37)^{d}	65.80
Other School Activities	2.04(1.38)^{c}	3.43(1.48)^{d}	1.21(0.62)^{a}	1.70(1.07)^{b}	1.53(1.01)^{b}	4.00(1.34)^{e}	64.65
Community Affairs	1.86(0.90)^{c}	2.61(1.02)^{d}	1.36(0.63)^{a}	1.85(0.98)^{bc}	1.53(0.74)^{ab}	2.53(1.13)^{d}	75.02

Note. Groups with the same subscript were not significantly different from one another; For all *F* statistics, df = (5, 742), $p < .001$

Table 3.4. Descriptive Statistics for Demographic Variables by Cluster

	Athletics Only[c] n=233	School Oriented[c] n=198	Uninvolved Users[a] n=121	Involved Users[bc] n=79	Uninvolved Non-users[ab] n=77	Club Members[bc] n=40
Parent Education						
Grade School	1.73%	2.43%	2.42%	2.29%	7.10%	1.26%
Some High School	11.74%	5.58%	15.18%	7.80%	16.95%	20.02%
High School Graduate	33.37%	24.89%	46.56%	41.83%	39.68%	28.06%
Some College	21.53%	30.69%	27.14%	23.38%	20.89%	18.12%
College Graduate	23.05%	25.60%	5.75%	16.57%	14.03%	22.12%
Graduate School	8.59%	10.82%	2.95%	8.14%	1.34%	10.41%

	Athletics Only	School Oriented	Uninvolved Users	Involved Users	Uninvolved Non-users	Club Members
Race/Ethnicity						
White	79.21%[c]	72.64%[bc]	84.83%[c]	78.00%[c]	65.62%[ab]	57.19%[a]
African American	3.85%[d]	7.33%[d]	5.53%[d]	7.30%[d]	8.04%[d]	8.24%[d]
Hispanic	8.22%[e]	13.67%[ef]	4.13%[e]	4.39%[e]	17.61%[fg]	24.46%[g]
Asian	3.05%[h]	1.57%[h]	0.68%[h]	2.28%[h]	1.23%[h]	1.38%[h]
Other	5.67%[i]	4.79%[i]	4.83%[i]	8.03%[i]	7.50%[i]	8.73%[i]

	Athletics Only[a]	School Oriented[b]	Uninvolved Users[c]	Involved Users[ab]	Uninvolved Non-users[ab]	Club Members[bc]
Gender						
Male	75.27%	64.64%	53.34%	72.09%	69.87%	57.10%
Female	24.73%	35.36%	46.66%	27.91%	30.13%	42.90%

Note. Within each characteristic, groups with the same subscript were not significantly different from one another

Table 3.5. Descriptive Statistics for Academic Variables by Cluster

	Athletics Only n=233	School Oriented n=198	Uninvolved Users n=121	Involved Users n=79	Uninvolved Non-users n=77	Club Members n=40
Variable	*Mean(SD)*	*Mean(SD)*	*Mean(SD)*	*Mean(SD)*	*Mean(SD)*	*Mean(SD)*
Average Grades	5.29(2.19)^{c}	5.88(2.10)^{b}	3.98(2.24)^{a}	4.41(2.24)^{a}	4.42(2.15)^{a}	5.95(2.48)^{bc}
Cutting School	1.61(1.27)^{a}	1.39(0.97)^{a}	2.28(1.84)^{b}	2.58(2.02)^{c}	1.46(1.10)^{a}	1.59(1.24)^{ab}
Skipping Class	1.57(1.09)^{a}	1.50(1.00)^{a}	1.96(1.41)^{bc}	2.19(1.36)^{c}	1.36(0.72)^{a}	1.63(1.13)^{ab}
Suspension/Expulsion	1.59(0.79)^{b}	1.39(0.67)^{a}	1.94(0.89)^{c}	1.96(0.93)^{c}	1.68(0.85)^{b}	1.55(0.75)^{ab}

Note. Within each characteristic, groups with the same subscript were not significantly different from one another

Figure 3.1. Profiles of Clusters by Substance Use Variables

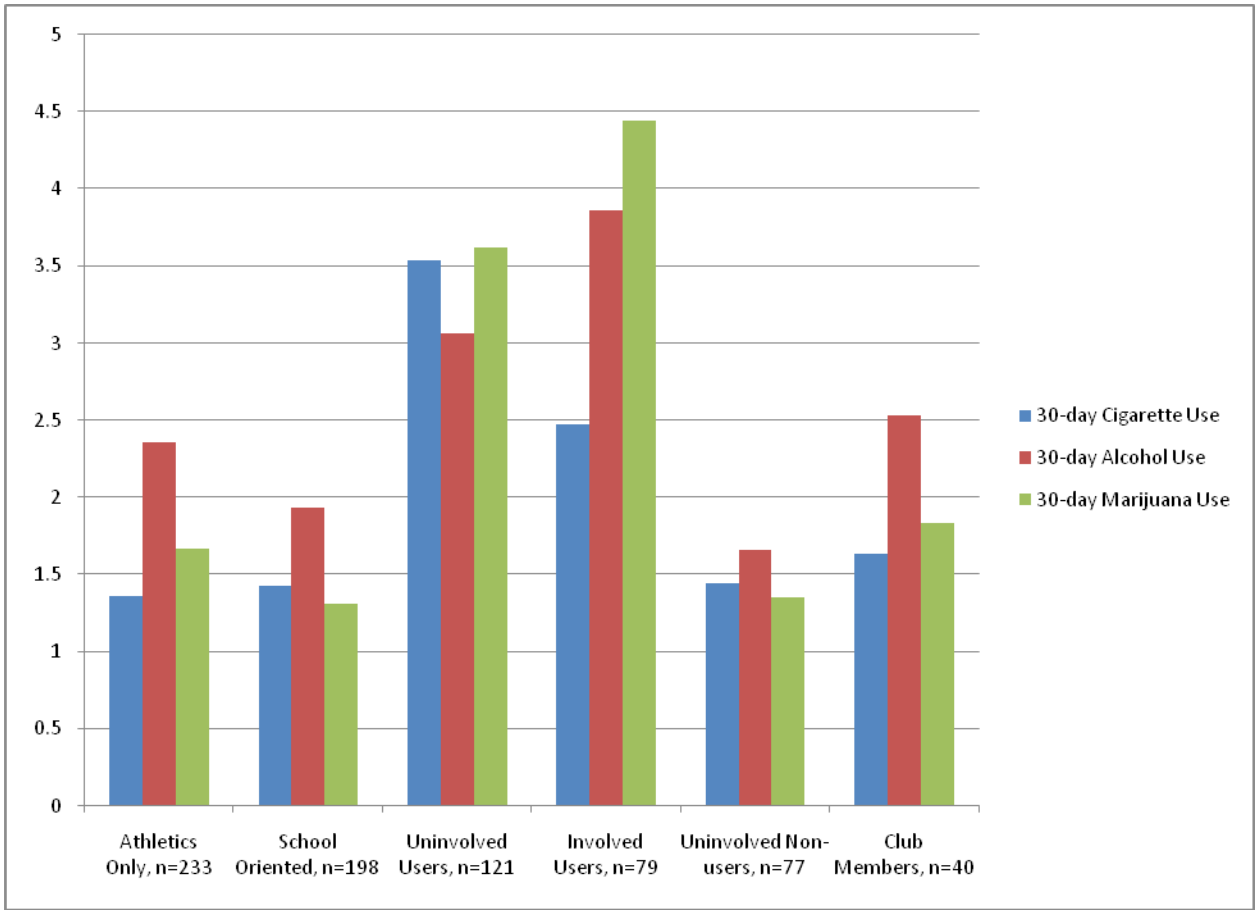


Figure 3.2. Profiles of Clusters by Leisure Activity Variables

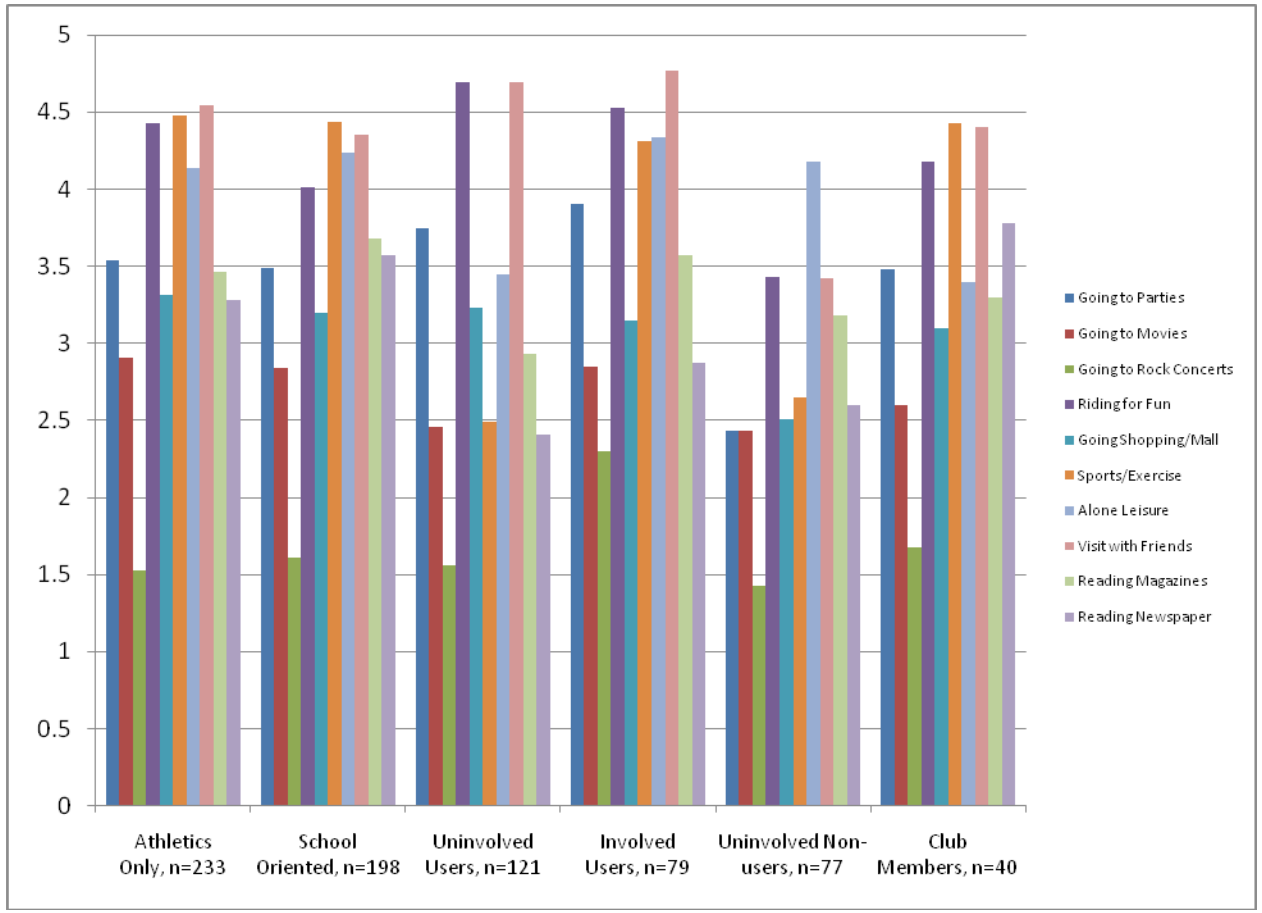


Figure 3.3. Profiles of Clusters by School Attitude Variables

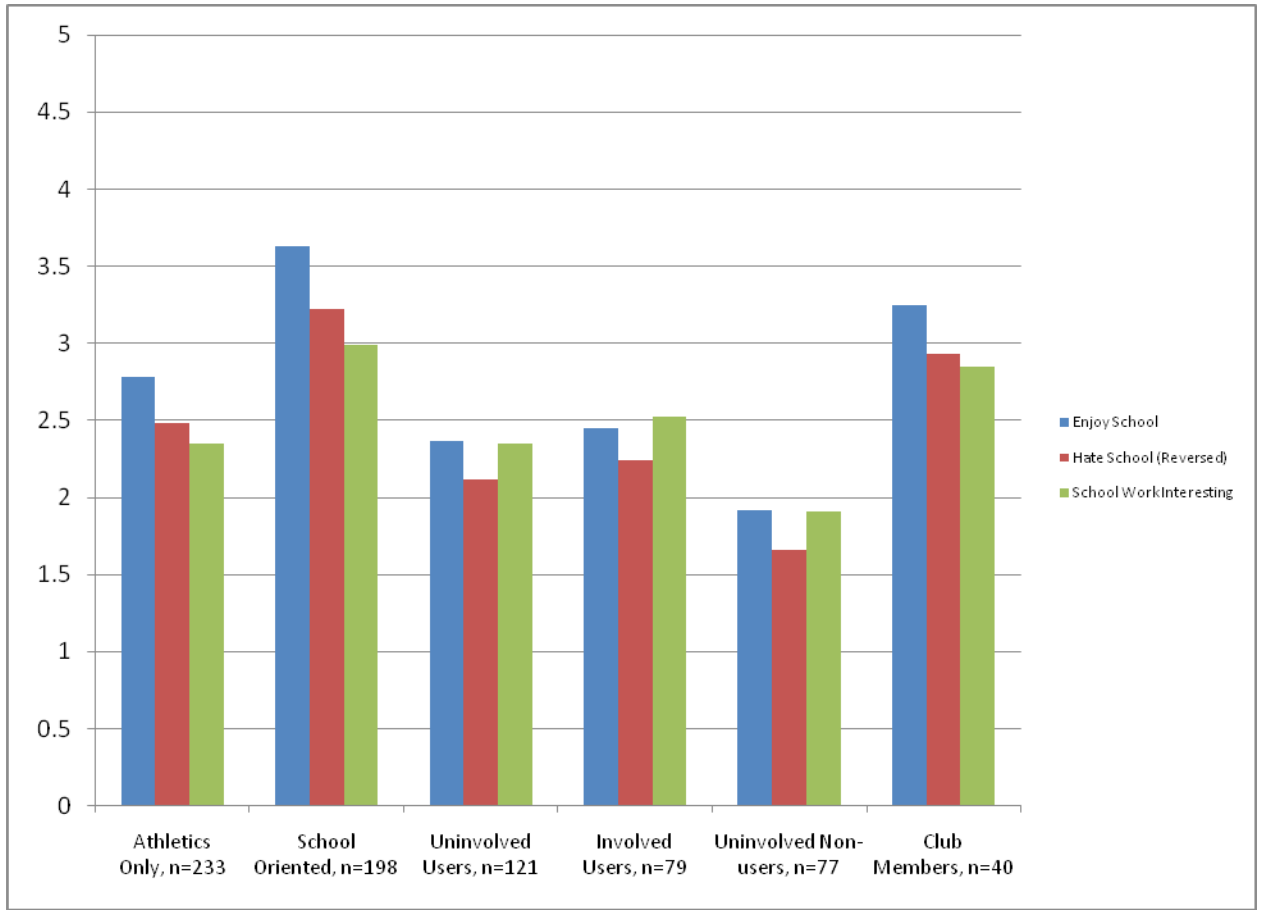


Figure 3.4. Profiles of Clusters by Extracurricular Variables

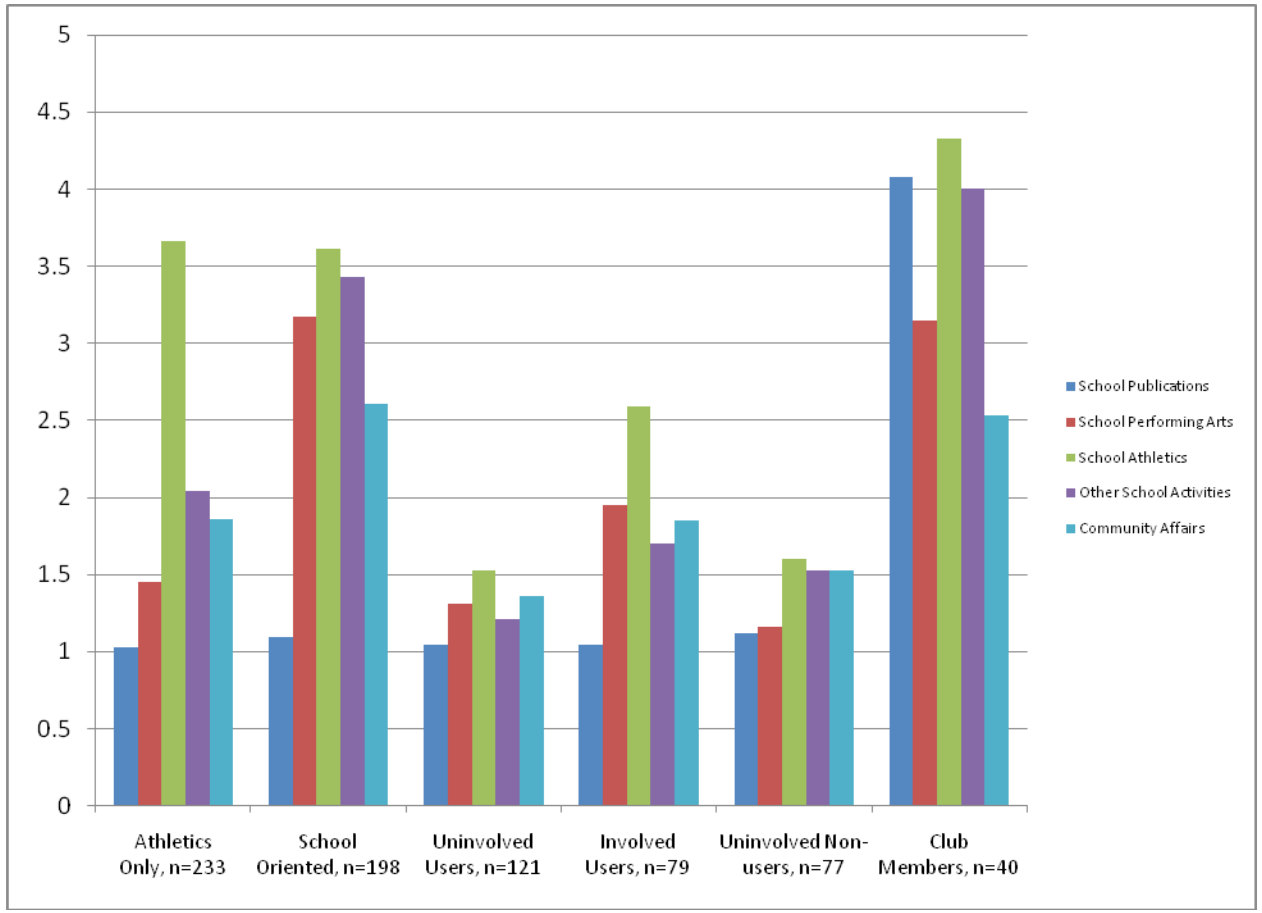
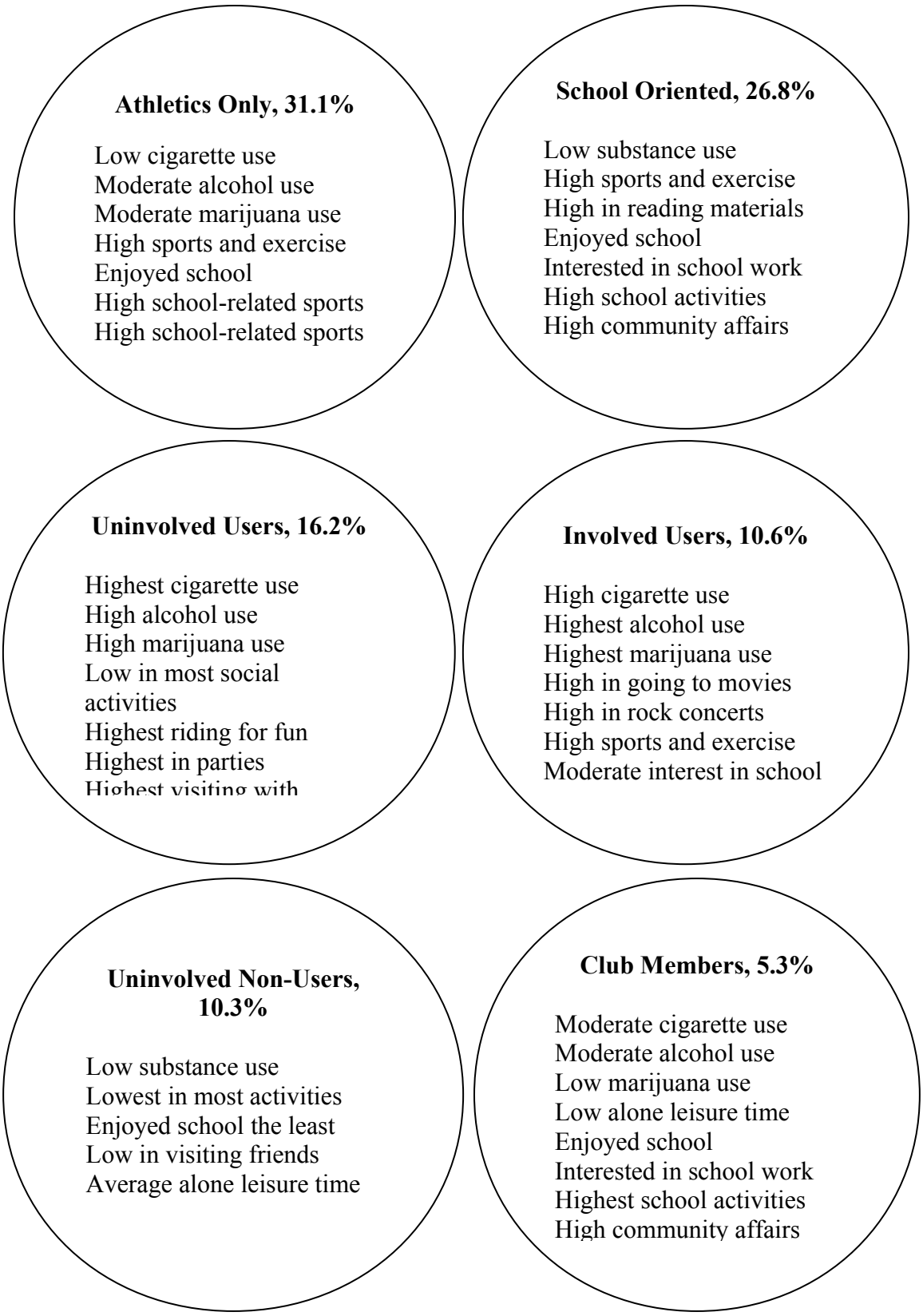


Figure 3.5. Depiction of Defining Characteristics of Adolescent Risk-Takers by Cluster



Chapter IV

A Model of Classroom Context, Motivation, and Math Achievement across Alternative and Traditional High School Settings

Expectancy-Value Theory of Achievement Motivation

The expectancy-value theory of achievement motivation (e.g., Eccles, 1983; Eccles, 2005) focuses on the influences that utility value, interest value, attainment value, cost value, and expectancies for success have on achievement-related behavior (e.g. Wigfield & Eccles, 2000). Utility value is defined as a student's beliefs concerning the usefulness of a task. Attainment value is defined as the importance of a task for one's own identity. Interest value refers to a student's intrinsic liking of a task. Cost value refers to the student's perceptions that he or she must give up things that are important to them to do well at the task. Finally, expectancy is defined as the perceived likelihood of success for a given task (Wigfield & Eccles, 2000). Overall, a great deal of research indicates that values and expectancies predict academic outcomes such as achievement and choice to enroll in a particular course (e.g., Eccles, 1983; Eccles, 1985; Wigfield, 1994; Wigfield & Eccles, 1992).

Eccles and colleagues have found that expectancies for success and values are most adaptive when the characteristics of the environment match the needs and characteristics of the individual student; it follows that a mismatch between the needs of the adolescent and the characteristics of the school context can be detrimental (e.g. Eccles

et al., 1993a). The effect of a person-environment mismatch on the values and expectancies of adolescents has been especially useful in understanding why school transitions have been associated with decreased motivation and performance (e.g., Eccles et al., 1993a). Students who are at-risk for academic difficulties in particular show the most vulnerability to motivation problems in the context of a person-environment mismatch (e.g. Lepper, Sethi, Dialdin, & Drake, 1997). The present study aimed to determine whether the effects of the school context operated different between two groups of students: those who were considered to be at-risk for academic failure and a similar comparison group.

Educational Risk and Resilience During Adolescence

Ameliorating the trend of decreased motivation in adolescence is especially urgent when students are at high risk for academic failure and drop out. *Risk factors* are variables at the individual or contextual level that increase the likelihood of an undesirable outcome (e.g. Gutman, Sameroff, & Cole, 2003; Luthar, Cicchetti, & Becker, 2000). Some of the most commonly studied risk factors for academic difficulty include poverty, membership in a racial minority group, previous low academic achievement, and behavioral problems in school (Borman & Overman, 2004; Croninger & Lee, 2001; Gutman, Sameroff, & Cole, 2003). In most instances, the undesirable outcomes studied involve the failure to meet critical developmental tasks; in adolescence, the developmental tasks to be met include successful school transitions and academic achievement (Masten & Coatsworth, 1998).

Fortunately, some students who are considered to be at-risk for academic difficulties are able to "beat the odds" and achieve academic success; this process of

adaptive development despite risk is known as resilience (Garmezy, 1991; Werner, 1994). Therefore, in order for resilience to be present, risk factors must be identified, and the outcome must be satisfactory adaptation. To better understand *how* resilience operates, it is necessary to study the processes that intervene between the presence of risk and the adaptive outcome. *Protective factors* are personal attributes or contextual resources that interact with risk level such that those who are at higher levels of risk are more likely to experience beneficial, competence-supporting effects from these resources (Masten, Best, & Garmezy, 1990). In other words, protective factors are those variables that are more important to the success of at-risk individuals as compared to those who are not at-risk. Protective factors are different from *promotive factors*, which benefit all individuals in the same way, regardless of risk (e.g. Luthar, Cicchetti, & Becker, 2000; Masten, Best, & Garmezy, 1990). In order to design interventions and preventative efforts to close the gaps between those who are at-risk and those who are not, the task is to identify beneficial protective factors.

As previously stated, achievement motivation tends to decrease during adolescence (Eccles et al., 1993a). In fact, adolescence can be seen as a critical period for educational risk and resilience due to the impact of changes in the school context (Becker & Luthar, 2002). The study of educational resilience, or resilience indicated by successful educational outcomes, is therefore highly relevant during adolescence. Because adolescents spend a great deal of their time in school, the school context is a useful source of information regarding educational resilience and the protective factors that operate to support such resilience (Condly, 2006).

Garmezy (1991) challenged teachers to become protective figures in the lives of at-risk students. In general, a supportive teacher-student relationship is predictive of academic success. For the most part, the effects of teacher support have been studied among groups of students who are not considered to be at-risk for academic difficulties. In other words, the promotive effects of a supportive teacher have been well-established. For example, within a largely homogenous sample of middle-class, Caucasian 5th and 6th grade students, Marchant, Paulson, and Rothlisberg (2001) found that teachers' responsiveness predicted school competence and motivation, which in turn predicted academic achievement. In other words, teacher behaviors predicted motivation-related outcomes, and motivation mediated the effect of teacher behaviors on achievement outcomes. Patrick, Ryan, and Kaplan (2007) also provided support for a model that included motivation as a mediator between the classroom context and achievement outcomes.

Although the promotive value of various types of teacher support has been well-demonstrated, the protective potential of specific types of teacher support deserves further study. In fact, Cefai (2007) recommended using the knowledge of what is successful in ordinary classrooms to structure the classrooms of at-risk students; in other words, resilience researchers are urged to study known promotive factors to explore their potential as protective factors as well. In very broad terms, a positive teacher-student relationship is predictive of resilience among at-risk students across grades (e.g. Bondy et al., 2007; Croninger & Lee, 2001). Ryan and Patrick (2001) studied teacher support and promotion of mutual respect within a diverse, largely working-class sample of 7th and 8th grade students. These researchers found that teacher support predicted higher levels of

self-regulated learning and lower levels of disruptive behavior in the classroom. In addition, teachers' promotion of respect was associated with higher levels of self-regulated learning and academic self-efficacy. Although studies of these directly relationships are important, the educational resilience literature would be strengthened by further specification of the process by which teacher support behaviors predict resilient outcomes among at-risk students. Additionally, focusing on specific behaviors, as opposed to supportive relationships in general, will assist the design of appropriate interventions and professional development aimed at training teachers to become the protective figures that Garmezy (1991) believed they could be. Therefore, the present study considered a meditational model of educational resilience, in order to capture the motivational processes that might underlie protective processes within the classroom.

Alternative Schooling as a Potential Source of Resilience: Identifying Successful Contexts

Placement into "alternative schools" is increasingly becoming a preferred intervention, particularly at the high school level, for truancy, problem behaviors, and underachievement (Foley & Pang, 2006). The study of students in alternative high schools provides an opportunity to examine how levels of motivation can decrease less drastically, or even increase, during adolescence despite the normative decline in the larger population. Kim and Taylor (2008) conducted a qualitative study of one alternative high school in which students generally reported a greater liking for the alternative school as opposed to the traditional high schools they previously attended. Students often stated that they did not want to return to the traditional high schools, and that the alternative high schools motivated them to continue their education.

Although alternative schools have been criticized as being "dumping grounds" for students with behavioral issues, teachers interviewed by Kim and Taylor (2008) referred to their school as a "safety net" for students at risk for dropping out or failing. By referring to alternative schools as safety nets, the focus shifted away from the risk factors of students to the potential protective influence the school context could have for these at-risk students. When alternative schools focus on trust, positive relationships, and students' strengths, students earn more credits and are more likely to pursue higher education as compared to similar peers in traditional high schools (Franklin, Streeter, Kim, & Tripodi, 2007). In addition, alterative schools are more successful when students feel that they are important to the school community (Loy & Gregory, 2002). Gold (1995; Gold & Mann, 1982) suggests that the alternative school context benefits at-risk students when it is fair, and when structure is presented within the context of caring and respect. As students in alternative schools are likely to have perceived themselves as stigmatized and treated poorly within traditional schools, messages of fairness and respect reported by them would be expected to be especially salient motivating factors in such settings. Fairness and respect also have been found to predict achievement motivation for students in traditional school settings (e.g., Ryan & Patrick, 2001); therefore, research is needed to determine whether the effects of fairness and respect are solely promotive or both promotive and protective.

The Present Study – Research Predictions

Figure 4.1 presents the predicted model of relationships of the study variables. This model was based on previous research that suggests that the effects of context characteristics on achievement are mediated by motivational factors (Marchant, Paulson,

& Rothlisberg, 2001; Patrick, Ryan, & Kaplan, 2007); however, the present study extended the contributions of past studies by applying a mediation model to an understanding of the processes behind educational resilience. Although this model was expected to apply within both traditional and alternative school settings (i.e., promotive effects were hypothesized), the magnitude of the relationships was predicted to be higher for students in alternative schools (i.e., protective effects).

More specifically, although teacher fairness and respect were expected to be promotive factors (i.e. positive predictors of motivation and achievement for all students), the present study tested the prediction that the effect of fairness and respect on motivation and achievement would be greater for alternative school students as compared to those in traditional school settings (i.e. fairness and respect would have protective effects in addition to the predicted promotive effects). A meditational model was tested in which teacher fairness and respect was expected to predict values and expectancies, and that these motivational variables would predict achievement. Again, although values and expectancies were predicted to be promotive factors (i.e. positive predictors of achievement for all students), the present study tested the prediction that the effect of these motivational variables on achievement would be greater for alterative school students as compared to those in traditional school settings (i.e. values and expectancies would have protective effects in addition to the predicted promotive effects).

Method

Procedure

This research is part of a larger study in conjunction with national Mathematics and Science Partnerships (MSPs) concerning students' motivation in mathematics and

science. The larger study included approximately 14,000 middle- and high-school students over six waves of data collection. These 14,000 students were drawn from 14 schools (7 middle schools and 7 high schools). The present study analyzed data from six of the high-schools included in the larger study.

Data used for the current study were collected in the spring of 2005. Consent and assent were attained by the individual MSPs prior to any data collection. Students were told that the purpose of the study was to find out their thoughts and feelings about the subject of math and their own math class. They were informed that participation was voluntary and that they could discontinue the survey at any time. Students were guided through a sample item and then independently completed a 110 question survey during their math period. The survey took approximately 40 minutes to complete. Only a subset of these items was used in the present study. The survey was administered by trained research assistants, and although the teacher was present in the room while the survey was being completed, he/she remained unobtrusive during the procedure and did not view any of the survey responses.

Participants

A subsample of students was selected from the larger Math-Science Partnership-Motivation Assessment Program (MSP-MAP). The larger research project focused on students' motivation and classroom perceptions in middle and high school mathematics classes. Participants for the present study included 402 students in three alternative high schools in an ethnically-diverse, working class area of southern California. A demographically-similar comparison sample consisted of 437 students in traditional high schools in the same geographic area.

Students were eligible for enrollment in the alternative school within their district if they were not making satisfactory progress toward graduation at one of the traditional high schools. Students were referred for a variety of reasons, including a lack of credits in required courses, poor attendance, and behavioral issues within the traditional schools. The alternative high schools offered similar courses, yet the scheduling was more flexible and the class sizes were smaller in comparison to the traditional high schools.

The subsample of students in traditional high schools was selected randomly using a procedure to obtain samples of students that were not significantly different in terms of gender: $\chi^2(1) = 0.64$, $p = .67$, ethnicity: $\chi^2(4) = 2.55$, $p = .65$, and English-learner status: $\chi^2(1) = 0.56$, $p = .47$ (see Table 4.1). Sixty percent of the alternative school students and 62% of students in the traditional school sample were male. In the alternative schools, 67% were Latino, 21% were Caucasian (non-Latino), 5% were Asian (primarily Vietnamese), 3% were African American, and 4% were of other ethnicities. In the comparison sample, 71% were Latino, 18% were Caucasian, 3% were Asian, 3% were African American, and 4% were of other ethnicities. Thirty-seven percent of alternative school students were English language learners, compared to 40% in the comparison sample. The alternative school students had a mean age of 17 years; students in the comparison sample were significantly younger with a mean age of 16 years: $t(710) = 16.41$, $p < .001$. The two groups were significantly different in terms of socioeconomic status, with more students in the traditional schools participating in free/reduced lunch programs: $\chi^2(1) = 93.66$, $p < .001$. All students were enrolled in grades 9 through 12.

Measures

Means and standard deviations of all study variables can be found in Table 4.2. An omnibus MANOVA test indicated significant differences in the study variables by school type. The results of post-hoc pairwise comparisons found that students in traditional schools reported higher levels of attainment value and efficacy than those in the alternative schools. Students in the traditional schools also scored better on the standardized math exam. There were no significant differences in attainment value, interest value, cost value, or reports of teacher fairness and respect by school type. Exact item wording can be found in the Appendix.

Teacher Fairness and Respect. Five items measured students' perceptions of their teacher as someone who promotes respect in the classroom and treats all students equitably ($\alpha = .84$; sample item: "Our math teacher wants all students to feel respected"). The scale was constructed from several existing measures (Feldlaufer, Midgley, & Eccles, 1988; Ryan & Patrick, 2001). Items were rated on a 5-point response scale with the following anchors: Not at all true (1), Somewhat true (3), and Very true (5).

Utility Value. Three items measured students' perceptions of math as something that is useful to them in general, in comparison to other school subjects, and for their future ($\alpha = .84$; sample item: "In general, how useful is what you learn in math?"). Items were adapted from established scales for the purposes of the present study (e.g., Eccles & Wigfield, 1995). Items were rated on a 5-point response scale with the following anchors: Not at all useful (1), Somewhat useful (3), and Very useful (5).

Interest Value. The Interest scale consisted of three items which measured students' subjective liking and enjoyment of math ($\alpha=.94$; sample item: "I enjoy the subject of math"). The five-point response scale for these items was anchored at the

endpoints and in the middle with the anchors: (1) Not at all true, (3) Somewhat true, and (5) Very true. Items for the present study were adapted from established scales (Mitchell, 1993; Wigfield et al., 1997).

Attainment Value. Two items measured students' perceptions of how important it was for them to be someone who was good at math (α = .69; sample item: "Compared to most of your other school subjects, how important is it for you to be good at math?"). Items were adapted from established scales (e.g. Eccles et al., 1993b). Items were rated on a 5-point response scale with the following anchors: Not at all important (1), Somewhat important (3), and Very important (5).

Cost Value. Two items measured students' perceptions of needing to sacrifice things that were important to them in order to do well in math (α = .82; sample item: "Success in math requires that I give up other activities I enjoy"). Items used in the present study were adapted from established scales (e.g. Eccles et al., 1984). Items were rated on a 5-point response scale with the following anchors: Not at all true for me (1), Somewhat true for me (3), and Very true for me (5).

Math Efficacy. Four items measured students' beliefs about their own capability in mathematics (α = .84; sample item: "How certain are you that you can learn everything taught in math?"). Items were adapted from established scales (Midgley et al., 2000). Items were rated on a 5-point response scale with the following anchors: Not at all sure (1), Somewhat sure (3), and Very sure (5).

Mathematics Achievement was measured with a state-wide standardized test administered two months before the end of the focal academic year.

Results

Data Analysis Plan

Multi-group structural equation modeling (SEM) was used to test the hypotheses, with missing data imputed using an Expectation Maximization (EM) algorithm. Modeling of latent factors was of interest even for single indicators, but simply estimating a latent variable as perfectly measured is generally not justified; therefore, residual variance of the single-item indicator for math achievement was fixed to 10% of the total variance for that item based on conservative estimations of error variance (see Schulenberg et al., 1994).

Results are presented in the standardized metric, and several indices of fit are presented. The chi-square goodness of fit statistic is presented, although with larger sample sizes the interpretation of this statistic becomes less clear (e.g., Joreskog & Sorbom, 1989). The Comparative Fit Index (CFI) and Bentler-Bonnett Normed Fit Index (NFI) are considered as indices of model fit, with values above 0.90 and 0.95 indicative of acceptable and superior model fit, respectively. The Root Mean-Square Error of Approximation is an index of model mis-fit, with values below 0.08 and 0.05 indicative of acceptable and superior model fit, respectively (Hu & Bentler, 1999; Marsh, Hau, & Wen, 2004).

Prior to testing the multi-group model, a measurement model was tested across the entire sample to determine the adequacy of the proposed factor structure. For teacher fairness/respect, the 5 items were separated into two packets (3 items regarding respect and 2 items regarding fairness) in order to capture the relative contribution of each facet to the overall latent construct. For all other latent variables, each item was considered as an individual observed variable in the model. The proposed measurement model

provided a superior fit: $\chi^2(84) = 133.72$, $p < .001$; CFI = 0.98; NFI = 0.95; RMSEA = 0.02. Factor loadings for all variables ranged from 0.64 to 0.95 (see Table 4.4). Correlations among the latent variables are presented in Table 4.3.

Multi-Group Analyses

The test for mediation of the effect of teacher fairness/respect on math achievement by motivation began by estimating the direct path from teacher fairness/respect to math achievement, with all relationships constrained to be equal across the two groups. The LaGrange Multiplier (LM) test indicated that the variances of the independent variables and the path from teacher fairness/respect to achievement should be freed to vary across the two groups; therefore, the effect of teacher fairness/respect on math achievement was not the same for both groups. Modifications were not indicated for factor loadings, variances, or covariances, which thus remained constrained across groups, demonstrating measurement invariance. Releasing the path from teacher fairness/respect to achievement resulted in a significant improvement to the model: $\Delta \chi^2 (1) = 138.53$, $p < 0.001$. This final model fit the data well: $\chi^2(1) = 0.143$, $p > .05$; CFI = 1.00; NFI = 0.99; RMSEA = 0.00. For both groups, perceived teacher fairness/respect was a significant predictor of math achievement; the significance of the LM test provided evidence that the observed difference in the magnitude of this relationship was significantly greater for students in alternative schools (Figure 4.2).

Next, the full mediation model was tested. Likely a function of the high correlation between utility value and attainment value (see Table 4.3), utility value was not found to be a unique predictor of achievement in any analysis and was therefore dropped from the model. Multi-group analyses began with a model constraining all

factor loadings, factor variances, factor covariances, and structural paths to be equal across the four groups. Constraints were released in a stepwise fashion, and improvement in the χ^2 statistic was used as a measure of improvement in model fit as constraints were released. In all models, factor loadings and factor covariances remained constrained across all groups in order to ensure measurement invariance across groups.

Beginning with all relationships constrained, LM tests revealed that the best-fitting model resulted when the paths from teacher fairness/respect to interest, attainment value, cost, and efficacy remained constrained across groups; however, LM tests indicated that the paths from each of these four motivational variables to math achievement as well as the variances of the independent variables should be free to vary across groups. These modifications resulted in a $\Delta \chi^2 (1) = 3.31$, $p = 0.069$, which was marginally significant. Direct paths from teacher fairness/respect to achievement for both groups dropped to non-significance; therefore, a full mediation model was adopted in the final analysis.

The results of this final model are presented in Figure 4.3. The final model provided an acceptable fit: $\chi^2(124) = 192.10$, $p < .05$; CFI = 0.97; NFI = 0.91; RMSEA = 0.03. The magnitude of the effect of perceived teacher fairness/respect on greater interest, greater attainment value, lower cost, and greater efficacy was equivalent for both groups. Therefore, the four pairs of coefficients on the left-hand side of Figure 4.3 are not significantly different by school type.

Moving to the four pairs of coefficients on the right-hand side of Figure 4.3, significant differences were present by school type. For students in alternative schools, greater attainment value predicted higher math achievement; attainment value did not

predict achievement for students in traditional schools. Greater interest predicted higher achievement for those in the alternative schools only; although the coefficient for this effect was similar for those in traditional schools, the effect of interest on achievement was not statistically significant for these students. Lower cost value predicted higher achievement for both groups of students, but the effect was higher among those in alternative schools. Finally, greater efficacy predicted higher achievement at similar levels for students in both types of schools. As a whole, the motivational variables accounted for 29% of the variance in math achievement for alternative school students. For students in traditional high schools, the motivational variables accounted for 16% of the variance in math achievement.

Discussion

The present study explored differences in a mediational model of teacher fairness and respect, motivation, and achievement between students in alternative and traditional high school settings. This model extended previous work (e.g. Patrick, Ryan, & Kaplan, 2007) by applying a meditational model as a way to explain the process of educational resilience for students within alternative schools. Based on previous research (e.g., Gold, 1995), it was predicted that perceived teacher fairness and respect would be a stronger predictor of both adaptive motivational beliefs and achievement for students in alternative schools.

The findings provided partial support for the hypotheses. Teacher fairness and respect had a significant, positive direct effect on math achievement for both groups of students and, as anticipated, the magnitude of this effect was significantly larger for students within alternative school settings. This finding was anticipated and supports

previous research that links teachers' promotion of respect directly to critical academic outcomes (e.g. Ryan & Patrick, 2001). The present study contributed to existing research by demonstrating that the direct relationship from teacher fairness and respect to achievement is not only promotive, but additionally protective among at-risk groups of adolescents such as those in alternative school contexts.

When student interest, attainment value, cost, and efficacy were added as mediators, the direct effect of the teacher on achievement became non-significant, indicating that motivational variables mediated this effect for both groups. Previous research also suggested a meditational model, with classroom context predicting achievement outcomes through mediating motivational processes (e.g. Marchant, Paulson, & Rothlisberg, 2001). However, contrary to the hypotheses, perceived teacher fairness and respect was not a more important predictor of adaptive motivation for alternative school students. That is, teacher fairness/respect was equally important for students in both school settings in predicting higher interest, higher attainment value, higher efficacy, and lower cost and was thus a promotive factor in the prediction of motivation across the two settings.

Despite the lack of a protective effect from teacher fairness and respect to student motivation, the effects of motivational variables on achievement were significantly higher for students in alternative school settings. This finding indicates that motivation, defined in terms of values and efficacy, exerted a protective effect in terms of achievement outcomes. For students in traditional high schools, only cost (negatively) and efficacy (positively) predicted achievement, whereas each of the four motivational variables had unique effects on achievement among students in the alternative schools.

Although motivation was an important predictor of achievement for all students, the motivational variables considered accounted for nearly twice the variance of achievement for alternative school students as compared to their counterparts in traditional high schools. In short, the meditational model provided evidence that *teacher fairness/respect matters more because motivation matters more for students in alternative high schools.*

This study contributes to an understanding of the processes by which alternative schools serve as protective contexts for at-risk students. Although Gold (1995; Gold & Mann, 1982) suggested that fairness and respect are critical to the success of alternative schools, the present study provides one explanation of the mechanism by which this occurs. Because motivation is more strongly predictive of achievement for alternative school students, a fair and respectful teacher may be more important in this context due to the motivational consequences of such a classroom.

Limitations and Future Directions

Although the current study clearly contributes to the literature on motivation and educational resilience, several limitations should be addressed in future students. First, the present study relied solely on students' own reports of both teacher behaviors and their own motivation. Future studies would strengthen this design by adding reports from multiple informants. However, it should be noted that the current focus on students' perceptions is both important and necessary to understanding the effects of context on student motivation. The current model does not explain why motivation is more important in the prediction of success for alternative school students. Future research should consider alternative mechanisms, such as social norms and self-regulatory processes, that might explain why motivation may be less predictive of achievement

among students who are at lower risk for educational difficulties. Finally, the design of this study was cross-sectional. To better understand potential processes and causal influences, a longitudinal design would be necessary. For example, a longitudinal study of students before and after the transition to an alternative school setting would better capture changes in both perceptions of the context and changes in personal outcomes related to the process of protection in educational resilience.

Implications

Despite the limitations of the present study, there are implications of the findings for adolescents and their teachers. In general, this study echoes the previous two Chapters by providing evidence that the context is critical to understanding potential sources of resilience among adolescents. In particular, the context of an alternative school may be a positive transition for at-risk adolescents, if it offers the adolescent a particular level of motivating support from teachers. Although messages delivered by teachers (both intentionally and unintentionally) are critical to the outcomes of all adolescents, the motivating impact that the classroom context can have on at-risk adolescents appears to be especially important in predicting their achievement outcomes. Therefore, teachers of at-risk students should be particularly cognizant of the ways in which they can structure their classrooms to be motivating for their students.

Conclusion

The present study contributes to a better understanding of differences in the processes that connect the context, motivation, and achievement in alternative and traditional high schools. Overall, motivation mediates the relationship between teacher behavior and achievement outcomes across both settings; however, the magnitude of

these relationships suggests that motivation serves a unique protective role for students within alternative schools. Therefore, teachers who are respectful and fair may be especially important within this context due to their motivating role. A longitudinal study of students who transition between these two settings is the next logical step to discover how alternative settings best encourage a shift toward adaptive motivation and increased achievement over time.

Appendix

Utility Value

In general, how useful is what you learn in math?
Compared to most of your other school subjects, how useful is what you learn in math?
How useful is learning math for what you want to do after you graduate and go to work?

Attainment Value

Compared to most of your other school subjects, how important is it for you to be good at math?
I feel that, to me, being good at solving problems which involve math or reasoning mathematically is…

Interest Value

I enjoy the subject of math.
I like math.
I enjoy doing math.

Cost Value

I have to give up a lot to do well in math.
Success in math requires that I give up other activities I enjoy.

Efficacy

How certain are you that you can learn everything taught in math?
How confident are you that you can do even the hardest work in your math class?
How sure are you that you can do even the most difficult homework problems in math?

Teacher Fairness/Respect

Our math teacher wants students in this class to respect each others' ideas.
Our math teacher does not allow students to make fun of other students' ideas in class.
Our math teacher wants all students to feel respected.
Our teacher grades our math work fairly.
Our teacher treats everyone in this math class fairly.

Table 4.1. Descriptive Statistics for Demographic Variables by School Type

	Alternative School n=402	Traditional School n=437
Gender		
Male	60.43%	62.01%
Female	39.57%	37.99%
Race/Ethnicity		
Latino	67.47%	71.16%
Caucasian (non-Latino)	21.24%	18.31%
Asian	4.57%	3.20%
African American	2.96%	2.97%
Other	3.76%	4.36%
English-Learner Status		
Learner	37.47%	40.05%
Proficient	62.53%	59.95%
*Free/Reduced Lunch Status**		
Yes	31.56%	64.96%
No	68.44%	35.04%

*$p < .001$

Table 4.2. Descriptive Statistics for Study Variables Across Groups

Construct	Alternative School n=402		Traditional School n=437	
	Mean	SD	Mean	SD
Utility Value*	3.32	0.86	3.48	0.95
Attainment Value	3.01	0.97	3.15	0.94
Interest Value	2.43	1.23	2.66	1.24
Cost Value	2.44	1.00	2.51	1.01
Efficacy*	3.09	0.96	3.25	0.88
Math Achievement**	279.87	33.54	305.77	43.05
Perceived Teacher	3.76	0.96	3.91	0.94

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

Table 4.3. Correlations of Latent Study Variables

	1	2	3	4	5	6	7
1. Utility Value	--						
2. Attainment Value	.96	--					
3. Interest Value	.64	.72	--				
4. Cost Value	-.04[ns]	.10*	-.07[n]	--			
5. Efficacy	.52	.63	.64	-.10	--		
6. Math	.19	.28	.34	-.17	.39	--	
7. Perceived Teacher Fairness/Respect	.32	.41	.31	-.17	.31	.12	--

Note. ns = not significant

*$p < .05$; for all other correlations, $p < .001$.

Table 4.4. Standardized Measurement Model Parameter Values

Construct	Variable	Factor Loading	Unique Variance
Teacher Fairness and	Respect (mean of 3 items)	0.83	0.31
	Fairness (mean of 2 items)	0.79	0.38
Utility Value	General usefulness	0.88	0.22
	Useful compared to other	0.92	0.15
	Useful after graduation	0.92	0.16
Interest Value	Enjoy subject of math	0.77	0.40
	Like math	0.72	0.48
	Enjoy doing math	0.68	0.54
Attainment Value	Generally important	0.64	0.59
	Important compared to other	0.93	0.14
Cost Value	Give up a lot	0.74	0.45
	Give up activities I enjoy	0.75	0.43
Efficacy	Can learn everything	0.77	0.41
	Can do hardest math work	0.81	0.34
	Can solve difficult homework	0.81	0.35
Math Achievement	Standardized test score	0.95	0.10

Figure 4.1. Proposed meditational model of latent study variables. Measurement model omitted from figure for simplicity.

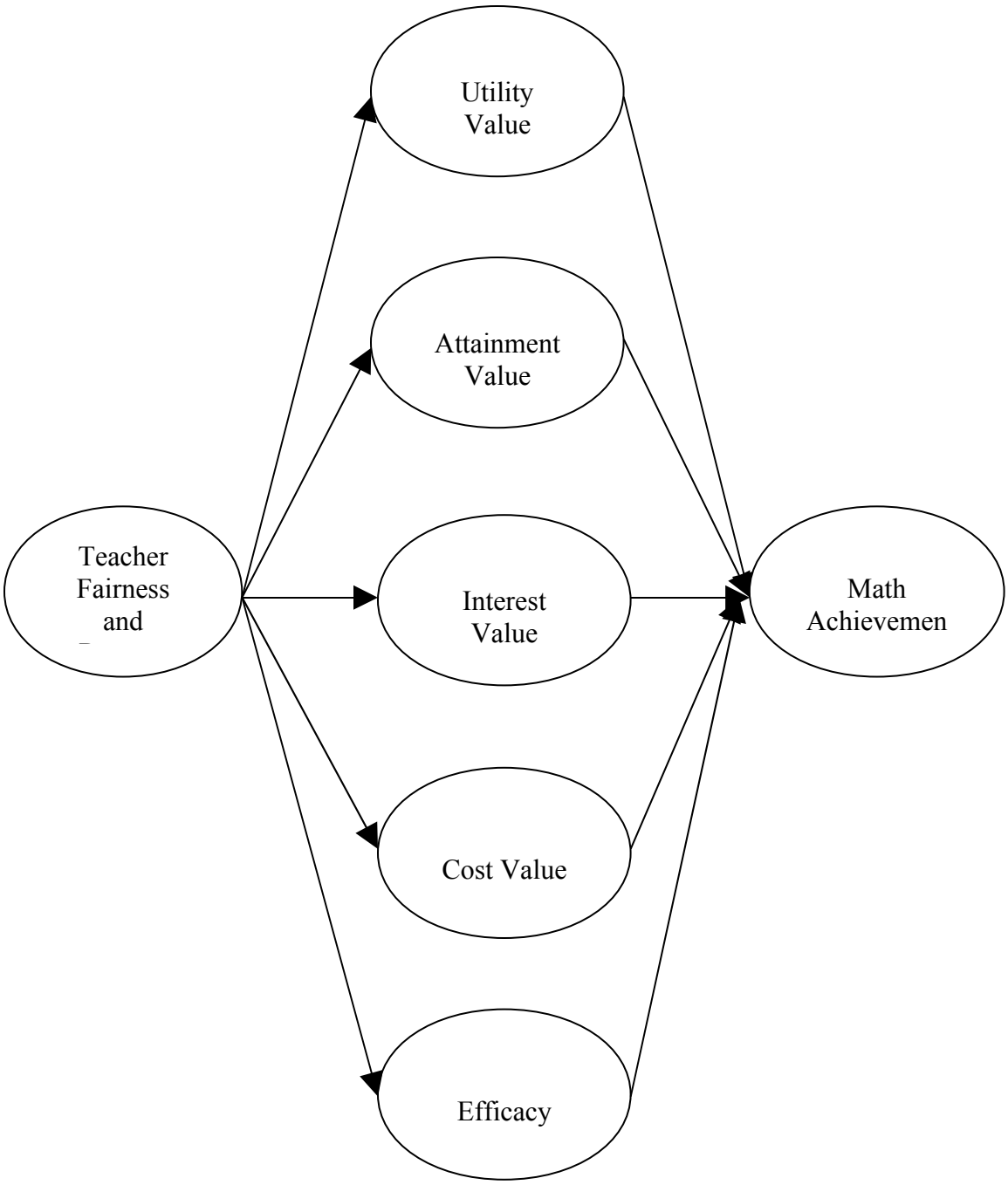
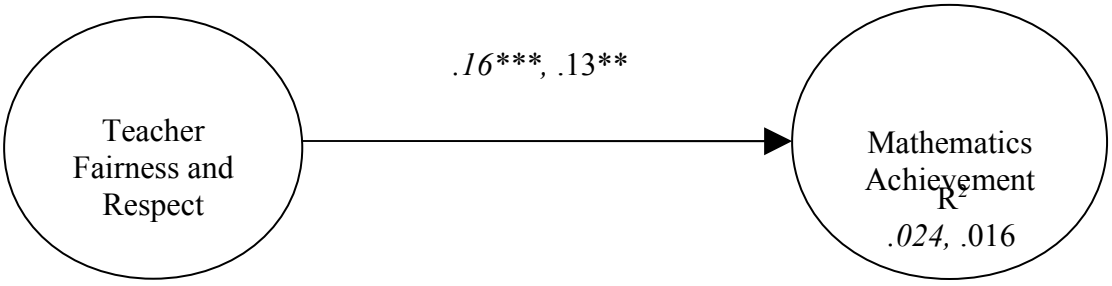
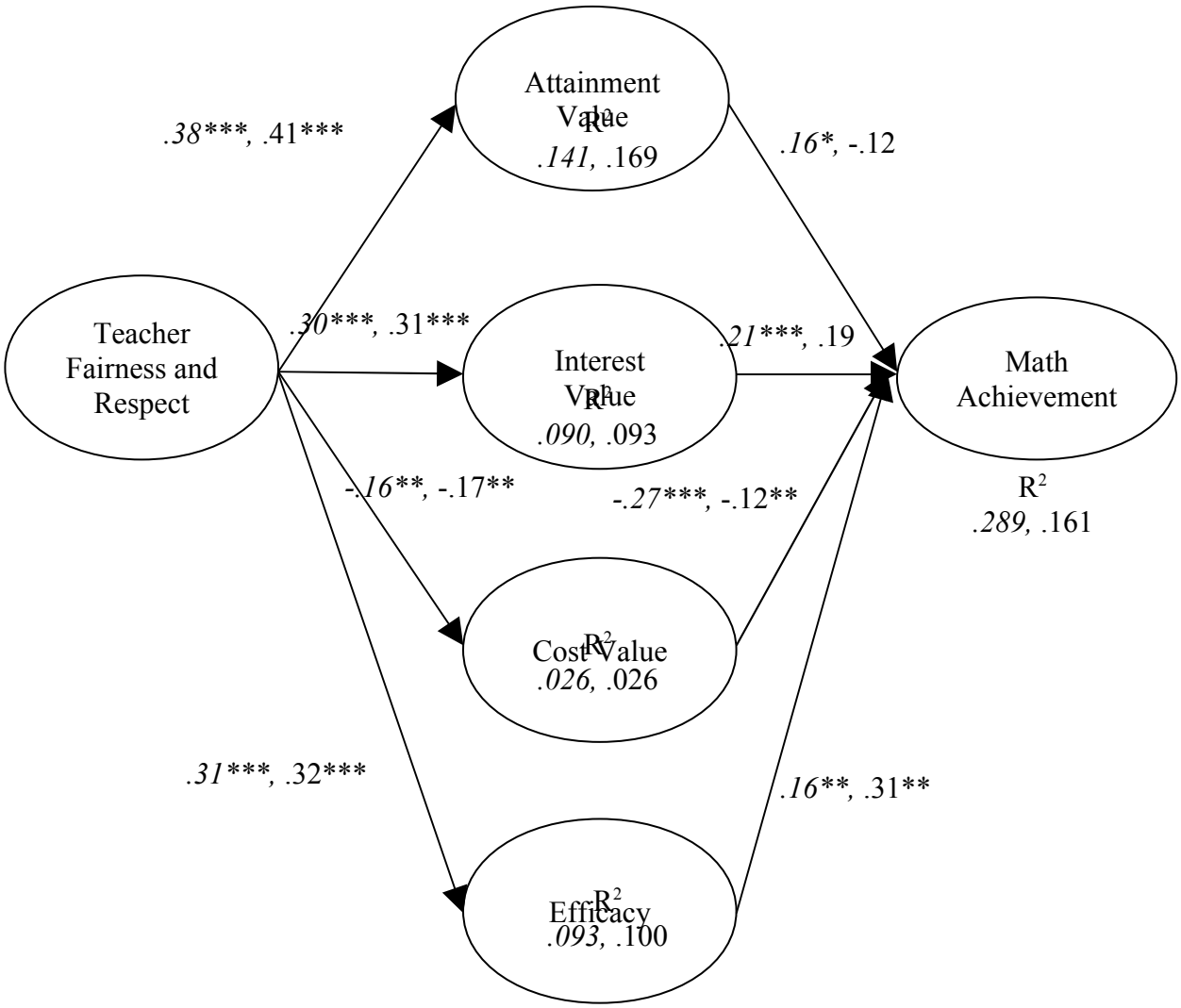


Figure 4.2. Direct effect of teacher fairness/respect on mathematics achievement for students in alternative (noted in italics) and traditional high schools. Measurement model omitted from figure for simplicity.



***p* < .01; ****p* < .001

Figure 4.3. Final structural model of relationships for alternative school (in italics) and traditional school students. Measurement model omitted from figure for simplicity.



Chapter V

Conclusion

The studies in this dissertation were designed to contribute to the literature on educational risk and resilience by addressing the various mechanisms through which contexts could operate as protective factors for those at-risk both educationally and behaviorally. Although the focus of these studies was educational, educational resilience was broadened in terms of outcomes to include not only achievement, but also motivational processes and behaviors related to success in school. The inclusion of multiple outcomes indicative of resilience has been suggested by other researchers who have found that adaptive outcomes are often present in one domain but absent in others (e.g. Luthar, Doernberger, & Zigler, 1993).

The main focus of this dissertation was the role of contextual influences in the process of resilience, including areas of the context that could serve as risk, promotive, and protective factors. The contextual factors that were studied in this dissertation were also expanded to include not only the influence of the classroom, but also the contributions of extracurricular and other leisure activities that are critical to understanding adolescent development. As suggested by Luthar and Brown (2007), resilience is best understood when research is informed by the literatures of multiple disciplines simultaneously. Therefore, this dissertation attempted to capture processes of

resilience that are relevant to and based in research in educational psychology, developmental psychology, sports psychology, and other related disciplines.

Summary of Findings

The first study was designed to address the inconsistencies in research concerning the relationships among sports participation, substance use, and academic outcomes. Although previous research had identified sports participation as a risk factor for academic difficulties (e.g. Coleman, 1961) and substance use (e.g. Barber, Eccles, & Stone, 2001), the findings of previous research have been relatively inconsistent. In an attempt to capture the patterns of sports in which adolescents participate, a pattern-centered approach was used. Results were examined separately for males and females, and for adolescents in the 8th and 10th grades, in order to address differences in sports participation by gender and grade level in previous work (e.g. Kirshnit, Ham, & Richards, 1989).

Overall, the findings presented in Chapter II provide evidence that sports participation acts as a promotive factor and predicts positive developmental outcomes, including lower substance use, higher grades, and fewer behavioral difficulties in school. There were important differences by gender and grade, however. In the 8th grade, the results indicated that both males and females belonged to three distinct sports clusters: Non-Participants, General Participants, and Jocks. These clusters progressed from no sports participation to high levels of sports participation, with the General participants falling somewhere in between. Among 8th grade males, Non-Participants reported the highest levels of substance use, with Jocks reporting the lowest levels of use. Among 8th grade females, Non-Participants also reported the highest levels of substance use, but

General Participants reported the lowest levels. For both males and females in the 8th grade, Non-Participants exhibited the most problem behavior in school with Jocks exhibiting the lowest levels of problem behaviors.

In the 10th grade, males and females both formed 5 clusters, although these clusters were different; this indicates a differentiation in sports participation both in terms of gender and grade level. Males in 10th grade formed the following clusters: Non-Participants, General Participants, Runners, Jocks, and Gymnasts. Females in 10th grade were classified as Non-Participants, General Participants, Lacrosse/Field Hockey players, Football/Basketball players, or Ice Hockey players. Among the 10th grade males, Runners had the most adaptive outcomes in terms of substance use and academic behaviors, with Non-Participants reporting the least adaptive outcomes. Among 10th grade females, General Participants and Lacrosse/Field Hockey players reported the most adaptive outcomes, whereas Non-Participants and Football/Basketball players reported the least adaptive substance use and academic behavior patterns. This finding suggests that whereas sports participation may be linearly promotive of positive outcomes for males, the relationship for females might be such that only certain levels of participation in particular sports are promotive for females and participation in male-typed sports serves as a potential risk factor.

The second study focused on high risk-taking adolescents, as they tend to be at-risk for reckless behaviors (e.g. Arnett, 1992; Steinberg, 2005). In particular, this study examined activity patterns that could operate to protect these adolescents from substance use and educational difficulties. A pattern-centered analysis identified six clusters of high risk-takers based on their use of leisure time and educational orientations: Athletics

Only, School Oriented, Uninvolved Users, Involved Users, and Club Members. These classifications were similar to those found by Linver, Roth, and Brooks-Gunn (2009); however, a focus on high risk-takers and addition of substance use and unstructured leisure time activities provided more detailed information regarding the potential protective and risk levels associated with particular activity profiles.

In general, high risk-takers in the School Oriented and Club Members clusters showed the best outcomes both in terms of substance use and academic behaviors, suggesting that school involvement serves a protective role for high risk-takers. The Uninvolved Users and Involved Users were both at increased risk as both clusters reported relatively high levels of substance use and poor academic outcomes; they were distinct from one another, however, in that Involved Users participated in more prosocial activities, both structured and unstructured. Those in Athletics Only reported generally adaptive profiles, although their alcohol use was moderate in comparison to the other clusters. Finally, Uninvolved Non-Users had very low levels of substance use, yet suffered in terms of grades. Therefore, this cluster in particular may provide an interesting direction for future research in order to determine how they are spending their leisure time.

The final study examined teacher fairness and respect, motivation, and achievement across traditional and alternative high school settings. The purpose of this study was both: a) to replicate the meditational effect of motivation on the relationship between classroom context and achievement with at-risk adolescents (e.g. Patrick, Ryan, & Kaplan, 2007) and b) demonstrate the uniquely protective effects of teacher fairness

and respect and motivation on educational outcomes for students in alternative schools (e.g. Gold, 1995).

Overall, motivation served as a mediator in the relationship between teacher fairness and respect and achievement across both contexts. Therefore, promotive effects of teacher fairness and respect and motivation were present. Teacher fairness and respect predicted motivation in the same way and at the same magnitude for students in both contexts. Additionally, motivation served a protective role in the prediction of achievement among students in the alternative schools. For students in alternative schools, greater interest, greater attainment value, lower cost, and greater efficacy all predicted higher math achievement; for students in traditional schools, only lower cost and greater efficacy predicted higher math achievement. Therefore, teacher fairness and respect was only indirectly protective for students in the alternative schools through its relationship with motivation.

Implications

The preceding three studies have implications both in theory and practice. Theoretically, they further research on educational resilience by broadening the intersections that connect education and resilience. Educational resilience does not only include relationships between schools and achievement; a more complete picture of educational resilience includes the rich experiences of adolescents relevant to school, such as extracurricular activities. Additionally, outcomes such as motivation, academic behavior, and even substance use must be included in order to provide a comprehensive portrait of the mechanisms at work in educational resilience during adolescence.

More research is necessary to replicate these findings, as well as establish directions of causation and developmental trends. However, these studies indicate potential implications for practice. Sports participation appears to serve both a promotive and a protective role in the academic and behavioral development of adolescents. Although linked with moderate levels of alcohol use among high risk-takers in one study, overall the benefits of sports participation outweigh the negative aspects. In addition, extracurricular activities more broadly appear to support positive youth development, particular among high risk-takers. In the face of tighter budgets, it is important that schools continue to offer extracurricular activities for students that consider their holistic development. Finally, as Garmezy (1991) asserted, this dissertation provided evidence that teachers can serve as protective figures for at-risk students. The establishment of a fair and respectful climate, while beneficial for all students, is even more important for students at-risk due to the motivating effects. Future research should continue to identify the underlying processes of resilience in adolescents in order to provide information concerning interventions that work best for particular groups of at-risk adolescents.

In conclusion, the prospects are optimistic for researchers and practitioners who wish to foster resilience among at-risk adolescents and promote positive youth development among adolescents in general. The three studies of this dissertation provide strong evidence that resilience is a process involving the interactions of an individual within a context, not a trait either present or absent at the individual level (Luthar, Cicchetti, & Becker, 2000). Therefore, future efforts at prevention and intervention should continue to explore the complex yet critical influences that the contexts in which adolescents operate can exert on their developmental outcomes.

References

Aaron, D. J., Dearwater, S. R., Anderson, R., & Olsen, T. (1995). Physical activity and the initiation of high-risk health behaviors in adolescents. *Medicine & Science in Sports & Exercise, 27,* 1639-1645.

Arellano, C. M., Chavez, E. L., & Deffenbacher, J. L. (1998). Alcohol use and academic status among Mexican American and White non-Hispanic adolescents. *Adolescence, 33,* 751-760.

Arnett, J. (1992). Reckless behavior in adolescence: A developmental perspective. *Developmental Review, 12,* 339-373.

Bachman, J. G., O'Malley, P. M., Schulenberg, J. E., Johnston, L. D., Freedman-Doan, P., & Messersmith, E.E. (2008). *The education–drug use connection: How successes and failures in school relate to adolescent smoking, drinking, drug use, and delinquency*. New York: Lawrence Erlbaum Associates/Taylor & Francis.

Bahrke, M. S., Yesalis, C. E., Kopstein, A. N., & Stephens, J. A. (2000). Risk factors associated with anabolic-androgenic steroid use among adolescents. *Sports Medicine, 29,* 397-405.

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.

Becker, B. E., & Luthar, S. S. (2002). Social-emotional factors affecting achievement outcomes among disadvantaged students: Closing the achievement gap. *Educational Psychologist, 37,* 197-214.

Bondy, E., Ross, D. D., Gallingane, C., & Hambacher, E. (2007). Creating environments of success and resilience: Culturally responsive classroom management and more. *Urban Education, 42,* 326-348.

Borman, G. D., & Overman, L. T. (2004). Academic resilience in mathematics among poor and minority students. *The Elementary School Journal, 104,* 177-196.

Boyer, T. W. (2006). The development of risk-taking: A multi-perspective review. *Developmental Review, 26,* 291-345.

Bryant, A. L., Schulenberg, J. E., O'Malley, P. M., Bachman, J. G., & Johnston, L. D. (2003). How academic achievement, attitudes, and behaviors relate to the course of substance use during adolescence: A 6-year, multiwave national longitudinal study. *Journal of Research on Adolescence, 13,* 361-397.

Casey, B. J., Getz, S., & Galvan, A. (2008). The adolescent brain. *Developmental Review, 28,* 62-77.

Castrucci, B. C., Gerlach, K. K., Kaufman, N. J., & Orleans, C. T. (2004). Tobacco use and cessation behavior among adolescents participating in organized sports. *American Journal of Health Behavior, 28,* 63-71.

Catterall, J. S. (1998). Risk and resilience in student transitions to high school. *American Journal of Education, 106,* 302-333.

Cefai, C. (2007). Resilience for all: A study of classrooms as protective contexts. *Emotional & Behavioural Difficulties, 12,* 119-134.

Chirivella, E. C., & Martinez, L. M. (1994). The sensation of risk and motivational tendencies in sports: An empirical study. *Personality and Individual Differences, 16,* 777-786.

Coleman, J. S. (1961). *The adolescent society: The social life of the teenage and its*

impact on education. Oxford, England: Free Press of Glencoe.
Cohen-Smith, D., & Severson, H. H. (1999). A comparison of male and female smokeless tobacco use. *Nicotine & Tobacco Research, 1,* 211-218.
Condly, S. J. (2006). Resilience in children: A review of literature with implications for education. *Urban Education, 41,* 211-236.
Crawford, A. M., Pentz, M. A., Chou, C-P., Li, C., & Dwyer, J. H. (2003). Parallel developmental trajectories of sensation seeking and regular substance use in adolescents. *Psychology of Addictive Behaviors, 17,* 179-192.
Crockett, L. J., Moilanen, K. L., Raffaelli, M., & Randall, B. A. (2006). Psychological profiles and adolescent adjustment: A person-centered approach. *Development and Psychopathology, 18,* 195-214.
Croninger, R. G., & Lee, V. E. (2001). Social capital and dropping out of high school: Benefits to at-risk students of teachers' support and guidance. *Teachers College Record, 103,* 548-581.
Darling, N., Caldwell, L. L., & Smith, R. (2005). Participation in school-based extracurricular activities and adolescent adjustment. *Journal of Leisure Research, 37,* 51-76.
Dawber, T. R., & Kannel, W. B. (1966). The Framingham study: An epidemiological approach to coronary heart disease. *Circulation, 34,* 553-555.
Dever, B. V., Schulenberg, J. E., Dworkin, J. B., O'Malley, P. M., Kloska, D. D., & Bachman, J. G. (Under Review). Risk-taking without substance use: The protective effects of sports participation, school bonding, and parental monitoring.
Doll, B., & Lyon, M. A. (1998). Risk and resilience: Implications for the delivery of educational and mental health services in schools. *The School Psychology Review, 27,* 348-363.
Donohew, L., Helm, D. M., Lawrence, P. & Shatzer, M. J. (1990). Sensation seeking, marijuana use, and responses to prevention messages: Implications for public health campaigns. In R. R. Watson (Ed.), *Drug and alcohol abuse prevention.* Totowa, NJ: Humana.
Durant, R. H., Rickert, V. I., Ashworth, C. S., & Newman, C. (1993). Use of multiple drugs among adolescents who use anabolic steroids. *New England Journal of Medicine, 328,* 922-926.
Dworkin, J. (2005). Risk taking as developmentally appropriate experimentation for college students. *Journal of Adolescent Research, 20,* 219-241.
Eccles, J. (1983). Expectancies, values, and academic behaviors. In J. T. Spence (Ed.), *Achievement and achievement motives: Psychological and sociological approaches* (pp. 75-146). San Francisco: Freeman.
Eccles, J. S. (1985). Why doesn't Jane run? Sex differences in educational and occupational patterns. In F. D. Horowitz & M. O'Brien (Eds.), *The gifted and talented: Developmental perspectives* (pp. 251-295). Washington, DC: APA.
Eccles, J. S. (2005). Subjective task value and the Eccles et al. model of achievement-related choices. In A. J. Elliot & C. S. Dweck (Eds.), *Handbook of competence and motivation* (pp. 105-121). New York: Guilford Publications.
Eccles (Parsons), J., Adler, T., & Meece, J. L. (1984). Sex differences in achievement: A test of alternate theories. *Journal of Personality and Social Psychology, 46,* 26-43.

Eccles, J. S., & Barber, B. L. (1999). Student council, volunteering, basketball, or marching band: What kind of extracurricular involvement matters? *Journal of Adolescent Research, 14,* 10-43.

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. S., Lord, S., Midgley, C. (1991). What are we doing to early adolescents? The impact of educational contexts on early adolescents. *American Journal of Education, 99,* 521-542.

Eccles, J. S., Midgley, C., Wigfield, A., Buchanan, C. M., Reuman, D., Flanagan, C., & MacIver, D. (1993b). Development during adolescence: The impact of stage-environment fit on young adolescents' experiences in schools and in families. *American Psychologist, 48,* 90-101.

Eccles, J. S., & Wigfield, A. (1995). In the mind of the actor: The structure of adolescents' achievement task values and expectancy-related beliefs. *Personality and Social Psychology Bulletin, 21,* 215-225.

Eccles, J. S., Wigfield, A., Midgley, C., Reuman, D., MacIver, D., & Feldlaufer, H. (1993a). Negative effects of traditional middle schools on students' motivation. *Elementary School Journal, 93,* 553-574.

Eitle, D., Turner, R. J., & Eitle, T. M. (2003). The deterrence hypothesis reexamined: Sports participation and substance use among young adults. *Journal of Drug Issues, 33,* 193-222.

Erikson, E. H. (1970). Reflections on the dissent of contemporary youth. *International Journal of Psychoanalysis, 51,* 11-22.

Everitt, B.S., Landau, S., & Leese, M. (2001). *Cluster analysis*, *4th edition*. London: Arnold.

Feldlaufer, H., Midgley, C., Eccles, J. S. (1988). Student, teacher, and observer perceptions of the classroom environment before and after the transition to junior high school. *Journal of Early Adolescence, 8,* 133-156.

Feldman, A. F., & Matjasko, J. L. (2007). Profiles and portfolios of adolescent school-based extracurricular activity participation. *Journal of Adolescence, 30,* 313-332.

Foley, R. M., & Pang, L. (2006). Alternative education programs: Program and student characteristics. *The High School Journal, 89,* 10-21.

Ford, J. A. (2007). Alcohol use among college students: A comparison of athletes and nonathletes. *Substance Use & Misuse, 42,* 1367-1377.

Frankenberger, K. D. (2004). Adolescent egocentrism, risk perceptions, and sensation seeking among smoking and nonsmoking youth. *Journal of Adolescent Research, 19,* 576-590.

Franklin, C., Streeter, C. L., Kim, J. S., & Tripodi, S. J. (2007). The effectiveness of a solution-focused, public alternative school for dropout prevention and retrieval. *Children & Schools, 29,* 133-144.

Franques, P., Auriacombe, M., Piquemal, E., Verger, M., Brisseau-Gimenez, S., Grabot, D., & Tignol, J. (2003). Sensation seeking as a common factor in opioid dependent subjects and high risk sport practicing subjects. A cross sectional study. *Drug and Alcohol Dependence, 69,* 121-126.

Fredricks, J. A., & Eccles, J. S. (2006). Is extracurricular participation associated with

beneficial outcomes? Concurrent and longitudinal relations. *Developmental Psychology, 42,* 698-713.
Garmezy, N. (1974). Children at risk: The search for the antecedents of schizophrenia: II. Ongoing research programs, issues, and intervention. *Schizophrenia Bulletin, 1,* 55-125.
Garmezy, N. (1991). Resiliency and vulnerability to adverse developmental outcomes associated with poverty. *American Behavioral Scientist, 34,* 416-430.
Gold, M. (1995). Charting a course: Promise and prospects for alternative schools. *Journal of Emotional and Behavioral Problems, 3,* 8-11.
Gold, M., & Mann, D. W. (1982). Alternative school for troublesome secondary students. *Urban Review, 14,* 305-316.
Goldfield, G. S. (2009). Body image, disordered eating and anabolic steroid use in female bodybuilders. *Eating Disorders: The Journal of Treatment & Prevention, 17,* 200-210.
Gutman, L. M., Sameroff, A. J., & Cole, R. (2003). Academic growth curve trajectories from 1st grade to 12th grade: Effects of multiple social risk factors and preschool child factors. *Developmental Psychology, 39,* 777-790.
Hansen, E. B., & Breivik, G. (2001). Sensation seeking as a predictor of positive and negative risk behaviour among adolescents. *Personality and Individual Differences, 30,* 627-640.
Henry, K. L., Slater, M. D., & Oetting, E. R. (2005). Alcohol use in early adolescence: The effect of changes in risk taking, perceived harm and friends' alcohol use. *Journal of Studies on Alcohol, 66,* 275-283.
Hoffman, J. P. (2006). Extracurricular activities, athletic participation, and adolescent alcohol use: Gender-differentiated and school-contextualized effects. *Journal of Health and Social Behavior, 47,* 275-290.
Holland, A., & Andre, T. (1987). Participation in extracurricular activities in secondary school: What is known, what needs to be known? *Review of Educational Research, 57,* 437-466.
Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6,* 1-55.
Jack, S. J., & Ronan, K. R. (1998). Sensation seeking among high- and low-risk sports participants. *Personality and Individual Differences, 25,* 1063-1083.
Jackson, K. M., Sher, K. J., & Schulenberg, J. E. (2008). Conjoint developmental trajectories of young adult substance use. *Alcoholism: Clinical and Experimental Research, 32,* 723-737.
Jerry-Szpak, J., & Brown, H. P. (1994). Alcohol use and misuse: The hidden curriculum of the adolescent athlete. *Journal of Child & Adolescent Substance Abuse, 3,* 57-67.
Jessor, R. (1992). Risk behavior in adolescence: A psychosocial framework for understanding and action. *Developmental Review, 12,* 374-390.
Jessor, R., Van Den Bos, J., Vanderryn, J., Costa, F. M., & Turbin, M. S. (1995). Protective factors in adolescent problem behavior: Moderator effects and developmental change. *Developmental Psychology, 31,* 923-933.

Johnston, L. D., O'Malley, P. M., Bachman, J. G., & Schulenberg, J. E. (2008). *Monitoring the Future national survey results on drug use, 1975-2007. Volume I: Secondary school students* (NIH Publication). Bethesda, MD: National Institute on Drug Abuse.

Joreskog, K. G., & Sorbom, D. (1989). *LISREL 7 user's reference guide.* Mooresville, IN: Scientific Software.

Keating, D. P. (2004). Cognitive and brain development. In R. M. Lerner & L. Steinberg (Eds.), *Handbook of adolescent psychology, 2nd edition.* Hoboken, NJ: John Wiley & Sons.

Kim, J., & Taylor, K. A. (2008). Rethinking alternative education to break the cycle of educational inequality and inequity. *Journal of Educational Research, 101,* 207-219.

Kirshnit, C. E., Ham, M., & Richards, M. H. (1989). The sporting life: Athletic activities during early adolescence. *Journal of Youth and Adolescence, 18,* 601-615.

Kloep, M., Guney, N., Cok, F., & Simsek, O. F. (2009). Motives for risk-taking in adolescence: A cross-cultural study. *Journal of Adolescence, 32,* 135-151.

Komoroski, E. M., & Rickert, V. I. (1992). Adolescent body image and attitudes to anabolic steroid use. *Am J Dis Child, 146,* 823-828.

Larson, R. W. (2000). Toward a psychology of positive youth development. *American Psychologist, 55,* 170-183.

Larson, R. W., Hansen, D. M., & Moneta, G. (2006). Differing profiles of developmental experiences across types of organized youth activities. *Developmental Psychology, 42,* 849-863.

Larson, R. W., & Richards, M. H. (1991). Boredom in the middle school years: Blaming schools versus blaming students. *American Journal of Education, 99,* 418-443.

Larson, R., & Seepersad, S. (2003). Adolescents' leisure time in the United States: Partying, sports, and the American experiment. *New Directions for Child & Adolescent Development, 99,* 53-64.

Lejuez, C. W., Aklin, W. M., Bornovalova, M. A., & Moolchan, E. T. (2005). Differences in risk-taking propensity across inner-city adolescent ever- and never-smokers. *Nicotine and Tobacco Research, 7,* 71-79.

Lepper, M. R., Sethi, S., Dialdin, D., & Drake, M. (1997). Intrinsic and extrinsic motivation: A developmental perspective. In S. S. Luthar, J. A. Burack, D. Cicchetti, & J. R. Weisz (Eds.), *Developmental psychopathology: Perspectives on adjustment, risk, and disorder.* New York, NY: Cambridge University Press.

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.

Loukas, A., & Prelow, H. M. (2004). Externalizing and internalizing problems in low-income Latino early adolescents: Risk, resource, and protective factors. *Journal of Early Adolescence, 24,* 250-273.

Loy, K. H. & Gregory, D. E. (2002). Educating troubled students in an alternative setting. In G. J. McAuliffe (Ed.), *Working with troubled youth in schools: A guide for all school staff* (pp. 109-124). Westport, CT: Greenwood Publishing Group, Inc.

Luthar, S. S., & Brown, P. J. (2007). Maximizing resilience through diverse levels of inquiry: Prevailing paradigms, possibilities, and priorities for the future. *Development and Psychopathology, 19,* 931-955.

Luthar, S. S., Chicchetti, D., & Becker, B. (2000). The construct of resilience: A critical evaluation and guidelines for future work. *Child Development, 71,* 543-562.

Luthar, S. S., Doernberger, C. H., & Zigler, E. (1993). Resilience is not a unidimensional construct: Insights from a prospective study of inner-city adolescents. *Development and Psychopathology, 5,* 703-717.

Maggs, J. L., & Schulenberg, J. E. (2005). Initiation and course of alcohol consumption among adolescents and young adults. In M. Galanter (Ed.), *Recent developments in alcoholism, vol. 17: Alcohol problems in adolescents and young adults* (pp. 29-47). New York: Kluwer Academic/Plenum Publ.

Mahoney, J. L. (2000). School extracurricular activity participation as a moderator in the development of antisocial patterns. *Child Development, 71,* 502-516.

Mahoney, J. L., Cairns, B. D., & Farmer, T. W. (2003). Promoting interpersonal competence and educational success through extracurricular activity participation. *Journal of Educational Psychology, 95,* 409-418.

Mahoney, J. L., Schweder, A. E., & Stattin, H. (2002). Structured after-school activities as a moderator of depressed mood for adolescents with detached relations to their parents. *Journal of Community Psychology, 30,* 69-86.

Marchant, G. J., Paulson, S. E., & Rothlisberg, B. A. (2001). Relations of middle school students' perceptions of family and school contexts with academic achievement. *Psychology in the Schools, 38,* 505-519.

Marcia, J. E. (1980). Identity in adolescence. In J. Adelson (Ed.), *Handbook of adolescent psychology.* New York: Wiley.

Marsh, H. W. (1991). Employment during high school: Character building or a subversion of academic goals? *Sociology of Education, 64,* 172-189.

Marsh, H. W. (1993). Physical fitness self-concept: Relations of physical fitness to field and technical indicators for boys and girls aged 9-15. *Journal of Sport & Exercise Psychology, 15,* 184-2006.

Marsh, H. W., Hau, K., & Wen, Z. (2004). In search of golden rules: Comment on hypothesis-testing approaches to setting cutoff values for fit indexes and dangers in overgeneralizing Hu and Bentler's (1999) findings. *Structural Equation Modeling, 11,* 320-341.

Marsh, H. W., & Kleitman, S. (2003). School athletic participation: Mostly gain with little pain. *Journal of Sport and Exercise Psychology, 25,* 205-228.

Martin, C. A., Kelly, T. H., Rayens, M. K., Brogli, B. R., Brenzel, A., Smith, W. J., & Omar, H. A. (2002). Sensation seeking, puberty, and nicotine, alcohol, and marijuana use in adolescence. *Journal of the American Academy of Child and Adolescent Psychiatry, 41,* 1495-1502.

Masten, A. S., Best, K. M., & Garmezy, N. (1990). Resilience and development: Contributions from the study of children who overcome adversity. *Development and Psychopathology, 2,* 425-444.

Masten, A. S., & Coatsworth, J. D. (1998). The development of competence in favorable and unfavorable environments: Lessons from research on successful children. *American Psychologist, 53,* 205-220.

Mays, D., & Thompson, N. J. (2009). Alcohol-related risk behaviors and sports participation among adolescents: An analysis of 2005 youth risk behavior survey data. *Journal of Adolescent Health, 44,* 87-89.

Midgley, C., Maehr, M. L., Hruda, L. Z., Anderman, E., Anderman, L., Freeman, K. E., Gheen, M., Kaplan, A., Kumar, R., Middleton, M. J., Nelson, J., Roeser, R., & Urdan, T., (2000). *Manual for the Patterns of Adaptive Learning Scales (PALS)*, Ann Arbor, MI: University of Michigan.

Mitchell, M. (1993). Situational interest: Its multifaceted structure in the secondary school mathematics classroom. *Journal of Educational Psychology, 85,* 424-436.

Moore, M. J., & Werch, C. E. (2005). Sport and physical activity participation and substance use among adolescents. *Journal of Adolescent Health, 35,* 486-493.

Naylor, A. H., Gardner, D., & Zaichkowsky, L. (2001). Drug use patterns among high school athletes and nonathletes. *Adolescence, 36,* 627-639.

Patrick, H., Ryan, A. M., & Kaplan, A. (2007). Early adolescents' perceptions of the classroom social environment, motivational beliefs, and engagement. *Journal of Educational Psychology, 99,* 83-98.

Paulson, M. J., Coombs, R. H., & Richardson, M. A. (1990). School performance, academic aspirations, and drug use among children and adolescents. *Journal of Drug Education, 20,* 289-303.

Peck, S. C., Vida, M., & Eccles, J. S. (2008). Adolescent pathways to adulthood drinking: Sport activity involvement is not necessarily risky or protective. *Addiction, 103,* 69-83.

Peretti-Watel, P., Beck, F., & Legleye, S. (2002). Beyond the U-curve: The relationship between sport and alcohol, cigarette and cannabis use in adolescents. *Addiction, 97,* 707-716.

Peretti-Watel, P., & Lorente, F. O. (2004). Cannabis use, sports practice and other leisure activities at the end of adolescence. *Drug and Alcohol Dependence, 73,* 251-257.

Pianta, R. C., & Walsh, D. J. (1998). Applying the construct of resilience in the schools: Cautions from a developmental systems perspective. *The School Psychology Review, 27,* 407-417.

Pilgrim, C. C., Schulenberg, J. E., O'Malley, P. M., Bachman, J. G., & Johnston, L. D. (2006). Mediators and moderators of parental involvement on substance use: A national study of adolescents. *Prevention Science, 10*, 1–15.

Prelow, H. M., & Loukas, A. (2003). The role of resource, protective, and risk factors on academic achievement-related outcomes of economically disadvantaged Latino youth. *Journal of Community Psychology, 31,* 513-529.

Randolph, K. A., Fraser, M. W., & Orthner, D. K. (2004). Educational resilience among youth at risk. *Substance Use & Misuse, 39,* 747-767.

Reyna, V. F., & Farley, F. (2006). Risk and rationality in adolescent decision making: Implications for theory, practice, and public policy. *Psychological Science in the Public Interest, 7,* 1-44.

Rhoades, B. L., & Maggs, J. L. (2006). Do academic and social goals predict planned alcohol use among college-bound high school graduates? *Journal of Youth and Adolescence, 35,* 913-923.

Rodriguez, D., & Audrain-McGovern, J. (2004). Team sport participation and smoking:

Analysis with general growth mixture modeling. *Journal of Pediatric Psychology, 29,* 299-308.
Roth, J. L., & Brooks-Gunn, J. (2003). What exactly is a youth development program? Answers from research and practice. *Applied Developmental Science, 7,* 94-111.
Rutter, M. (1987). Psychosocial resilience and protective mechanisms. *American Journal of Orthopsychiatry, 57,* 316-331.
Ryan, A. M., & Patrick, H. (2001). The classroom social environment and changes in adolescents' motivation and engagement during middle school. *American Educational Research Journal, 38,* 437-460.
Sabo, D., Miller, K. E., Melnick, M. J., Farrell, M. P., & Barnes, G. M. Athletic participation and the health risks of adolescent males: A national study. *International Journal of Men's Health, 1,* 173-193.
Sanders, C. E., Field, T. M., & Diego, M. A. (2001). Adolescents' academic expectations and achievement. *Adolescence, 36,* 795-802.
Schroth, M. L. (1995). A comparison of sensation seeking among different groups of athletes and nonathletes. *Personality and Individual Differences, 18,* 219-222.
Schroth, M. L., & McCormack, W. A. (2000). Sensation seeking and need for achievement among study-abroad students. *Journal of Social Psychology, 140,* 533-535.
Schulenberg, J. E., Bachman, J. G., O'Malley, P. M., & Johnston, L. D. (1994). High school educational success and subsequent substance use: A panel analysis following adolescents into young adulthood. *Journal of Health and Social Behavior, 35,* 45-62.
Schulenberg, J. E., Merline, A. C., Johnston, L. D., O'Malley, P. M., Bachman, J. G., & Laetz, V. B. (2005). Trajectories of marijuana use during the transition to adulthood: The big picture based on national panel data. *Journal of Drug Issues,* 35, 255-279.
Schulenberg, J. E., & Zarrett, N. R. (2006). Mental health during emerging adulthood: Continuity and discontinuity in courses, causes, and functions. In J. J. Arnett & J. L. Tanner (Eds.), *Emerging adults in America: Coming of age in the 21st century* (pp. 135-172). Washington DC: American Psychological Association.
Spear, L. P. (2000). Neurobehavioral changes in adolescence. *Current Directions in Psychological Science, 9,* 111-114.
Steinberg, L. (2005). Cognitive and affective development in adolescence. *Trends in Cognitive Sciences, 9,* 69-74.
Tomori, M., Martina, Z. B., Kores Plesnicar, B., Ziherl, S., & Stergar, E. Smoking in relation to psychosocial risk factors in adolescents. *European Child & Adolescent Psychiatry, 10,* 143-150.
Vartanian, L. R. (2000). Revisiting the imaginary audience and personal fable constructs of adolescent egocentrism: A conceptual review. *Adolescence, 35,* 639-661.
Werner, E. E. (1994). Overcoming the odds. *Journal of Developmental & Behavioral Pediatrics, 15,* 131-136.
Werner, E. E., & Smith, R. S. (1992). *Overcoming the odds: High risk children from birth to adulthood.* Ithaca, NY: Cornell University Press.
Wigfield, A. (1994). Expectancy-value theory of achievement motivation: A developmental perspective. *Educational Psychology Review, 6,* 49-78.

Wigfield, A., & Eccles, J. S. (1992). The development of achievement task values: A theoretical analysis. *Developmental Review, 12,* 265-310.
Wigfield, A., & Eccles, J. S. (2000). Expectancy-value theory of achievement motivation. *Contemporary Educational Psychology, 25,* 68-81.
Wigfield, A., Eccles, J. S., Yoon, K. S., Harold, R. D., Arbreton, A. J. A., Freedman-Doan, C., et al. (1997). Change in children's competence beliefs and subjective task values across the elementary school years: A 3-year study. *Journal of Educational Psychology, 89*, 451-469.
Zoccolillo, M., Vitaro, F., & Tremblay, R. E. (1999). Problem drug and alcohol use in a community sample of adolescents. *Journal of the American Academy of Child and Adolescent Psychiatry, 38,* 900-907.
Zuckerman, M. (1979). *Sensation seeking: Beyond the optimal level of arousal.* Hillsdale, NJ: Lawrence Erlbaum.
Zuckerman, M. (1994). *Behavioral expressions and biosocial bases of sensation seeking.* New York: Cambridge University Press.
Zuckerman, M. (2007). *Sensation seeking and risky behavior*. Washington, D.C.: American Psychological Association.