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Sports participation and alcohol-related behaviors among adolescents

By

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Doctor of Philosophy

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An abstract of
A dissertation submitted to the Faculty of the Graduate School of Emory University
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Abstract

Sports participation and alcohol-related behaviors among adolescents

By Darren Mays, MPH

This dissertation research investigated the relationship between school-based sports participation and alcohol-related behaviors among adolescents through two separate studies. The first study examined the relationships among sports-specific factors, perceived peer drinking, and alcohol-related behaviors in a sample of adolescents taking part in school-based sports in the Muscogee County, Georgia area. The second study investigated the longitudinal relationship between participation in school-based sports and other non-sports activities and problem alcohol use (PAU) within a nationally-representative, multi-wave sample of U.S. adolescents. In both studies, differences between males and females were examined.

The findings of the first study suggest that the relationships between alcohol-related behaviors and some sports-specific factors, including level of participation, contact sports, and females' participation in softball, warrant investigation in future research. In addition, greater perceived peer drinking was also associated with alcohol-related behaviors, and this relationship was stronger among males. These findings indicate that future research is needed to examine whether the contextual factors underlying specific aspects of sports participation may influence alcohol-related behaviors among adolescents. Furthermore, the findings of this study suggest that differences exist between males and females with respect to sports participation and the relationships among sports-specific factors, perceived peer drinking, and alcohol-related behaviors, which should be explored further in future research.

The findings of the second study indicate that, among adolescents who only took part in sports, greater involvement in sports was associated with faster average acceleration in PAU over time. Furthermore, the relationship between sports participation and PAU varied based on participation in sports in combination with other activities (i.e., music and academic activities), and also differed between males and females. The results of this analysis suggest that school-based sports participation may represent a potentially important context to efficiently administer selective alcohol interventions. Future research is needed, however, to examine the optimal targets for interventions among adolescent sports participants. The findings point to a number of important areas of investigation, which will advance the science examining alcohol-related behaviors among adolescent sports participants and may provide insight into potential opportunities for intervention.

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Chapter 1

Introductory Literature Review

Adolescent Alcohol Use

Adolescent alcohol use is a major public health problem in the United States (U.S. Department of Health and Human Services [US DHHS], 2003, 2007). Alcohol remains the most widely used substance among U.S. youths, and the prevalence of alcohol use among adolescents has remained steady for nearly a decade (Faden & Fay, 2004). Data from several national surveys of U.S. adolescents provide estimates of the prevalence of adolescent alcohol use and alcohol-related behaviors. For example, results from the Centers for Disease Control and Prevention's (CDC) 2007 Youth Risk Behavior Survey (YRBS) indicate that 75% of high school students reported lifetime alcohol use, 45% reported current alcohol use, and 26% reported one or more heavy drinking episode (i.e., $\geq$ 5 drinks on one occasion) in the past month (Eaton et al., 2008). Similarly, according to the 2007 National Survey on Drug Use and Health (NSDUH), among persons age 12 to 20, 28% reported drinking alcohol in the past month, 19% reported one or more heavy drinking episode in the past month, and 6% reported five or more heavy drinking episodes in the past month (Substance Abuse and Mental Health Services Administration [SAMHSA], 2008). Finally, the results of the 2008 Monitoring the Future (MTF) survey reveal that 16% of 8^{th} graders, 23% of 10^{th} graders, and 43% of 12^{th} graders drank alcohol at least once in the 30 days prior to the survey (Johnston, O'Malley, Bachman, & Schulenberg, 2009). In addition, 5% of 8^{th} graders, 14% of 10^{th} graders, and 28% of 12^{th} graders reported being drunk one or more times in the 30 days prior to the survey. While the exact prevalence estimates of specific alcohol-related behaviors vary across these surveys, the variability is attributed to differences in methodology, and the YRBS, MTF, and the NSDUH have consistently yielded similar patterns of alcohol-related behaviors

among U.S. youths (Faden & Fay, 2004; Johnston, O'Malley, Bachman, & Schulenberg, 2007; Windle & Windle, 2005).

The average age of drinking onset is also occurring earlier among U.S. adolescents, placing youths who begin drinking at an early age at a greater risk for alcohol-related problems later in life (Grant & Dawson, 1998; Hingson, Heeren, & Winter, 2006; Newes-Adeyi, 2005; Sartor, 2006). Early drinking onset (i.e., prior to the age of 13) is associated with heavy episodic drinking, alcohol interfering with daily activities such as school and work, and the development of alcohol-related disorders later in life (Grant & Dawson, 1997; Grant, Stinson, & Harford, 2001; Steuve & O'Donnell, 2005). Prior research also suggests that adolescents who first drink alcohol at an early age are more likely to engage in other alcohol-related behaviors during adolescence and young adulthood, such as drinking and driving (Hingson, Heeren, Levenson, Jamanka, & Voas, 2002). Many U.S. adolescents also meet clinical diagnostic criteria for alcohol use disorders (AUDs), suggesting that diagnosable AUDs are occurring at younger ages in the U.S. population. Recent evidence suggests, for example, that nearly 1.5 million youths between 12-17 years of age meet clinical criteria for alcohol abuse or dependence (US DHHS, 2006). Emerging evidence also suggests that the development of AUDs during adolescence significantly increases youths' mortality risk during young adulthood, particularly for certain high-risk groups, such as non-Hispanic black males (Clark, Martin, & Cornelius, 2008).

Adolescent alcohol use poses significant threats to the health of individual drinkers and to public health. At the population level, underage drinking accounts for nearly half of all alcohol consumed in the U.S. annually (Foster, Vaughan, Foster, &

Califano, 2003) and costs nearly $53 billion per year due to the numerous associated public health consequences (Levy, Miller, & Cox, 1999). Alcohol use by adolescents has a deleterious impact on youths' health in many ways, such as impairing neurological development and functioning (De Bellis et al., 2005; Zeigler et al., 2005), liver damage (Clark, Lynch, Donovan, & Block, 2001), and disrupting growth and endocrine function (Dees, Srivastava, & Hiney, 2001; Mauras, Rogol, Haymond, & Veldhuis, 1996). Adolescents who report drinking alcohol are also more likely than those who do not drink alcohol to engage in behaviors that put them at risk for a number of adverse health outcomes. These behaviors include risky sex, riding with drunk drivers, fighting, smoking, illicit drug use, suicide attempts, violence, and carrying firearms (CDC, 2006; Miller, Naimi, Brewer, & Jones, 2007; Sosin, Koepsell, Rivara, & Mercy, 1995; Windle & Windle, 2005; Zweig, Lindberg, & McGinley, 2002). Youths who report heavy episodic drinking are even more likely to report many of these risky behaviors (Miller et al., 2007). Preliminary research also suggests that early drinking among youths is associated with the development of health problems during adulthood, such as cardiovascular disease, and becoming overweight and obese (Fan, Russell, Stranges, Dorn, & Trevisan, 2008).

Drinking and driving is perhaps the most notorious public health consequence of adolescent alcohol use because of the direct risk this behavior creates for others. Evidence suggests that between 10% and 15% of adolescents generally report drinking and driving in response to national surveys (CDC, 2006; SAMHSA, 2007). Among adolescents and young adults, drinking and driving is directly linked to fatal motor vehicle accidents, one of the leading causes of death within this age group. In 2004, for

example, nearly 21% of drivers aged 15 to 20 years old who were killed in a motor vehicle crash had been drinking alcohol at the time of the accident (National Highway Traffic Safety Administration, 2004). Finally, each year approximately 5,000 youths under 21 years of age die as a result of drinking alcohol, including deaths due to motor vehicle accidents, homicides, suicides, injuries and other accidents (National Institute of Alcohol Abuse and Alcoholism [NIAAA], 2007). These numbers likely underestimate alcohol-related mortality among adolescents due to the reporting mechanisms in most states (NIAAA, 2004/2005).

Alcohol use among adolescents takes place during a time of complex developmental changes. There is an interactive relationship among alcohol-related behaviors and the multitude of social, biological, and cognitive developmental processes that occur during adolescence (Brown et al., 2008; Windle et al., 2008). Biological changes that take place during adolescence include physical growth, brain development, hormonal changes, alterations in sleep patterns, and development of emotional and behavioral self-regulation processes (Brown et al., 2008; Windle et al., 2008). Cognitive changes that occur during this period include the development of advanced decision-making capacity and executive functioning, and maturation of working memory (Brown et al., 2008; Windle et al., 2008). Finally, youths' social environments also change during adolescence as they begin to spend more time with their peers and less time with their families, develop serious romantic relationships, progress through school transitions (i.e., middle to high school), and adopt adult roles, such as employment (Brown et al., 2008; Windle et al., 2008). Drinking during adolescence interacts with many of these developmental processes, and the developmental changes that occur during this time also

influence drinking behaviors (Brown et al., 2008; Windle et al., 2008). Increasingly, adolescent alcohol use is viewed from this developmental perspective, which takes into consideration the dynamic changes that are occurring during this time and the potential relationships among these changes and drinking behaviors (Brown et al., 2008; Windle et al., 2008).

Adolescence & Sports Participation

Existing population-level data from numerous sources suggests that the majority of U.S. adolescents participate in some form of organized sports. For example, the majority of U.S. adolescents who responded to the 2007 YRBS reported participating in one or more organized athletic team or event in the 12 months prior to the survey, a pattern that has been consistent across the past several administrations of the YRBS (Eaton et al., 2008). In addition, according to the National Federation of High School Athletic Associations, during the in the 2007-2008 school year nearly 7.5 million U.S. high school students took part in school-based sports, and this number has increased over the past several years (National Federation of High School Athletic Associations, 2008).

Sports represent important contexts of physical, social, and cognitive development for many adolescents (Eccles, Barber, Stone, & Hunt, 2003; Scanlan, Babkes, & Scanlan, 2005; Steiner, McQuivey, Pavelski, Pitts, & Kraemer, 2000), and sports participation is associated with numerous health and developmental benefits (Barber, Stone, & Eccles, 2006; Eccles & Barber, 1999; Eccles et al., 2003). Participation in sports provides adolescents with opportunities to form personal and social identities and interact in positive ways with peers, and offers structured time for pro-social engagement (Barber et al., 2006; Barber, Stone, Hunt, & Eccles, 2005; Eccles et al.,

2003). Involvement in structured activities such as sports may also lead to less time to become involved in problem behaviors (Mahoney, 2000; Mahoney & Stattin, 2000), and can link youths to adults who may be positive influences in their lives, such as coaches and other adult role models (McLauglin, 2000). Finally, participation in sports appears to be associated with many positive health outcomes among adolescents. Prior studies suggest, for example, that sports participants are less likely than non-sports participants to engage in behaviors such as illicit drug use, smoking, and risky sexual behaviors (Baumert, Henderson, & Thompson, 1998; Eccles et al., 2003; Garry & Morrissey, 2000; Harrison & Narayan, 2003; Page, Hammermeister, Scanlan, & Gilbert, 1998; Rainey, McKeown, Sargent, & Valois, 1996; Winnail et al., 1997).

Prior research also suggests, however, that adolescent sports participants are more likely to report drinking alcohol than non-sports participants and youths who take part in non-sports extracurricular activities (Eccles et al., 2003; Fredricks & Eccles, 2005; Garry & Morrissey, 2000; Green & Burke, 1995; Hoffmann, 2006; Mays & Thompson, 2009; K. E. Miller, Melnick, Farrell, Sabo, & Barnes, 2006; Moore & Werch, 2005; Rainey et al., 1996; Wetherill & Fromme, 2007; Winnail et al., 1997). Researchers have explained that it is a popular myth that adolescents who participate in sports are less likely to drink alcohol because of the deleterious impact that drinking can have on athletic training and performance (Carr, 1990). A brief review of some of the research on sports participation and alcohol-related behaviors among adolescents also refutes this idea. For example, Winnail and colleagues (1997) used 1993 YRBS data to compare substance use behaviors among sports participants and non-sports participants in a Southern state. The findings from this study revealed that white, non-sports participant males were significantly less

likely to report drinking alcohol than the corresponding group of sports participants. Green and Burke (1995) investigated alcohol use behaviors among a sample of approximately 300 high school sports participants, finding that the majority of the sample reported drinking alcohol. Furthermore, Green and Burke found that the reasons for drinking among adolescent sports participants included celebrating achievements, to have a good time with friends, and to alleviate worries about the pressures of athletics and school. Wetherill and colleagues (2007) found, among a sample of older adolescents (i.e., high school seniors and recent graduates), that both male and female sports participants reported more drinking occasions in the past month and consuming more drinks per drinking occasion, compared to their non-athlete counterparts.

Using 2007 YRBS data to compare alcohol risk behaviors among sports participants and non-participants, Mays and Thompson (2009) found that male sports participants were significantly more likely to report heavy drinking and driving after drinking in the past 30 days, compared to males who did not report sports participation. In contrast, female sports participants were less likely to report ever drinking, early drinking, and drinking in the past 30 days than female non-sports participants (Mays & Thompson, 2009). Miller and colleagues (2003) found that students who self-identified as "jocks" were more likely to engage in alcohol-related behaviors than their non-jock peers, after controlling for several factors, including gender, age, other demographics, and measures of social and physical maturity. Hoffmann (2006) analyzed data from the 1990-1992 National Educational Longitudinal Study and found that drinking was associated with sports participation for both males and females, however, the association

varied in strength with school-level characteristics, such as socioeconomic status and public/private school status.

In a recent study using data from the Michigan Study of Adolescent Life Transitions (MSALT), Peck and colleagues (2008) examined the longitudinal relationship between sports participation and alcohol use, specifically investigating whether smaller, more homogenous subgroups of sports participants formed based on characteristics such as social relationships and problem behaviors in late childhood and adolescence were predictive of alcohol use during young adulthood. The authors applied variable-based analyses (i.e., regression models) in order to determine what predictor variables at age 12 and age 18 were significantly associated with alcohol use later in life. Subsequently, the authors used pattern-based analyses (i.e., cluster analysis) in order to examine whether homogenous subgroups of sports participants were more likely to drink alcohol during adolescence and into young adulthood. The authors found that certain subgroups of adolescents who were engaged in sports during adolescence and late childhood were more likely to report drinking alcohol during adulthood, and this relationship varied based on individual-level characteristics during childhood and adolescence, such as level of sports involvement, aggression, and other problem behaviors. For example, adolescents who reported few problem behaviors and high sports involvement at age 18 were less likely to be heavy drinkers at age 28 (Peck et al., 2008). Adolescents who reported relatively high levels of sports involvement, alcohol use, and problem behaviors at age 18 were more likely to become heavy drinkers at age 28. In contrast, adolescents who reported greater than average alcohol and drug use and other problem behaviors at age 18 and were minimally involved in sports were no more likely than chance to become

heavy drinkers at age 28. Similar patterns were also revealed when examining whether characteristics at age 12 predicted drinking behaviors at age 18 (Peck et al., 2008).

Several studies conducted outside of the United States have also illustrated a positive association between sports participation and alcohol use among adolescents (Hellandsjo Bu, Watten, Foxcroft, Ingebrigtsen, & Relling, 2002; Lorente, Souville, Griffet, & Grelot, 2004; Peretti-Watel, Beck, & Legleye, 2002a, 2002b; Peretti-Watel et al., 2003). Furthermore, a number of other studies conducted among U.S. youths have found that adolescents who take part in sports are as likely as their non-sports participant counterparts to engage in alcohol-related risk behaviors (Baumert et al., 1998; Kulig, Brener, & McManus, 2003; Naylor, Gardner, & Zaichkowsky, 2001; Page et al., 1998; Pate, Trost, Levin, & Dowda, 2000), bolstering the notion that athletic participation does not necessarily deter youths from drinking (Eitle, Turner, & Eitle, 2003). For example, Baumert and colleagues (1998) found no significant differences in a comparison of alcohol risk behaviors between adolescent sports participants and non-sports participants in Southwest Georgia. Naylor et al. (2001) compared the use of alcohol, tobacco, illicit drugs, and performance enhancing substances among high school sports participants and non-sports participants in Massachusetts. Their findings revealed no significant difference in the prevalence of alcohol use among these two groups. Kulig and colleagues (2003) assessed differences in health risk behaviors, including alcohol use, across four different groups of adolescents created based on level of physical activity and sports participation using 1999 YRBS data. The results of this study suggest that physically active males who participated in sports were as likely as their non-sports participant, non-active peers to report drinking alcohol (Kulig et al., 2003). Furthermore, this study

reported that physically-active female sports participants were less likely to report current alcohol use and heavy episodic drinking than their non-sports participant, non-active peers (Kulig et al., 2003). In an analysis of 2001 YRBS data, Pate et al. (2000) found no significant differences among both males and females in lifetime alcohol use and heavy episodic drinking behaviors when comparing sports participants to non-sports participants.

The body of research on sports participation and alcohol use among adolescents also suggests that there may be a number of factors that influence this relationship. There is compelling evidence to suggest, for example, that the relationship between sports participation and alcohol-related behaviors may differ between males and females. Recent research suggests that both patterns of drinking behaviors (Windle & Windle, 2005) and sports participation (Suggs, 2005; Women's Sports Foundation, 2007) differ between male and female adolescents, indicating that sex may moderate the relationship between sports participation and alcohol-related behaviors. In addition, findings from prior studies also suggest that alcohol use among adolescent sports participants may be influenced by several sports-specific factors, such as when the season of a particular sport falls, participation in different sports and team sports, and the level of participation (Bower, 1999; Kulig et al., 2003; Leaver-Dunn, Turner, & Newman, 2007; Moore & Werch, 2005; Rainey et al., 1996; Shields, 1998). Several researchers have also indicated that aspects of the sports environment, such as social pressure to succeed athletically and academically (Barber et al., 2005; Eccles & Barber, 1999; Eccles et al., 2003; Green & Burke, 1995) and the possible norming effects of the collective nature of sports teams on drinking behaviors (Martens, Dams-O'Connor, Duffy-Paiement, & al., 2006; Wetherill &

Fromme, 2007), may affect the relationship between sports participation and alcohol-related behaviors as well.

Finally, researchers have theorized that the peer environment surrounding sports participation may encourage drinking behaviors among sports participants (Barber, Eccles, & Stone, 2001; Barber et al., 2005; Dams-O'Connor, Martin, & Martens, 2007; Hoffmann, 2006; Lewis, 2008; Martens, Cox, & Beck, 2003). Existing literature has clearly established an association between peer drinking and adolescent alcohol-related behaviors (Brown et al., 2008; Windle et al., 2008). Peer drinking behaviors have been shown to be stronger predictors of alcohol use than other factors that are consistently linked with adolescent drinking, such as parental monitoring and other family-related factors (Bahr, Marcos, & Maughan, 1995; Jones, Mussong, Manning, & Sterrett, 2008; Nash, McQueen, & Bray, 2005; Wood, Read, Mitchell, & Brand, 2004). Perceived peer drinking, one operationalization of the influence of peers, has been found to explain up to 50% of the variability in adolescent drinking in prior research (Simmons-Morton, Haynie, Crump, Eitel, & Saylor, 2001; Windle, 2000; Windle et al., 2008), and is predictive of both the initiation of alcohol use and alcohol use over time (D'Amico & McCarthy, 2006; Simmons-Morton & Chen, 2006).

Sussman and colleagues (2007) concluded, based on a recent review of research examining adolescent peer group affiliation, that one of the primary peer groups with which adolescents identify is based on sports participation. Adolescents who participate in sports have a stronger activity-oriented identity compared to those who take part in non-sports activities (e.g., music or band, academic clubs), and this activity-oriented identity includes closer ties to peers who also take part in sports, compared to identities

formed around non-sports activities (Eccles & Barber, 1999). Given adolescent sports participants' strong ties to the groups formed around sports, and theories suggesting that the peer environment of sports may influence drinking behaviors among adolescent sports participants, it is reasonable to hypothesize that the influence of peers may contribute to the associations between sports participation, sports-specific factors, and drinking behaviors among youths.

Limitations in the Current Research

The preceding evidence is useful for conceptualizing the relationship between sports participation and alcohol-related behaviors, however, this review of prior studies also reveals several limitations in the body of research examining this relationship. While research over the course of approximately the past two decades suggests that sports participation may be associated with alcohol use among adolescents, several methodological limitations inhibit our understanding of this relationship. For example, many prior studies have relied on broad measures of sports participation that do not distinguish between school-based and non-school based contexts of participation (Dunham, 2003; Kulig et al., 2003; Mays & Thompson, 2009; Miller et al., 2003; Pate et al., 2000; Winnail et al., 1997), which may differ in their association with drinking behaviors. Many of these studies have analyzed YRBS data to assess the relationship between sports participation and alcohol use. The YRBS operationalizes sports participation based on a single item, such as: "During the past 12 months, on how many sports teams did you play?" In contrast to youths who take part in non-school based sports, school-based sports participants may be subject to more strict disciplinary practices—both formal (e.g., drug testing) and informal (e.g., coaches' practices)—which

may influence their drinking behaviors. Thus, using measures that clearly assess school-based and non-school based contexts of sports participation appears particularly important to our understanding of the relationship between sports participation and alcohol-related behaviors.

In addition, among existing studies investigating alcohol-related behaviors among school-based sports participants, the different measures applied to operationalize sports participation have varied substantially. Examples of the measures used to define sports participation in prior research have included participating in school-based sports for "one hour or more per week" (Harrison & Narayan, 2003), taking part on "one or more sports team at school for at least one season" (Green & Burke, 1995), and using an index to examine the specific sports in which youths participate at their schools (Hoffmann, 2006; Miller et al., 2003; Moore & Werch, 2005). Our understanding of the relationship between sports participation and alcohol-related behaviors among adolescents appears to be confounded by the various operationalizations of sports participation applied in prior research. The use of consistent, specific measures that clearly define sports participation will strengthen research investigating the relationships between sports participation and alcohol-related behaviors.

Nearly all prior studies examining the relationship between sports participation and alcohol-related behaviors among youths have also focused on alcohol consumption, while only a few studies have investigated alcohol-related behaviors such as drinking and driving, early drinking onset, and riding with another driver who had been drinking among adolescent sports participants (Mays & Thompson, 2009; Miller, Sabo, Melnick, & Barnes, 2000). These studies suggest that sports participants may be more likely than

non-sports participants to report alcohol-related behaviors, such as heavy episodic drinking and drinking and driving, and this is particularly true among males (Mays & Thompson, 2009; Miller et al., 2000). Additional research is needed, however, to examine alcohol-related behaviors beyond alcohol consumption among sports participants, such as the negative consequences that occur as a result of drinking, and to investigate the factors influencing these behaviors.

Despite several researchers suggesting that sports-specific factors may influence the relationship between sports participation and alcohol-related behaviors among adolescents, investigations of how sports-specific factors may influence alcohol-related behaviors remain limited (Bower, 1999; Moore & Werch, 2005; Rainey et al., 1996; Shields, 1998). Most of these studies have focused on a limited set of sports-specific factors, such as level of physical activity and participation in different sports, and few have examined the effects of multiple factors concurrently, or assessed factors such as level of participation and participation in team sports. In addition, while some researchers have examined the influence of the peer environment on drinking behaviors among intercollegiate athletes (Dams-O'Connor et al., 2007; Lewis, 2008), only one study has investigated the relationship between peer drinking and alcohol-related behaviors among high school sports participants (Eccles et al., 2003). Furthermore, the few previous longitudinal investigations of the relationship between sports participation and alcohol use have been limited in many of the same ways, applying restricted measures of sports participation and examining only alcohol consumption behaviors (Crosnoe, 2002; Hoffmann, 2006; Peck et al., 2008). Finally, prior longitudinal examinations of the impact of sports participation on adolescent development have not taken into account the

influence of participation in non-sporting activities on changes in alcohol use and related behaviors over time, which prior research suggests may confound findings with respect to sports (Larson, Hanson, & Moneta, 2006; Linver, Roth, & Brooks-Gunn, 2009).

There is also compelling evidence to suggest that the relationship between sports participation and alcohol-related behaviors may differ among male and female adolescents, with gender acting as a moderating variable. Both cross-sectional (Mays & Thompson, 2009) and longitudinal studies (Crosnoe, 2002; Hoffmann, 2006; Peck et al., 2008) have demonstrated distinct differences in the relationship between sports participation and alcohol use between males and females. However, these studies are affected by many of the limitations described above, and no prior studies have investigated differences between males and females in the relationships among sports-specific factors, perceived peer drinking, and alcohol-related behaviors.

Proposed Research

While the preceding evidence is useful for conceptualizing the relationship between sports participation and alcohol-related behaviors among adolescents, the limitations of prior studies suggest that there are a number of areas for future research to make substantive contributions to the science in this area of investigation. The proposed research seeks to fill several gaps in the existing research by investigating: (1) whether sports-specific factors are associated with alcohol-related behaviors; (2) the relationships among sports-specific factors, perceived peer drinking, and alcohol-related behaviors; (3) whether sports participation is associated with change over time in alcohol-related behaviors and consequences experienced as a result of drinking; and (4) examining differences between males and females in these relationships.

This research is informed by a theoretical framework based on Peer Cluster Theory (PCT). PCT indicates that the influence of peers is one of the factors most commonly linked with adolescents' use of alcohol and other drugs (Oetting & Beauvais, 1986a, 1986b, 1987; Petraitis, Flay, & Miller, 1995). For example, Oetting and Beauvais (1986b) examined the associations between 26 different psychosocial variables and substance use behaviors. This analysis illustrated that peer encouragement to use drugs and alcohol was the factor most consistently related to adolescent drug and alcohol use, and peer discouragement from using drugs and alcohol was the factor most consistently associated with adolescents' abstention from using drugs and alcohol. Numerous other studies support the claim that peer influence is one of the most consistent predictors of adolescent alcohol use (see Brown et al., 2008; Windle et al., 2008).

PCT also illustrates that, while peer influence is a general term, peer groups are formed around common interests, such as participation in sports and other activities (Oetting & Beauvais, 1987), and peers within these groups can influence when, where, and how adolescents use drugs and alcohol (Oetting & Beauvais, 1986b). Additionally, prior research examining the effects of extracurricular activity participation on youth development can also be integrated into this theoretical framework. According to this research, the activities that adolescents take part in and the social relationships that are built around these activities are central to the development of youths' personal and social identities (Barber et al., 2001). The activities in which youth participate, and the social identities that are formed around these activities, also influence their development and behaviors over the course of adolescence and into young adulthood (Barber et al., 2001; Eccles & Barber, 1999). Thus, participation in sports and other types of activities can

influence the processes through which adolescents develop their own identities and their social relationships, and may impact alcohol-related behaviors during adolescence as well.

The proposed research took place in two separate studies. In the first study, a brief, self-completed survey was administered among a sample of adolescents obtaining physical examinations in order to take part in school-based sports in the Muscogee County, Georgia area. The objectives of this exploratory study were to: (1) examine the relationships among sports-specific factors (e.g., different sports, level of sports participation, and participation in team/individual sports) and six alcohol-related behaviors (Chapter 2); (2) explore the relationships among sports-specific factors, perceived peer drinking, and alcohol-related behaviors (Chapter 3); and (3) assess how these relationships differ among male and female sports participants (Chapters 2 and 3). This research makes a substantive contribution to the existing science on this topic by applying a more specific measure of school-based sports participation compared to many prior studies, and assessing a number of alcohol-related behaviors; specifically investigating how sports-specific factors and perceived peer drinking relate to drinking behaviors; and examining differences between males and females.

In the second study, data from the National Longitudinal Study of Adolescent Health (Add Health) were analyzed in order to examine the longitudinal relationship between school-based sports participation during adolescence and problem alcohol use (PAU) among a nationally-representative sample of youths. Specifically, this study used latent growth modeling to investigate differences between males and females in the relationship between participation in school-based sports and other school-based

activities during adolescence and change in PAU over time (Chapter 4). This study is one of only a few existing studies to investigate the longitudinal relationships between sports participation and alcohol-related behaviors. This study builds upon prior longitudinal research by applying a more specific measure of school-based sports participation and examining a broad range of alcohol-related behaviors and negative consequences of alcohol use among a multi-wave, nationally-representative sample of U.S. youths.

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Chapter 2

The Relationship between Sports-Specific Factors and Alcohol-Related Behaviors among Adolescents in Southwest Georgia: An Exploratory Study

Abstract

Sports participation, while offering many development benefits for adolescents, has been associated with alcohol use in prior research. Despite some findings suggesting that sports-specific factors may impact this relationship, few studies have examined the impact of such factors on drinking behaviors among adolescents taking part in school-based sports. This study investigated whether sports-specific factors were associated with six alcohol-related behaviors among a sample of adolescents participating in school-based sports in Southwest Georgia. This study also investigated differences between male and female sports participants. A self-completed questionnaire was administered to students obtaining physical screenings to participate in school-based sports. The questionnaire assessed demographics, sports-specific factors (i.e., level of participation, different sports, team vs. individual sports, contact sports), and six alcohol-related behaviors. Analyses included bivariate statistics and linear and logistic regression models. The prevalence of alcohol-related behaviors among the sample was markedly lower than among adolescents nationally and in the state of Georgia. Few sports-specific factors were associated with alcohol-related behaviors, however some relationships, including level of participation, contact sports, and females' participation in softball merit investigation in future research. Future studies are needed to examine the potential factors underlying the low prevalence of alcohol-related behaviors among the sample. Furthermore, while few sports-specific factors were associated with alcohol-related behaviors, future research is needed to examine the contextual factors underlying specific aspects of sports participation that may affect associations with alcohol-related behaviors.

Differences between males and females with respect to sports participation should also be further examined.

Introduction

Sports represent important contexts of development among adolescents (Eccles, Barber, Stone, & Hunt, 2003) and are associated with numerous health and developmental benefits (Barber, Stone, & Eccles, 2006). Sports provide adolescents with opportunities to form their own identities, engage in positive ways with peers, and offer structured time for pro-social engagement (Barber et al., 2006; Barber, Stone, Hunt, & Eccles, 2005; Eccles et al., 2003). Recent evidence indicates that millions of U.S. adolescents stand to acquire benefits from sports participation each year. In the 2007-2008 school year, for example, nearly 7.5 million high school students nationwide took part in school-based sports, and this number has increased over the past several years (National Federation of High School Athletic Associations, 2008).

Prior research suggests, however, that adolescent sports participants are more likely to drink alcohol than non-participants (Eccles et al., 2003; Fredricks & Eccles, 2005; Garry & Morrissey, 2000; Green & Burke, 1995; Hoffmann, 2006; Mays & Thompson, 2009; Miller, Melnick, Farrell, Sabo, & Barnes, 2006; Moore & Werch, 2005; Rainey, McKeown, Sargent, & Valois, 1996; Wetherill & Fromme, 2007; Winnail et al., 1997). Researchers have suggested that alcohol use by sports participants may be related to sports-specific factors, such as whether sports are in season, participation in different sports, and the level of participation (Bower, 1999; Leaver-Dunn, Turner, & Newman, 2007; Moore & Werch, 2005; Peretti-Watel, 2009; Rainey et al., 1996; Shields, 1998). Researchers have also attributed some of the negative health outcomes related to collision sports (e.g., concussions) to factors such as the propensity for risk-taking (Barnes et al., 1998) and lowered sense of perceived risk (Kontos, 2004), and similar

factors have been associated with alcohol-related behaviors among youths as well (Windle et al., 2008).

While the preceding evidence is useful in conceptualizing drinking behaviors by adolescent sports participants, investigations examining whether sports-specific factors may be related to alcohol use have been limited (Bower, 1999; Leaver-Dunn et al., 2007; Moore & Werch, 2005; Rainey et al., 1996; Shields, 1998). Furthermore, few prior studies have examined alcohol-related behaviors beyond alcohol consumption, such as riding with a driver who had been drinking and driving after drinking (Mays & Thompson, 2009). Finally, evidence suggests that patterns of drinking behaviors (Windle & Windle, 2005) and sports participation (Suggs, 2005; Women's Sports Foundation [WSF], 2007) differ between male and female adolescents. The state of Georgia, where the current study took place, ranks 46th among all U.S. states in terms of the overall proportion of female high school students (49.8%), compared to the proportion of female high school sports participants (37.5%; WSF, 2007). Yet few studies have specifically examined how the relationships between sports-specific factors and alcohol-related behaviors differ among males and females (Mays & Thompson, 2009; Moore & Werch, 2005).

This study sought to explore whether sports-specific factors were associated with six alcohol-related behaviors among a sample of adolescents participating in school-based sports in the Muscogee County, Georgia area. This study also examined whether these relationships differed among males and females.

Methods

Setting & Procedures

The Institute of Athletic Health Care and Research, Inc. at the Hughston Foundation provides low-cost pre-participation screening examinations (PPSEs) for students from high schools in the surrounding community to detect conditions that put the students at risk for sports-related injuries. Students obtaining PPSEs were asked to volunteer to complete a brief, anonymous, paper-and-pencil questionnaire during the summer of 2008. All procedures were approved by the Emory University and Hughston Foundation Institutional Review Boards.

Measures

Due to the short time that students spent at each of the PPSE stations (approximately 5-10 minutes), a limited number of items was required.

Demographics. Demographic characteristics including age, sex, and race/ethnicity were assessed using items from the YRBS (Centers for Disease Control and Prevention [CDC], 2004).

Alcohol-related behaviors. Six alcohol-related behaviors were assessed using items from the YRBS that have established reliability among adolescents (Foster, Vaughan, Foster, & Califano, 2003). The alcohol-related behaviors measured were: ever drinking alcohol, early drinking onset (prior to 13 years of age), drinking in the past month, heavy drinking in the past month (5 or more drinks on an occasion), riding in the past month in a car with a driver who had been drinking, and driving a car in the past month after drinking. Each of the alcohol-related behaviors was treated as a dichotomous variable. A summary variable indicating the total number of alcohol-related behaviors was also created (6 items; Kuder-Richardson 20 = 0.72).

Sports-Specific Factors. An index from the National Longitudinal Study of

Adolescent Health (Add Health) was used to assess the different sports that participants planned to take or were currently taking part in at their school during the academic year (Udry, 2001). Level of sports participation was assessed by asking participants "Of the sports you take part in at school, at what level do you primarily participate?" Response options were freshman, junior varsity, varsity or other level.

The number of school-based sports was calculated by summing the sports indicated on the Add Health index. A dichotomous variable for participation in fall sports was created to indicate whether any of the sports reported were in season at the time of data collection. Dichotomous variables were also created to indicate participation in team only, individual only, or both team and individual sports. Sports classified as team sports included baseball/softball, basketball, football, soccer, and volleyball. Individual sports included golf, tennis, wrestling, track and field, swimming, and cross-country. A dichotomous variable was also created to indicate collision (i.e., "contact") sports based on classifications of the American Academy of Pediatrics (American Academy of Pediatrics Committee on Sports Medicine and Fitness, 2001).

Analyses

SAS 9.2 (SAS Institute, Cary, NC) was used for all analyses. First, bivariate comparisons were conducted to examine associations between sports-specific factors and individual alcohol-related behaviors and the sum of alcohol-related behaviors among the sample and separately among males (n = 287) and females (n = 89). Fischer's Exact Test was used for bivariate comparisons where 25% or more of cells contained fewer than 5 participants (Tabachnick & Fidell, 2007).

Next, a series of regression models was conducted to examine whether sports-specific factors were associated with reported alcohol-related behaviors. Among the entire study sample, logistic regression models were created where the individual alcohol-related behaviors were regressed onto sports-specific factors of interest. A linear regression model was created where the total alcohol-related behaviors was regressed onto the sports-specific factors of interest. The same linear model was conducted separately among males and females. Finally, regression models were conducted separately among males and females to determine whether different sports were associated with individual alcohol-related behaviors and the sum of alcohol-related behaviors.

The statistical significance of the logistic regression models was established using the Wald χ^2 statistic; model fit was assessed using the Hosmer-Lemeshow χ^2 goodness-of-fit statistic (Hosmer & Lemeshow, 2000). Logistic regression models could not be created for driving in the past 30 days after drinking because the behavior was reported by too few participants (3.7%) to achieve a model that fit the observed data. The overall *F*-test was used to establish the statistical significance of linear regression models. Initially, regression models controlled for age, race/ethnicity, and sex where appropriate; however, because these adjustments did not contribute significantly to the regression models they were excluded from the final models. Adjusting for age and race/ethnicity did impact the parameter estimates for some relationships, which are noted in the results.

Results

Participants

Participants (n = 378) were mostly male (76.3%) and self-identified as non-Hispanic black (70.0%; Table 1). The characteristics of the sample with respect to sports participation and alcohol-related behaviors are also displayed in Table 1.

The mean number of sports reported was 2.53 (Standard Deviation [*SD*] 1.28); there was no significant difference in the number of sports reported between males and females (t [370] = -0.32, p = 0.75). A larger proportion of males (50.7%) reported taking part in both team and individual sports compared to females (41.7%), while fewer males (6.3%) reported taking part in only individual sports compared to females (17.7%; χ^2 [2] = 10.32, $p < 0.01$). A larger proportion of males (68.4%) reported taking part in sports at the varsity level compared to females (56.0%), and a larger proportion of females reported taking part in sports at the freshman or other level compared to males (χ^2 [2] = 6.28, p = 0.04).

At the bivariate level, a larger proportion of males who reported varsity sports participation also reported ever drinking alcohol (42.9%), compared to males who had participated in sports the junior varsity (28.9%) and freshman/other (20.0%) levels (χ^2 [2] = 8.56, p = 0.01). Males who participated in varsity sports reported significantly more alcohol-related behaviors (*M* 1.01 [*SD* 1.41]) than males who participated in sports at the freshman/other level (*M* 0.36 [*SD* 0.36]), but did not differ significantly from the junior varsity level (*M* 0.61 [SD 1.04]; F [2, 257] = 4.59, p = 0.01). Tukey's post hoc comparison confirmed that the means difference between varsity and freshman/other level differed significantly at $p < 0.05$. There were no significant bivariate relationships between different sports (e.g., football, basketball) and alcohol-related behaviors among males.

Among females, at the bivariate level a larger proportion of females who reported taking part in softball also reported first drinking alcohol prior to the age of 13 (Fisher's Exact χ^2 [1] = 3.90, p = 0.07), riding with a driver who had been drinking (Fisher's Exact χ^2 [1] = 2.54, p = 0.09), and driving after drinking (Fisher's Exact χ^2 [1] = 4.08, p = 0.10), compared to females who did not report taking part in softball.

Sports-Specific Factors and Alcohol-Related Behaviors

Regression models examining the relationships among sports-specific factors and alcohol-related behaviors are displayed in Table 2. The regression model for ever drinking alcohol suggests that, after controlling for other variables in the model, participants who took part in varsity sports were significantly more likely to report ever drinking alcohol than those who took part in sports at other levels (Odds Ratio [OR] = 2.28, 95% Confidence Interval [CI] 1.41-3.69, $p < 0.01$). Furthermore, participants who took part in collision sports were significantly less likely than those reporting limited contact or non-contact sports to report ever drinking alcohol (OR = 0.46, 95% CI 0.22-0.98, p = 0.04). When age and race/ethnicity were controlled, however, this relationship was no longer significant.

Participants who took part in sports at the varsity level were also significantly more likely to report drinking in the past month (OR = 3.75, 95% CI 1.70, 8.28, $p <$ 0.01). Varsity sports participation was also associated with more total reported alcohol-related behaviors among the sample (B = 0.41, 95% CI 0.14, 0.68, p = 0.003) and among males (B = 0.50, 95% CI 0.17, 0.83, p = 0.003), however these relationships were no longer significant when age was included in the model. Finally, varsity sports participation was associated with heavy episodic drinking in the past month and

significantly more total reported alcohol-related behaviors among the entire study sample; however, these regression models were not statistically significant overall (Table 2).

The regression models displayed in Table 3 examined whether different sports were associated with alcohol-related behaviors among males and females. While each of the models demonstrated a good fit for the data, none were statistically significant based on the overall χ^2 or F statistics. Notably, the model examining relationships among different sports and total reported alcohol-related behaviors among females approached statistical significance (F [6,76] = 2.02, p = 0.07). According to this model, females who took part in softball reported significantly more alcohol-related behaviors compared to females who did not take part in softball (Table 3).

Discussion

Prior research suggests there is an association between sports participation and alcohol use among adolescents (Eccles et al., 2003; Fredricks & Eccles, 2005; Garry & Morrissey, 2000; Green & Burke, 1995; Hoffmann, 2006; Mays & Thompson, 2009; Miller et al., 2006; Moore & Werch, 2005; Rainey et al., 1996; Wetherill & Fromme, 2007; Winnail et al., 1997) and that sports-specific factors may influence this relationship (Bower, 1999; Leaver-Dunn et al., 2007; Moore & Werch, 2005; Rainey et al., 1996; Shields, 1998). To date, however, investigations of the relationships among sports-specific factors and alcohol-related behaviors among adolescents remain limited (Bower, 1999; Leaver-Dunn et al., 2007; Moore & Werch, 2005; Rainey et al., 1996; Shields, 1998). The findings from this study suggest that, while few of the sports-specific factors

examined were associated with alcohol-related behaviors, some emerging relationships revealed merit investigation in future research.

The prevalence of alcohol-related behaviors reported among the sample was markedly lower than among adolescents in the U.S. (CDC, 2007) and in Georgia (CDC, 2008). There are a number of possible explanations for this observation. The study sample was comprised primarily of non-Hispanic black males who participated in football, and these characteristics make the sample unique compared to most prior studies which suggest that youths who participate in sports are more likely to engage in alcohol-related behaviors (Eccles et al., 2003; Fredricks & Eccles, 2005; Garry & Morrissey, 2000; Green & Burke, 1995; Hoffmann, 2006; Mays & Thompson, 2009; Miller et al., 2006; Moore & Werch, 2005; Rainey et al., 1996; Wetherill & Fromme, 2007; Winnail et al., 1997). Among this sample of youths, it may be the case that sports participation is associated with fewer alcohol-related behaviors, a finding contrary to most prior studies in this area of research. While this conclusion cannot be firmly established based on the data collected because the study did not include a comparison group of non-sports participants, it warrants further investigation.

In addition, the data collection setting where youths obtained physical exams to take part in school-based sports may have led to underreporting of alcohol-related behaviors. While the questionnaire was anonymous and participants were assured their responses were confidential, this setting may have introduced bias. Furthermore, the fact that the sample was primarily comprised of non-Hispanic black adolescents may have contributed to the lower prevalence estimates observed, as this group of youths tends to report the lowest levels of alcohol use compared to other racial and ethnic groups

(Windle & Windle, 2005). Finally, adolescents in the southern United States generally report fewer alcohol-related behaviors than adolescents in other regions of the country (CDC, 2008), in part influenced by aspects of southern culture such as a strong tradition of religious beliefs that emphasize abstinence from drinking (Lindquist, Cockerham, & Hwang, 1999). Future research is needed to examine to what extent the low prevalence of alcohol-related behaviors observed within this unique study sample of sports participants may be attributable to sports participation, or to other factors that may influence alcohol-related behaviors, such as race/ethnicity and regional influences.

Existing data suggest that among U.S. adolescents, females have fewer opportunities to take part in high school sports compared to males, and this disparity is particularly pronounced in the state of Georgia (Suggs, 2005; WSF, 2007). Although this study did not objectively assess opportunities for sports participation, the results of bivariate analyses provide support for this idea. Compared to females, males were significantly more likely to take part in sports at the varsity level and to participate in both team and individual sports. Given that, on average, there was no significant difference in the number of sports reported between males and females, the differences with respect to team sports participation appear to be heavily influenced by males' participation in football, a team-based sport that was exclusively reported among males. However, it remains unclear whether the observed differences in participation in varsity sports result from fewer opportunities to participate in varsity sports among females, social norms and perceptions affecting females' decisions whether or not to participate in certain sports, or individual-level psychosocial factors that also influence decisions to take part in sports (Eccles, 1991). It is likely that a combination of these factors influence

sports participation among adolescent females. Future research is needed, however, to more closely examine the structural-, social-, and individual-level factors contributing to the differences between males and females in sports participation and to assess the potential impact on the health and developmental benefits acquired from sports participation.

The results of the regression models suggest that varsity sports participation was the sports-specific factor most consistently associated with alcohol-related behaviors, and this was particularly true among males. Prior research provides some insight that may help contextualize these findings. In one previous study conducted among a sample of high school sports participants, Green and Burke found that the motives for drinking included factors specific to sports, such as to celebrate sports-related achievements and to alleviate the social pressures to succeed athletically and academically (Green & Burke, 1995). The majority of males in the present study participated in varsity sports and prominent sports such as football and basketball, which receive a substantial amount of attention in schools and in the media. Consequently, males taking part in prominent varsity sports may experience more pressure to succeed scholastically and athletically and they may be more frequently exposed to social contexts that involve celebrating sports-related achievements, both of which are factors that may influence their drinking behaviors.

Another possible explanation for these findings is that the peer environments surrounding varsity sports participation may encourage drinking behaviors. A number of researchers have proposed that the peer environments of sports participation may affect drinking behaviors among adolescent and intercollegiate sports participants (Barber et al.,

2005; Dams-O'Connor, Martin, & Martens, 2007; Hoffmann, 2006). Prior research also suggests that sports participation may increase youths' social status at school (Eccles et al., 2003), and that during this developmental stage youths increasingly experience social situations that expose them to alcohol (Windle et al., 2008). It is possible that these processes are escalated among males who take part in varsity sports such as basketball and football. These sports may act to increase their social status among their peers at school and in their communities, and may also increase the likelihood that they will encounter social contexts where peers are using alcohol (e.g., parties celebrating sports achievements, older friends drinking). This heightened exposure to such social contexts related to varsity sports participation may, in turn, influence their drinking behaviors. To date, however, investigations of whether the peer environments of sports participation and other social factors influencing drinking behaviors among adolescents remain limited, and future research is needed in this area of investigation.

Participants in this study who took part in collision sports (American Academy of Pediatrics Committee on Sports Medicine and Fitness, 2001) were significantly less likely to report ever drinking alcohol compared to those who took part in only limited or non-contact sports. This result is somewhat surprising in light of prior research that has related the negative health outcomes associated with collision sports (e.g., concussions, injuries) to factors such as the propensity for risk-taking (Barnes et al., 1998), lowered sense of perceived risk (Kontos, 2004), and aggressiveness (Garry & Morrissey, 2000). Researchers have also proposed that similar factors may be linked to alcohol use and other risk behaviors among sports participants (Garry & Morrissey, 2000). In the current study, it appears to be the case that after controlling for the other variables in the

regression model, participation in the constellation of sports classified as collision sports is negatively associated with lifetime alcohol use. In other words, the significant decrease in odds of reporting ever drinking alcohol among collision sports participants may not be due to a specific feature of collision sports participation, but rather other aspects of the sports that were classified as collision sports when taking into account the other variables in the regression models. Further research is needed to explore this finding with respect to collision sports, in particular, examining how the individual-level factors that prior research has linked to collision sports, such as propensity for risk-taking, perceived risk, and aggressiveness affect drinking behaviors among collision sports participants in order to clarify this relationship.

Finally, among males and females participation in different sports was not significantly associated with alcohol-related behaviors. Notably, among females, the model examining the relationships among participation in different sports and the total alcohol-related behaviors approached statistical significance, and softball participants reported more alcohol-related behaviors than non-participants. Participation in softball among females was also associated with a significant increase in the odds of reporting ever drinking alcohol and drinking alcohol prior to the age of 13; however, those regression models were not statistically significant overall.

Findings from prior research suggests that adult (Snyder & Ammons, 1993) and adolescent (Alley & Hicks, 2005) female softball players are often stereotypically perceived as being more masculine than females who take part in other sports, and researchers have concluded that these stereotypes influence females' decisions to participate in certain sports (Alley & Hicks, 2005). This research suggests that it may be

the case that females who are stereotyped as being more masculine than their peers may be more likely to take part in softball than other sports, and female softball players may engage in higher levels of drinking that are more frequently attributed to males as a result of these gender-based stereotypes. In addition, prior research indicates that females who participate in softball are among the most likely to identify as "jocks" (Eccles et al., 2003), an identity that has been associated with higher levels of alcohol use in prior research (Eccles et al., 2003; Miller et al., 2003). Future research is needed to explore how such perceptions of masculinity and femininity among female sports participants may affect the relationships between participation in specific sports such as softball and alcohol-related behaviors among larger, more diverse samples of adolescent females.

Limitations

Several limitations of this study should be noted. First, all alcohol-related behaviors were measured by self-report, which may be subject to reporting biases. Second, this study used a convenience sample of adolescents taking part in school-based sports in the Muscogee County, Georgia area; therefore, the findings are not generalizable to broader populations. Third, the small, relatively homogenous sample in this study, particularly the small number of female participants, limits the findings and conclusions that can be drawn. Finally, the high school sports offered in the Muscogee County, Georgia area restrict the comparisons that can be made to adolescents who take part in sports in other regions of the United States. While the schools in the Muscogee County area offer a variety of sports, these may not be representative of sports offered elsewhere.

Conclusions

The findings from this exploratory study reveal potentially important areas of future research that may help advance our understanding of the relationship between sports-specific factors and alcohol-related behaviors among adolescents. First, future research is needed to examine the potential factors underlying the relatively low prevalence of alcohol-related behaviors observed in this study, including aspects of sports participation and other non-sports factors such as race/ethnicity and regional variability in drinking behaviors. Second, future research is needed to examine how the contextual factors associated with varsity sports participation, such as pressures to succeed athletically and the peer environment of varsity sports participation, may impact drinking behaviors. Third, while limited by the small sample size, the results suggest that participation in softball among females may be associated with alcohol-related behaviors among adolescent females in Southwest Georgia. Future studies among larger, more diverse samples of female sports participants should explore further this relationship.

Chapter 2 References

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Chapter 3

School-Based Sports Participation, Perceived Peer Drinking, and Alcohol-Related Behaviors among Adolescents in Southwest Georgia

Abstract

This study examined sex differences in the relationships among sports-specific factors, perceived peer drinking, and alcohol-related behaviors among adolescents. A questionnaire assessing demographics, sports-specific factors, perceived peer drinking, and alcohol-related behaviors was administered among 378 adolescents obtaining physical examinations. Most participants were male (76.3%) and non-Hispanic black (70.0%). Participants who engaged in varsity sports (B = 1.09, 95% CI 0.47, 1.72, p < 0.001) and in both team- and individual-level sports (B = 0.90, 95% CI 0.03, 1.76, p = 0.04) reported higher levels of perceived peer drinking. Perceived peer drinking was positively associated with alcohol-related behaviors (B = 0.30, 95% CI 0.24, 0.37, p < 0.001) and the relationship differed between males (B = 0.33, 95% CI 0.26, 0.40, p < 0.001) and females (B = 0.17, 95% CI 0.03, 0.32, p = 0.02). Suggestions for future research are discussed, including examining the factors contributing to the low observed prevalence of drinking behaviors, and how factors such as dispositional goal-orientation and the social contexts of sports participation impact perceived peer drinking and alcohol-related behaviors.

Introduction

The majority of adolescents drink alcohol prior to adulthood and alcohol use is associated with many of the leading causes of morbidity and mortality among this age group (Centers for Disease Control and Prevention [CDC], 2006; National Institute on Alcohol Abuse and Alcoholism, 2007; Windle & Windle, 2005). The average age of drinking onset is also occurring earlier, putting youths who begin drinking early at greater risk for experiencing alcohol-related problems later in life (Newes-Adeyi, 2005).

One of the most consistent predictors of adolescent alcohol use is the influence of peers (Brown et al., 2008; Windle et al., 2008). Specifically, peer drinking behaviors have been shown to be stronger predictors of alcohol use than other factors that are consistently linked with adolescent drinking, such as parental monitoring and other family-related factors (Bahr, Marcos, & Maughan, 1995; Jones, Mussong, Manning, & Sterrett, 2008; Nash, McQueen, & Bray, 2005; Wood, Read, Mitchell, & Brand, 2004). Perceived peer drinking has been found to explain up to 50% of the variability in adolescent drinking in prior research (Simmons-Morton, Haynie, Crump, Eitel, & Saylor, 2001; Windle, 2000; Windle et al., 2008) and is predictive of both the initiation of alcohol use and alcohol use over time (D'Amico & McCarthy, 2006; Simmons-Morton & Chen, 2006).

A recent review by Sussman and colleagues (2007) of research examining adolescent peer group identification concluded that one of the primary peer groups with which adolescents identify is based on sports participation. Prior research also suggests that adolescents who participate in sports identify more strongly with sports as an activity compared to youths who take part in non-sports activities (Eccles & Barber, 1999).

Sports represent an important aspect of development among many adolescents (Barber, Stone, & Eccles, 2006), as the majority of U.S. adolescents report some form of organized sports involvement (Eaton et al., 2008; National Federation of High School Athletic Associations, 2008). Many investigators have observed, however, that adolescent sports participants are more likely to drink alcohol than non-participants (Barber, Eccles, & Stone, 2001; Hoffmann, 2006; Mays & Thompson, 2009; Moore & Werch, 2005; Wetherill & Fromme, 2007).

A number of researchers have also suggested that alcohol use by adolescent sports participants may be influenced by several sports-specific factors, such as when the season of a particular sport falls, participation in different sports and team sports, and the level of participation (Bower, 1999; Leaver-Dunn, Turner, & Newman, 2007; Moore & Werch, 2005; Peretti-Watel, 2009; Shields, 1998). Furthermore, researchers have theorized that the peer environment surrounding sports participation may encourage drinking behaviors (Barber et al., 2001; Barber, Stone, Hunt, & Eccles, 2005; Dams-O'Connor, Martin, & Martens, 2007; Hoffmann, 2006; Lewis, 2008; Martens, Cox, & Beck, 2003). Finally, the relationships among peer drinking, sports-specific factors, and alcohol-related behaviors may also differ between males and females. Evidence indicates that differences exist between adolescent males and females in terms of patterns of alcohol consumption (Windle & Windle, 2005), the influence of peers on alcohol use (Dick et al., 2007; Simmons-Morton et al., 2001; Yeh, Chiang, & Huang, 2006)**,** and the opportunities available to participate in school-based sports (Suggs, 2005; Women's Sports Foundation [WSF], 2007). The last of these is especially true in the state of Georgia, where the current study took place, which ranks 46th among U.S. states in terms of the proportion

of high school students who are female (49.8%) relative to the proportion of female high school sports participants (37.5%; WSF, 2007).

Despite this evidence, few existing studies have examined whether sports-specific factors influence alcohol-related behaviors among U.S. adolescents who take part in school-based sports (Moore & Werch, 2005; Shields, 1998). Furthermore, while some researchers have examined the influence of the peer environment on drinking behaviors among intercollegiate athletes (Dams-O'Connor et al., 2007; Lewis, 2008), none has investigated the relationship between perceived peer drinking and alcohol-related behaviors among high school sports participants. Finally, no studies have examined how the relationships among perceived peer drinking, sports-specific factors, and alcohol-related behaviors differ between male and female sports participants. In order to build on prior research, this study explored the relationships among sports-specific factors, perceived peer drinking, and alcohol-related behaviors in a sample of adolescents participating in school-based sports in the Muscogee County, Georgia area. This study also analyzed whether these relationships differ between males and females.

Methods

Procedures

All study procedures were approved by the Emory University and Hughston Foundation Institutional Review Boards. The Institute of Athletic Health Care and Research, Inc. at the Hughston Foundation provides low-cost ($7), pre-participation screening examinations (PPSEs) for students from high schools in the surrounding community. Data for this study were collected by asking students obtaining PPSEs to

volunteer to complete a brief paper-and-pencil questionnaire assessing sports-specific factors, perceived peer drinking, and alcohol-related behaviors.

Participants

Participants were 378 high school aged adolescents obtaining PPSEs in order to take part in school-based sports in the Muscogee County, Georgia area. The characteristics of the sample are displayed in Table 4.

Measures

Due to the short amount of time that students spent at each of the stations during the PPSEs (approximately 5-10 minutes) only a limited number of items was possible. The questionnaire was comprised primarily of items from existing assessments of adolescent health behaviors.

Demographics. Demographic characteristics including age, sex, and race/ethnicity were assessed using items from the Youth Risk Behavior Survey (YRBS; CDC, 2004).

Alcohol-related behaviors. Six alcohol-related behaviors were assessed using items from the YRBS, which have demonstrated reliability compared to other brief assessments of adolescent alcohol-related behaviors (Foster, Vaughan, Foster, & Califano, 2003). The alcohol-related behaviors measured were ever drinking alcohol, early drinking onset (prior to 13 years of age), drinking in the past month, heavy episodic drinking in the past month (five or more drinks on an occasion), riding in a car with a driver who had been drinking in the past month, and driving a car after drinking in the past month. Each was treated as a dichotomous variable and a summary variable indicating the total number of alcohol-related behaviors reported was created for analyses (6 items; Kuder-Richardson 20 = 0.72).

Perceived Peer Drinking. Perceived peer drinking was measured using two items (Cronbach's $\alpha = 0.81$) from the Monitoring the Future Survey (Johnston, O'Malley, Bachman, & Schulenberg, 2007) that asked participants to indicate: (1) how many of their friends drink alcoholic beverages occasionally (e.g., a few times a month or less); and (2) how many of their friends drink alcohol regularly (e.g., more than a few times a month). Response options for these two items ranged from (0) none to (4) all and a summary variable ranging from zero to eight indicating the level of perceived peer drinking was created for analyses.

Sports-Specific Factors. An index from the National Longitudinal Study of Adolescent Health (Add Health) was used to measure the different sports that participants planned to or were currently taking part in at their school, including baseball/softball, basketball, cheerleading/dance, football, soccer, swimming, tennis, track, volleyball, wrestling, and other sports (Udry, 2001). Level of sports participation was assessed by asking: "Of the sports you take part in at school, at what level do you primarily participate?" Response options were freshman, junior varsity, varsity or other level. For bivariate analyses, respondents who participated in sports at the freshman/other level were combined due to the small number of respondents in each of these groups. For regression models, respondents who participated in sports at the junior varsity and freshman/other levels were combined due to small cell sizes.

The total number of sports was calculated by summing the sports indicated on the Add Health index. A dummy variable for participation in fall sports was created to indicate whether any of the sports were in season at the time of data collection. Dummy variables were also created to indicate participation in team only, individual only, or both

team and individual sports using methods similar to prior research (Larson, Hanson, & Moneta, 2006). The following sports were classified as team sports: baseball/softball, basketball, football, soccer, and volleyball. Sports classified as individual sports included golf, tennis, wrestling, track and field, swimming, and cross-country. A dichotomous variable was also created to indicate collision (i.e., contact) sports based on the definitions of the American Academy of Pediatrics (American Academy of Pediatrics Committee on Sports Medicine and Fitness, 2001).

Analyses

Analyses were conducted in two stages using SAS 9.2 (SAS Institute, Cary, NC). Bivariate analyses, including χ^2 tests and t-tests, were first used to examine the relationships between demographic characteristics, sports-specific factors, perceived peer drinking, and alcohol-related behaviors among males (n = 287) and females (n = 89).

A series of linear regression models was then used to examine the relationships among sports-specific factors, perceived peer drinking, and alcohol-related behaviors. In model one, alcohol-related behaviors were regressed onto the sports-specific factors of interest, controlling for demographics. In model two, perceived peer drinking was regressed onto the sports-specific factors of interest, controlling for demographics. In model three, alcohol-related behaviors was regressed onto perceived peer drinking, sports-specific factors, and demographic controls in order to examine the effect of perceived peer drinking on the relationships between sports-specific factors and alcohol-related behaviors. Finally, separate linear regression models were created among males (model four) and females (model five) where the sum of the alcohol-related behaviors was regressed onto perceived peer drinking, sports-specific factors, and demographics.

The overall *F*-test was used to examine the statistical significance of regression models. Variance inflation factors and tolerance statistics were also used to assess collinearity of independent variables, and all were determined to be within acceptable limits.

Results

Participants

The majority of participants were male (76.3%) and self-identified ethnically as non-Hispanic black (70.0%). The characteristics of the sample are displayed in Table 4. Participants were distributed relatively evenly across the age groups.

Sports-Specific Factors

Males and females differed significantly with respect to level of sports participation and participation in both team and individual sports (Table 4). The mean total number of sports reported among the sample was 2.53 (*SD* 1.28), and males and females did not differ significantly with respect to the number of sports reported (t [370] = -0.32, p = 0.75).

Alcohol-Related Behaviors & Perceived Peer Drinking

The mean number of alcohol-related behaviors reported was 0.82 (*SD* 1.22) and the mean level of perceived peer drinking was 1.85 (*SD* 1.95); these means did not differ significantly between males and females (Table 4). Participants who took part in sports at the varsity level reported significantly more alcohol-related behaviors (*M* 0.96, *SD* 1.34) than participants who took part in sports at the freshman level or another level (*M* 0.48, *SD* 0.86), but did not differ significantly from those who took part in junior varsity sports (*M* 0.65, *SD* 1.00; F [2,331] = 4.05, p = 0.02). Participants who took part in varsity sports

also reported significantly higher levels of perceived peer drinking (*M* 2.25, *SD* 2.11), compared to those who took part in junior varsity sports (*M* 1.31, *SD* 1.48) or sports at the freshman or another level (*M* 0.95, *SD* 1.31 ; *F* [2,264] = 14.40, $p < 0.001$). Tukey's post-hoc comparisons confirmed that these pair-wise mean differences for alcohol-related behaviors and perceived peer drinking were significant at $p < 0.05$.

Males who participated in varsity sports reported significantly more alcohol-related behaviors (*M* 1.01 [*SD* 1.41]) than males who participated in sports at the freshman/other level (*M* 0.36 [*SD* 0.36]), but did not differ significantly from the junior varsity level (*M* 0.61 [SD 1.04]; *F* [2, 257] = 4.59, $p = 0.01$). Males who took part in sports at the varsity level also reported significantly higher levels of perceived peer drinking (*M* 2.26, *SD* 2.16) than males who reported taking part in junior varsity sports (*M* 1.19, *SD* 1.43) or sports at the freshman or another level (*M* 0.86, *SD* 1.40; *F* [2,280] = 11.71, $p < 0.001$). Tukey's post hoc tests confirmed that these mean differences were significant at $p < 0.05$. There were no significant bivariate relationships between sports-specific factors and alcohol-related behaviors or perceived peer drinking among female participants.

Regression Analyses

The results of model one suggest that, controlling for demographics, there were no significant statistical relationships between the sports-specific factors and alcohol-related behaviors among the entire study sample including males and females (Table 5). The results of model two (Table 5) suggest that, controlling for demographics, participants who took part in varsity sports (*B* = 0.95, 95% CI = 0.48, 1.42, $p < 0.001$) reported significantly higher levels of perceived peer drinking than those who took part in

sports at the freshman/other levels. Furthermore, participants who took part in both sports offering team-level and sports offering individual-level competition also reported significantly higher levels of perceived peer drinking, compared to those only taking part in sports offering individual-level competition (Table 5; $B = 0.92$, 95% CI 0.04, 1.80, $p = 0.04$).

The results of model three (Table 5) indicate that, controlling for demographics and sports-specific factors, perceived peer drinking was significantly associated with the total alcohol-related behaviors ($B = 0.30$, 95% CI 0.24, 0.37, $p < 0.001$). Similarly, model four (Table 5) suggests that, among males, when controlling for other demographic characteristics and sports-specific factors, perceived peer drinking was significantly associated with total alcohol-related behaviors ($B = 0.33$, 95% CI 0.26, 0.40, $p < 0.001$). Model five (Table 5) indicates that, among females, while perceived peer drinking was significantly associated with reported alcohol-related behaviors ($B = 0.17$, 95% CI 0.03, 0.32, $p = 0.02$), overall the model was not statistically significant (F [9.76] = 1.13, $p = 0.36$). Similar to model one, in models three, four, and five, none of the sports-specific factors assessed was significantly associated with alcohol-related behaviors, even after taking into account perceived peer drinking in addition to demographic characteristics (Table 5).

Discussion

This study investigated sex differences in the relationships among sports-specific factors, perceived peer drinking, and alcohol-related behaviors in a sample of adolescents who participated in school-based sports in the Muscogee County, Georgia area. Overall, the results suggest that few sports-specific factors were associated with alcohol-related

behaviors; however, the findings with respect to perceived peer drinking may warrant investigation in future research.

Notably, the prevalence of the alcohol-related behaviors reported among the sample was strikingly lower than among adolescents nationally (CDC, 2007) and in Georgia (CDC, 2008). There are several potential explanations for this finding. It is possible among this study sample, which was comprised primarily of non-Hispanic black males who participated in football, that sports participation may be associated with fewer alcohol-related behaviors. The characteristics of the study sample make it unique compared to prior studies which indicate that sports participation is associated with alcohol use among adolescents (Eccles, Barber, Stone, & Hunt, 2003; Fredricks & Eccles, 2005; Garry & Morrissey, 2000; Green & Burke, 1995; Hoffmann, 2006; Mays & Thompson, 2009; Miller, Melnick, Farrell, Sabo, & Barnes, 2006; Moore & Werch, 2005; Rainey, McKeown, Sargent, & Valois, 1996; Wetherill & Fromme, 2007; Winnail et al., 1997). Compared to this body of existing research, sports participation may be associated with fewer alcohol-related behaviors among the sample of youths who took part in this study, given the relatively low prevalence of all of the alcohol-related behaviors examined. While this conclusion cannot be definitively drawn because data were not collected among a comparison group of non-sports participants, it merits investigation in future research.

In addition, the lower prevalence of alcohol-related behaviors observed may be a result of underreporting in the data collection setting where youths obtained physical examinations in order to take part in school-based sports. Moreover, non-Hispanic black adolescents generally report fewer alcohol-related behaviors compared to adolescents of

other racial and ethnic backgrounds (Windle & Windle, 2005). As a result, the fact that the sample was primarily comprised of non-Hispanic black adolescents may have also contributed to the relatively low prevalence estimates. Finally, youths in the southern United States tend to report fewer alcohol-related behaviors than those in other regions of the country (CDC, 2008). Prior research suggests that this pattern is likely influenced by aspects of southern culture, such as a strong tradition of religious beliefs that emphasize abstinence from alcohol use (Lindquist, Cockerham, & Hwang, 1999). These factors most likely operated in combination to influence the prevalence of alcohol-related behaviors reported. Further research is needed to examine the factors underlying the relatively low prevalence of alcohol-related behaviors observed in this study. In particular, research is needed to investigate the factors potentially underlying the low prevalence of alcohol-related behaviors observed among the sample, including aspects of sports participation, and other factors that may affect alcohol-related behaviors, such as race/ethnicity and regional variability in drinking behaviors.

Consistent with prior research on the influence of peers on youth drinking behaviors (Simmons-Morton et al., 2001; Windle, 2000; Windle et al., 2008)**,** perceived peer drinking was a strong predictor of alcohol-related behaviors. In addition, participation in varsity sports and participation in both in sports offering individual-level and sports offering team-level competition were associated with significantly higher levels perceived peer drinking. There are a number of possible explanations for these findings. First, prior studies suggest that the collective nature of sports teams may lead to strong norming effects regarding drinking behaviors among team sports participants (Martens, Dams-O'Connor, Duffy-Paiement, & al., 2006; Wetherill & Fromme, 2007).

Within this sample, it appears that participation in a combination of team and individual sports may be associated with more cohesive peer groups that are formed around team sports participation, and as a result, these youths perceive more of their peers engage in drinking behaviors.

Second, prior research also suggests that sports participation may act to increase youths' social status among their peers at school (Eccles et al., 2003), and that during this particular developmental stage, youths are more likely to experience social situations that expose them to alcohol (Windle et al., 2008). It is possible that these social developmental processes are escalated among youths who take part in varsity sports, particularly sports that are very prominent at most schools in the area where the study took place, such as basketball and football. Consequently, youths who take part in varsity sports may be more likely to experience social contexts where peers are using alcohol (e.g., sports-related parties, older friends drinking), which may in turn affect their perceptions of their peers' drinking behaviors.

Finally, prior research also suggests that individual-level psychosocial factors may affect the relationships among sports-specific factors, perceived peer drinking, and alcohol-related behaviors. Research by Duda and Ntoumanis (2005), for example, suggests that the effects of sports participation on adolescent development depend, in part, upon individual differences in dispositional goal-orientation. According to this model, task-oriented youths believe that athletic success requires high levels of effort in collaboration with peers and achieve their full athletic potential, regardless of the peers' perceptions of their athletic ability (Duda & Ntoumanis, 2005). In contrast, ego-oriented youths' beliefs about their athletic success are strongly linked to the perceptions of their

athletic skills among their peers, coaches, and other significant individuals. Ego-oriented youths judge their own athletic achievement based on their ability to impress others with their athletic talents (Duda & Ntoumanis, 2005). Ego-oriented youths' reliance on their peers' perceptions to validate their athletic accomplishments may also extend to their attitudes towards other behaviors, such as drinking alcohol. In other words, differences in dispositional goal-orientation may act to moderate the relationship between perceived peer drinking and alcohol-related behaviors. In particular, this effect may be more pronounced among varsity sports participants, who may experience greater social pressures to succeed athletically from their peers, coaches, parents and other social influences (Larson et al., 2006; Scanlan, Babkes, & Scanlan, 2005). Further research is needed to specifically examine how both the social contexts accompanying sports participation and individual factors such as dispositional goal-orientation impact the relationships among sports participation, perceived peer drinking, and alcohol-related behaviors.

The findings also suggest that there may be differences between males and females in the relationships among sports-specific factors, perceived peer drinking, and alcohol-related behaviors. Perceived peer drinking was a strong predictor of alcohol-related behaviors among males. However, the strength of this relationship diminished considerably among females; the regression model was not statistically significant overall, and the amount of variance in alcohol-related behaviors explained was also substantially lower among females. While these findings are to some extent contrary to prior research, which suggests that the influence of peers on drinking behaviors may be stronger among females (Dick et al., 2007; Simmons-Morton et al., 2001; Yeh et al.,

2006), due to the small number of female participants in the study firm conclusions regarding differences between males and females cannot be drawn**.** Prior research on the social identities of adolescent sports participants, however, provides some context for the observed differences between males and females in this study and potential directions for future research.

Previous studies suggest that many adolescent sports participants associate themselves with an abstract "athlete identity" or a universal athlete peer group (Sussman et al., 2007). This idea appears similar to conceptualizations of informal social athlete identity types, such as "jocks," which reflect how sports participants subjectively perceive themselves and how they are perceived by their peers (Miller et al., 2006). These informal athlete identity types are based social aspects of sports-related identity formation, which are seen as separate from the behavioral domains of sports participation such as the factors assessed in this study (Miller et al., 2006). Researchers have found that compared to females, adolescent male sports participants are more likely to associate themselves with informal social athlete identities such as "jocks" (Barber et al., 2005; Pascoe, 2003), and those who identify as "jocks" are more likely to drink alcohol (Barber et al., 2001; Miller et al., 2003). Research among intercollegiate sports participants also indicates that perceived drinking among "typical athlete" peers is a stronger predictor of alcohol use than perceived drinking among non-athlete peer reference groups (Dams-O'Connor et al., 2007).

Identification with informal athlete identity types among males may in part explain the stronger relationship between perceived peer drinking and alcohol-related behaviors observed among males compared to females. The body of prior research

suggests that males may be more likely to base their perceptions of drinking among peer groups around social (e.g., “jock”) identities rather than around more formal sports-related peer groups based on the sports in which they take part. Future research is needed to examine differences between adolescent males and females in the relationship between perceived peer drinking and alcohol use based on more specific referent peer groups (i.e., comparing athlete and non-athlete peers) and identification with informal athlete identity types (e.g., “jocks,” “typical athletes”).

Limitations

The results of this study should be interpreted with a number of limitations in mind. First, all alcohol-related behaviors were based on self-report and may be subject to respondent biases. Second, this study used a convenience sample of adolescents taking part in school-based sports in the Muscogee County, Georgia area. As a result, the generalizability of the findings reported is limited and extrapolations to broader populations should be made with caution. Finally, the small, relatively homogenous sample in this study, in particular the fact that a small proportion of females reported alcohol-related behaviors, limit the findings and the conclusions that can be drawn based on the data.

Conclusions

Future studies are needed to investigate the relatively low prevalence of alcohol-related behaviors observed among this unique sample. In particular, research is needed to examine whether this finding was due to aspects of sports participation among this unique study sample, or whether other factors influenced the observed prevalence of alcohol-related behaviors. The results of this study also suggest that a number of sports-

specific factors examined were associated with perceived peer drinking. Furthermore, while perceived peer drinking was a strong predictor of alcohol-related behaviors, the findings suggest that the relationship between perceived peer drinking and alcohol-related behaviors may be stronger among males than females.

These findings point towards a number of potentially important areas for future research. First, because this study is based on a small convenience sample, further research is needed to explore the relationships among sports-specific factors, perceived peer drinking, and alcohol-related behaviors in larger, more diverse samples of adolescents. Second, research is needed to investigate whether individual-level factors (e.g., dispositional goal-orientation) and social contexts surrounding different aspects of sports participation, such as participation in varsity sports, influence the relationship between perceived peer drinking and alcohol-related behaviors. Finally, studies are needed to more specifically examine how perceived peer drinking among athlete and non-athlete referent groups and associations with informal athlete identity types may impact the relationships among sports-specific factors, perceived peer drinking and alcohol-related behaviors among adolescent sports participants.

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Chapter 4

Sports Participation and Problem Alcohol Use in a Multi-Wave National Sample of Adolescents

Abstract

Background. Sports participation, while offering numerous developmental benefits for youths, has been associated with adolescent alcohol use in prior research. Previous studies also suggest that substantial differences exist between males and females in both sports participation and patterns of alcohol-related behaviors. However, prior longitudinal investigations of this relationship have been limited. This study investigated the longitudinal relationship between school-based sports participation and alcohol-related behaviors using data from a multi-wave, national study of adolescents, specifically examining differences between males and females. *Methods.* Nationally-representative data from the National Longitudinal Study of Adolescent Health, collected between 1994 and 2001, were analyzed (n = 8,271). Latent growth modeling, accommodating the complex survey design, was applied to examine whether participation in school-based sports was associated with initial levels and change in problem alcohol use (PAU) over three waves of data collection. *Results.* Taking into account participation in academic and music activities, as well as other time-invariant covariates including demographics and other predictors of alcohol use, among youths who only took part in sports, greater involvement in sports during adolescence was associated with faster average acceleration in PAU over time. The findings suggest, however, that the relationship between sports participation and PAU depends on participation in sports in combination with other activities, and also differs to some degree among males and females. *Conclusions.* Given that millions of U.S. adolescents are involved in school-based sports each year, sports may represent an important context for selective interventions to prevent problem alcohol use and negative consequences of alcohol use.

Introduction

Sports participation is an important aspect of many adolescents' lives, offering benefits for cognitive, physical, and social domains of development (Barber, Stone, Hunt, & Eccles, 2005; Eccles & Barber, 1999; Sussman, Pokhrel, Ashmore, & Brown, 2007). There is substantial evidence to suggest, however, that sports participation may be associated with alcohol use among U.S. adolescents (Eccles, Barber, Stone, & Hunt, 2003; Garry & Morrissey, 2000; Hoffmann, 2006; Mays & Thompson, 2009; Miller et al., 2003). Unfortunately, a review of prior research investigating this relationship reveals several limitations in previous studies. For instance, many studies have used measures of sports that do not distinguish between school-based and non-school based contexts, which may impact associations with drinking behaviors (Garry & Morrissey, 2000; Mays & Thompson, 2009; Rainey, McKeown, Sargent, & Valois, 1996; Winnail et al., 1997). There has also been limited research examining behaviors beyond alcohol consumption and heavy drinking, such as the negative consequences of alcohol use (Mays & Thompson, 2009). Previous longitudinal studies have been limited in similar ways, applying restricted measures of sports participation and alcohol-related behaviors (Barber, Eccles, & Stone, 2001; Crosnoe, 2002; Hoffmann, 2006; Peck, Vida, & Eccles, 2008).

Research has also shown that distinct differences in the relationship between sports participation and alcohol use exist between males and females (Crosnoe, 2002; Hoffmann, 2006; Mays & Thompson, 2009; Peck et al., 2008). These findings are consistent with population-level data indicating that differences exist between adolescent males and females in the United States in both patterns of alcohol consumption (Windle

& Windle, 2005) and school-based sports participation (Suggs, 2005; Women's Sports Foundation, 2007). Only a few studies, however, have specifically investigated whether the relationship between sports participation during adolescence and change in alcohol use over time differs between males and females. Briefly, the findings indicated that differences exist between males and females in the relationships between sports participation during adolescence and increases in alcohol use over time (Crosnoe, 2002; Eccles & Barber, 1999; Hoffmann, 2006). However, these investigations were limited to data collected at only two time points (Hoffmann, 2006) and among youths from two states (Crosnoe, 2002; Eccles & Barber, 1999). Finally, prior research also suggests that developmental outcomes among youths are associated with participation in sports in combination with other activities (e.g., academic or music activities; Larson, Hanson, & Moneta, 2006; Linver, Roth, & Brooks-Gunn, 2009). However, no studies have specifically examined the longitudinal relationships between participation in sports in combination with other activities and alcohol use and alcohol-related problems.

There has been considerable debate over whether sports participation is an independent “risk factor” for adolescent alcohol use (Eitle, Turner, & Eitle, 2003; Peck et al., 2008; Peretti-Watel, 2009; Skolnick, 1993). Whether or not this is the case likely depends upon a number of factors influencing both alcohol use and sports participation, not on sports participation in isolation (Duda & Ntoumanis, 2005; Peretti-Watel, 2009). From a public health perspective, however, determining whether adolescents who participate in sports are more likely to use alcohol and experience alcohol-related problems over time has implications for the development of selective interventions targeting sports participants. Millions of U.S. adolescents take part in school-based sports

each year (Eaton et al., 2008; National Federation of High School Athletic Associations, 2008), suggesting that sports may represent an important context for efficiently administering alcohol prevention efforts to a large number of youths. Selective alcohol prevention efforts targeting groups of adolescents identifiable by easily-recognized characteristics such as sports participation may augment universal school-level prevention efforts and indicated interventions tailored to individual drinkers exhibiting particularly high-risk behaviors.

In order to advance research on this topic, this study investigated the longitudinal relationship between school-based sports participation during adolescence and problem alcohol use (PAU) by analyzing data from the National Longitudinal Study of Adolescent Health. This study also examined differences between males and females in this relationship.

Methods

Procedures

Data from the National Longitudinal Study of Adolescent Health (Add Health), a multi-wave, national study of adolescents conducted between 1994 and 2001, were analyzed (Harris et al., 2003). Add Health used a multi-stage, stratified-sampling design to create a representative sample of U.S. schools based on region, metropolitan status, size, type, and ethnic composition. In order to be eligible, high schools had to include an 11^{th} grade and at least 30 students. The sampling frame included 26,666 high schools from which a systematic random sample of 80 high schools was selected. For each high school selected, the largest feeder school was also recruited to participate. In total, 132 schools (79% of those selected) agreed to take part in the study (Harris et al., 2003).

The Add Health sample consisted of youths in grades 7 through 12 during the 1994-1995 school year (Harris et al., 2003). Each school provided a roster of students, all of whom were eligible to participate. An in-school questionnaire was administered to over 90,000 students in the 1994-1995 school year (Harris et al., 2003). A randomly-selected subsample of students was then recruited to complete in-home questionnaires during the same year (Wave 1, 1994-1995; *n* = 20,745) and approximately one (Wave 2, 1996; *n* = 14,738) and six years following Wave 1 (Wave 3, 2001-2002; *n* = 15,170; Harris et al., 2003). Data collected during the in-home assessments were entered directly into a computer by an interviewer; for more sensitive subject matter, respondents listened to questions on the computer and directly entered their answers.

The sample for this study included adolescents who responded to the in-school assessment and all waves of the survey, and had weights at Wave 3 designed for longitudinal analysis (*n* = 8,271). The characteristics of the sample are displayed in Table 1.

Measures

Problem Alcohol Use (PAU)

Several alcohol-related behaviors were assessed at each wave. Alcohol use behaviors in the past 12 months included drinking alcohol, getting drunk, and drinking five or more drinks on one occasion. Numerous alcohol-related problems in the past 12 months were also examined, such as having problems with parents, friends, or at school/work as a result of drinking; doing something regrettable as a result of drinking; and drinking and driving. Similar to previous analyses of Add Health data (Swahn & Donovan, 2004; Swahn & Donovan, 2005; Thompson, Sims, Kingree, & Windle, 2008),

a continuous PAU variable was created for each wave by summing dichotomous variables for alcohol use and alcohol-related problems. PAU ranged from 0 to 12 for Wave 1 (PAU1; 12 items, Kuder Richardson-20 0.87), 0 to 13 for Wave 2 (PAU2; 13 items, Kuder Richardson -20 0.88), and 0 to 12 for Wave 3 (PAU3; 12 items, Kuder Richardson -20 0.86). Table 2 illustrates descriptive statistics on PAU for males and females.

Sports and Other Activity Participation

School-based sports, academic, and music activities were operationalized in a manner similar to prior research (Eccles et al., 2003; Larson et al., 2006). Sports participation was assessed during the in-school survey by stating, "Here is a list of clubs, organizations, and teams found at many schools. Darken the oval next to any of them you are participating in this year, or that you plan to participate in later in the school year." The list of sports included: cheerleading/dance team, baseball/softball, basketball, field hockey, football, ice hockey, soccer, swimming, tennis, track, volleyball, wrestling, and other sports. The number of sports was summed into a continuous variable for analyses.

Response options for academic (i.e., foreign language clubs, debate team, drama club, and student council) and music (i.e., band, chorus or choir, or orchestra) activities were included on the same index. Dichotomous variables were used to indicate whether respondents took part in any school-based academic or music activities. Finally, interaction terms were created to examine the effects of participation in sports in combination with academic or music activities. To create interaction terms, the number of sports reported was standardized and multiplied by the dichotomous music and academic activity variables, in order to avoid strong collinearity in analyses.

Covariates

Demographics included sex, age, race/ethnicity, and grade in school. Other covariates included variables that prior research has shown to be strong predictors of PAU among adolescents (parental alcoholism, parental monitoring, friends' drinking; Windle et al., 2008). Friends' drinking was measured by asking, "Of your 3 best friends, how many drink alcohol at least once a month?" with responses ranging from 0 to 3. Parental monitoring was measured by summing 7 dichotomous items examining whether respondents' parents were involved decisions related to curfew, bed time, friends, clothing, and television watching (Cronbach's $\alpha = 0.94$). Parental alcoholism was assessed by asking parents interviewed at Wave 1 to indicate whether the respondent's biological mother or father currently had alcoholism as part of an index assessing a number of health problems among respondents' biological parents. A dichotomous variable was created to indicate whether either of the respondents' biological parents had alcoholism based on self-report.

Data Analysis

Latent growth modeling (LGM; Duncan, Duncan, & Strycker, 2006) was used to examine the longitudinal relationship between sports participation and PAU at Waves 1, 2, and 3. LGM was applied because it has several advantages over alternative approaches to analysis of change, including relaxing assumptions underlying traditional modeling applications (Duncan, Duncan, Stryker, Fuzhong, & Alpert, 1999). Similar analyses have been conducted in prior research examining alcohol-related behaviors using Add Health data (Thompson et al., 2008).

LGMs were created using Mplus 5.2 (Muthen & Muthen, 2007), accounting for the complex sampling design of the Add Health study using the suggested cluster, stratification, and weight variables (Chantala, 2006). The LGMs included two latent variables representing the intercept and growth factors for PAU. The intercept and slope factors each have two parameters, representing the mean and variance of the collection of initial levels of PAU and rate of change in PAU. The intercept factor represents the average intercept at Wave 1 derived from estimated individual intercepts of each participant; the factor loading for each of the measured PAU variables was fixed at 1 to constrain the height of the reference curve. For the growth factor, the time points for the manifest PAU variables were fixed at 1, 2, and 6, corresponding to the time at which data collection occurred at each of the three respective waves. Model fit was assessed using the following criteria: Comparative Fit Index (CFI) > 0.96; Root Mean Square Error of Approximation (RMSEA) < 0.05 (Hu & Bentler, 1999).

An unconditional growth model, without predictors or covariates, was first created to confirm that the data were consistent with the specified LGM (χ^2 [1] = 10.3, p = 0.001, CFI = 1.00, RMSEA= 0.03) and that there was significant variation in the latent intercept (t = 18.62, p < 0.001) and slope (t = 8.89, p < 0.001) factors to be explained by adding predictors. While the chi-square statistic for the model was statistically significant, the significance of chi-square statistics is highly sensitive to large sample sizes (Duncan et al., 2006). Given the very large sample in this study, even slight distributional differences could lead to a statistically significant model chi-square statistic (Duncan et al., 2006). After establishing the unconditional LGM, time-invariant predictors, covariates, and interaction terms between sports and music and academic

activities were added to the model. The bivariate correlations between variables included in the LGM are displayed in Table 8. This conditional model evaluated how well the predictors, covariates, and interaction terms predicted average initial levels and growth in PAU over time. In order to test the hypothesis that the relationship between participation in sports and other school-based activities and PAU differs by respondent sex, separate models were then specified for males (n =4,457) and females (n = 3,814).

Results

Conditional LGM for the sample

The conditional LGM for the entire sample (n = 8,271; Figure 1) was a good fit for the observed data (χ^2 [12] = 30.9, p = 0.002, CFI = 1.00, RMSEA = 0.01), explaining 35% and 24% of the variance in the latent intercept and slope factors, respectively (see Figure 1). The means of the measured PAU variables increased over time (Wave 1, 1.67; Wave 2, 1.90; Wave 3, 3.44). Participation in sports without other activities was a significant predictor of growth in PAU, indicating that, without taking part in other activity types, greater sports involvement was associated with more rapid average growth in PAU. However, among those who took part in sports *and* academic activities, greater sports involvement was associated with slower average acceleration in PAU. Participation in music activities without sports was associated with significantly lower initial levels of PAU and with more accelerated growth in PAU across the three waves of measurement. Neither participation in academic activities without sports, nor participation in sports with music activities was significantly associated with the intercept or slope factors of PAU.

Conditional LGM for Males

The conditional LGM for males (n = 3,814; Figure 2) was a good fit for the observed data (χ^2 [11] = 36.5, p <0.001; CFI = 0.99; RMSEA = 0.03), explaining 37% and 22% of the variance in the intercept and slope factors, respectively. The means of the measured PAU variables increased over time among males (Wave 1, 1.67; Wave 2, 1.94; Wave 3, 3.90). Participation in sports without other activities was a significant predictor of the slope factor, indicating that among males who took part in sports and no other activities, greater sports involvement was associated with more rapid average acceleration in PAU. Participation in music activities without sports was associated with significantly lower initial levels of PAU and a more rapid average acceleration in PAU. Finally, among males who took part in sports *and* one or more academic activities, greater involvement was associated with slower average acceleration in PAU over time.

Conditional LGM for Females

The conditional LGM created among females (n =4,457; Figure 2) was a good fit for the observed data (χ^2 [11] = 16.9, p = 0.11; CFI = 1.00; RMSEA = 0.01), and the model explained 34% and 23% of the variance in the latent intercept and slope factors, respectively. Similar to males, the means of the measured PAU variables increased over time among females (Wave 1, 1.66; Wave 2, 1.85; Wave 3, 2.99). Also similar to males, participation in sports without other activities was a significant predictor of the slope factor, indicating that among females who took part in sports and no other activities, greater sports involvement was associated with more rapid average acceleration in PAU. Participation in music activities without sports was associated with significantly lower initial levels of PAU and more rapid average growth in PAU over time.

Discussion

This study examined the longitudinal relationship between sports participation and PAU using data from a multi-wave, nationally-representative study of adolescents. The findings suggest that, among both males and females who only participated in sports, greater sports involvement was associated with faster average acceleration in PAU. The results also indicate that the longitudinal relationship between sports participation and PAU varied based on respondents' participation in non-sports activities, and the activity combinations associated with PAU differed between males and females. These findings have important implications for the development of selective alcohol prevention interventions targeting youths who take part in sports and point to important areas for future research.

Consistent with prior research (Windle & Windle, 2005), males and females in this study evinced increasing levels of PAU as they grew older, and males had slightly higher levels of PAU compared to females, especially at Wave 3. The negative correlation between the intercept and slope factors in the LGMs shows that adolescents with lower initial levels of PAU at Wave 1 exhibited faster acceleration in PAU over time, a finding consistent with previous analyses of Add Health data (Thompson et al., 2008). As Thompson and colleagues (2008) explained, this is due to the fact that respondents with higher initial levels of PAU were more likely to maintain those levels over time, whereas those with lower initial levels of PAU demonstrated more rapid growth in PAU.

Among males and females who only participated in sports, greater sports involvement was associated, on average, with significantly more rapid growth in PAU. This finding supports prior research, which suggests that sports participation is associated

with more rapid increases in drinking during adolescence (Barber et al., 2001; Eccles & Barber, 1999; Wichstrom & Wichstrom, 2009). However, it also suggests that participation in only sports may be associated with a more comprehensive PAU construct, which includes a number of negative consequences of alcohol use in addition to alcohol consumption behaviors. Many of the negative consequences associated with adolescent alcohol use (e.g., violence, drinking and driving) have substantial public health consequences (Windle & Windle, 2005). The PAU construct in this study was comprised of alcohol use behaviors and negative consequences that occur as a result of drinking alcohol, highlighting the importance of the findings to inform future research and intervention activities targeting alcohol consumption and negative consequences of alcohol use among adolescent sports participants.

There were notable differences between males and females that also warrant discussion. For instance, among males who participated in one or more academic activity and sports, greater sports involvement was associated with slower average acceleration in PAU over time, while the same relationship was not evident among females. In one recent study, Linver and colleagues (2009) demonstrated that participation in sports plus other non-sports activities is associated with more positive developmental outcomes, when compared to sports participation alone. When alcohol use was specifically examined, however, participation in sports plus other activities was positively associated with drinking behaviors over time (Linver et al., 2009). In contrast, the results from the present study suggest that one pattern of activity participation that may benefit male adolescents in particular with respect to PAU is participation in sports plus academic activities. Prior research indicates that, compared to sports participants, many youths who

engage in academic activities are more academically-inclined, less likely to drink alcohol, and have fewer friends who drink alcohol (Barber et al., 2001). Taken together, this evidence suggests that the developmental benefits associated with participation in academic activities may outweigh the possible risks associated with participation in sports with respect to PAU among males.

Research also indicates that youths who participate in performing arts, such as music activities, exhibit significantly lower levels of alcohol use during adolescence (Eccles & Barber, 1999) and more rapid increases in alcohol use between the ages of 18 and 21 years (Barber et al., 2001) and that this relationship is moderated by respondents' sex (Eccles & Barber, 1999). The findings from the present study reflect a similar pattern. Among both males and females, participation in music activities without sports was associated with lower initial levels of PAU and more rapid average growth in PAU over time. Males who reported participation in music activities also had substantially lower initial levels of PAU compared to females, however, the magnitude of this difference between males and females diminished considerably when examining change in PAU over time. Additionally, this relationship was not present among males and females who participated in *both* sports and music activities.

These findings highlight the potential importance of school-based sports and other activities as contexts for interventions to reduce PAU. With respect to sports, millions of U.S. adolescents take part in school-based sports each year (National Federation of High School Athletic Associations, 2008), and these youths can be easily identified and targeted by selective alcohol prevention efforts (Spoth, Greenberg, & Turrisi, 2008). In addition, indicated interventions may be tailored to sports participants who are at a

greater risk for PAU over time. Recent research suggests, for example, that adolescents who participate in sports and engage in other problem behaviors (e.g., illicit drug use, aggressive behaviors) may be more likely to engage in heavy drinking behaviors and experience alcohol-related problems over time (Peck et al., 2008). A few preliminary educational and skills-based interventions integrated into team practices (Goldberg et al., 2000) and other sports contexts (Werch et al., 2003) have shown promising results in reducing alcohol use and related problems and improving alcohol expectancies, behavioral control, and normative beliefs. Recent research also suggests that sports-based intervention programs may result in sustained reductions of alcohol use into young adulthood, particularly among females (Elliot et al., 2008). Interventions implementing drug testing programs, however, have failed to demonstrate reductions in alcohol use among adolescent sports participants (Goldberg et al., 2003). Nevertheless, the impact of educational and skills-based alcohol interventions targeting adolescent sports participants has been somewhat limited (Elliot et al., 2008; Goldberg et al., 2000). Additional research is needed to better understand the optimal targets of selective interventions seeking to reduce PAU among adolescent sports participants.

Based on a review of research on alcohol-related behaviors among intercollegiate athletes, Martens and colleagues (2006) concluded that the effectiveness of alcohol prevention efforts may be improved by targeting sports-specific factors underlying drinking behaviors (e.g., the peer environment surrounding sports participation), and the potential deleterious effects of alcohol use on athletic performance. Similar factors have been associated with alcohol use among adolescent sports participants, including the peer environment surrounding sports (Barber et al., 2005; Hoffmann, 2006) and stress

resulting from social pressures to excel athletically (Larson et al., 2006). These factors may represent important targets for selective interventions among adolescent sports participants. A better understanding of the sports-specific factors underlying drinking behaviors among adolescent sports participants is needed, however, to inform such intervention efforts.

This study has several strengths, including the large sample size, longitudinal design, and expanded measures of sports participation and PAU, compared to previous longitudinal research. Nevertheless, due to study limitations, caution should be exercised when interpreting the findings of this study. First, all assessments were based on self-report and may have been affected by respondent biases. Second, only adolescents who were on rosters at participating schools could take part in the Add Health study, which excluded youths who were not enrolled in school from the sampling frame. Generalizations of the findings to broader populations should be made cautiously. Third, only participants with weights at all waves of data collection were included in analyses, which may have excluded those youths with higher initial levels of PAU at Wave 1 who did not complete subsequent assessments. Finally, the use of only three data points for the LGMs limited the shape of growth curves that could be tested. Data with more time points would allow for the investigation of non-linear patterns of growth in PAU (e.g., quadratic), in order to test more substantive hypotheses regarding change in PAU over time.

Despite these limitations, the findings of this study suggest that selective interventions targeting adolescents who take part in school-based sports may help to reduce problem alcohol use among youths. While the associations between sports

participation and PAU certainly do not outweigh the potential developmental benefits that may be attained through participation in sports, such interventions may serve to bolster the positive impact of participation in sports on youth development. Future research is needed to investigate how these findings can best be used to inform selective alcohol intervention efforts among adolescent sports participants. In particular, examinations of the factors that may represent optimal intervention targets among adolescent sports participants are needed in future research.

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Chapter 5

Summary and Conclusions

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Sports represent important contexts for development among many adolescents (Eccles, Barber, Stone, & Hunt, 2003), and participation in sports has been associated with numerous health and developmental benefits in prior research (Barber, Stone, & Eccles, 2006). Prior research suggests, however, that adolescent sports participants are more likely to drink alcohol than non-participants (Eccles et al., 2003; Fredricks & Eccles, 2005; Garry & Morrissey, 2000; Green & Burke, 1995; Hoffmann, 2006; Mays & Thompson, 2009; Miller, Melnick, Farrell, Sabo, & Barnes, 2006; Moore & Werch, 2005; Rainey, McKeown, Sargent, & Valois, 1996; Wetherill & Fromme, 2007; Winnail et al., 1997). While this research is useful to conceptualize the relationship between sports participation and alcohol use among U.S. adolescents, prior studies examining this relationship have been limited in a number of ways. In particular, investigations of the relationships among sports-specific factors (e.g., level of participation, participation in different sports) and alcohol use have been limited (Bower, 1999; Leaver-Dunn, Turner, & Newman, 2007; Moore & Werch, 2005; Rainey et al., 1996; Shields, 1998). In addition, no prior studies have examined how perceived peer drinking influences these relationships. Finally, while ample evidence suggests that the relationships among sports-specific factors, perceived peer drinking, and alcohol-related behaviors may differ between adolescent males and females, few studies have specifically investigated differences between males and females in these relationships (Mays & Thompson, 2009; Moore & Werch, 2005).

The first component of this research contributes to the existing body of literature on sports participation and alcohol-related behaviors by investigating the relationships

among sports-specific factors, perceived peer drinking, and alcohol-related behaviors among a sample of adolescents obtaining physical examinations in order to take part in school-based sports in the Muscogee County, Georgia area. This is one of the first investigations to examine the associations between several sports-specific factors, including participation in different sports, team and individual sports, and level of sports participation, and alcohol-related behaviors. This study also expands on prior research that has investigated the relationship between sports participation and alcohol use by assessing a number of different alcohol-related behaviors, in addition to alcohol consumption, such as riding with a driver who had been drinking and driving a car after drinking. Finally, this is the only study to date to investigate the relationships among sports-specific factors, perceived peer drinking, and alcohol-related behaviors among adolescent sports participants.

The second portion of this research investigated the longitudinal associations between participation in school-based sports and other extracurricular activities and problem alcohol use among a nationally-representative, multi-wave study of U.S. adolescents. Prior longitudinal studies of the relationship between sports participation and alcohol-related behaviors have also been limited in many of same ways described earlier. In particular, these studies have applied restricted measures of both sports participation and alcohol-related behaviors (Barber, Eccles, & Stone, 2001; Crosnoe, 2002; Hoffmann, 2006; Peck, Vida, & Eccles, 2008). Additionally, few studies have examined whether the relationship between sports participation during adolescence and change in alcohol use over time differs between males and females (Crosnoe, 2002; Eccles & Barber, 1999; Hoffmann, 2006), and these studies were limited to data collected at only two time points

(Hoffmann, 2006) and among adolescents from two states (Crosnoe, 2002; Eccles & Barber, 1999). This research builds on prior longitudinal investigations of the relationship between sports participation and alcohol-related behaviors by examining a number of alcohol-related behaviors, including negative consequences of alcohol use, which have substantial public health consequences among U.S. youths. Furthermore, this is the first longitudinal study to investigate these relationships among a nationally-representative sample of U.S. adolescents, examining change in alcohol-related behaviors over three waves of data collection.

The results of this research point to a number of potentially important areas of future research on sports participation and alcohol-related behaviors among adolescents. The findings may also help to inform future alcohol prevention intervention efforts targeting youths who take part in school-based sports. For instance, the results described in Chapter 2 suggest that, while few sports-specific factors were significantly associated with alcohol-related behaviors, the relationships between participation in varsity sports, participation in collision sports, and softball participation among females, and alcohol-related behaviors merit investigation in future research. Collectively, these findings indicate that future research is needed to examine whether the contextual factors underlying specific aspects of sports participation may influence alcohol-related behaviors. Future investigations should examine factors that prior research suggests may be associated with alcohol use among adolescent sports participants, such as sports-specific motives for drinking behaviors (Green & Burke, 1995), the social contexts of varsity sports participation (Barber, Stone, Hunt, & Eccles, 2005; Dams-O'Connor, Martin, & Martens, 2007; Hoffmann, 2006), and perceptions regarding females who take

part in sports such as softball (i.e., gender-based stereotypes; Alley & Hicks, 2005), which may impact drinking behaviors.

In addition, the findings described in Chapter 2 revealed significant differences between males and females with respect to participation varsity and team sports. While this study did not objectively assess the opportunities for sports participation available to the study participants, the findings support existing data which suggest that differences exist between males and females in terms of the opportunities available to take part in sports (Suggs, 2005; Women's Sports Foundation, 2007). Future research is needed to specifically examine the potential structural- (i.e., opportunities available to participate in sports), social- (i.e., norms regarding participation in certain sports), and individual-level (i.e., attitudes towards sports participation) factors that likely contribute to the differences in sports participation between males and females. Additionally, research is needed to assess the potential impact of the observed differences in sports participation among males and females on the health and developmental benefits that may be acquired from sports.

With respect to perceived peer drinking, the findings detailed in Chapter 3 revealed that a number of the sports-specific factors examined were associated with perceived peer drinking, and there were substantial differences between males and females in the relationship between perceived peer drinking and alcohol-related behaviors. These findings point to a number of areas where future research may be useful to improve our understanding of the relationships among sports-specific factors, perceived peer drinking, and alcohol-related behaviors among adolescent sports participants. In particular, the findings suggest that future studies can advance the science

on this topic by examining whether individual-level factors (e.g., dispositional goal-orientation; Duda & Ntoumanis, 2005) and the social contexts of varsity sports participation (Larson, Hanson, & Moneta, 2006; Scanlan, Babkes, & Scanlan, 2005) influence the relationship between perceived peer drinking and alcohol-related behaviors. Moreover, the results indicate that future research is also needed to investigate how perceived peer drinking among athlete and non-athlete referent peer groups (Dams-O'Connor et al., 2007), as well as associations with informal athlete identity types (i.e., "jocks"; Miller et al., 2006), may impact the relationships among sports-specific factors, perceived peer drinking and alcohol-related behaviors among adolescent sports participants.

One particularly important observation based on the findings described in Chapters 2 and 3 was that among the sample, which was comprised primarily of non-Hispanic black males who participated in football, the prevalence of alcohol-related behaviors was markedly lower than among U.S. adolescents (Centers for Disease Control and Prevention [CDC], 2007) and adolescents in the state of Georgia (CDC, 2008). There are several potential explanations for this finding, including potential biases that may have been introduced by the data collection setting, and the possible influence of other factors that have been shown to influence adolescent alcohol use, such as race/ethnicity and regional variation in drinking behaviors. It may also be the case, however, that among this particular sample, sports participation is negatively associated with alcohol-related behaviors. In other words, contrary to prior research, sports participation may provide some protective effect with respect to the drinking behaviors examined among the study sample, which consisted primarily of non-Hispanic black males who reported

participating in football. This sample is very unique compared to prior studies that have investigated the relationship between sports participation and alcohol-related behaviors, both in terms of the demographic characteristics of the sample and the sports in which respondents participated (Eccles et al., 2003; Fredricks & Eccles, 2005; Garry & Morrissey, 2000; Green & Burke, 1995; Hoffmann, 2006; Mays & Thompson, 2009; Miller et al., 2006; Moore & Werch, 2005; Rainey et al., 1996; Wetherill & Fromme, 2007; Winnail et al., 1997). Thus, there may be some aspects of sports participation among this understudied group that are associated with the relatively low prevalence of alcohol-related behaviors observed, and the low prevalence may also be influenced by a combination of the factors mentioned above (i.e., racial/ethnic composition of the sample, regional influences, methodological factors). While the data that were collected do not allow for a concrete conclusion to be drawn regarding the factors underlying the relatively low observed prevalence of alcohol-related behaviors, future research is needed to explore in greater detail the potential factors contributing to this finding.

Finally, the results from the longitudinal component of this research described in Chapter 4 suggest that, not only is sports participation associated with greater average acceleration in PAU over time, but this relationship differs among males and females and also varies based on adolescents' participation in school-based music and academic activities, in addition to sports (Chapter 4). These findings are largely consistent with prior research on the effects of extracurricular activity participation on adolescent development (Barber et al., 2001; Eccles & Barber, 1999; Linver, Roth, & Brooks-Gunn, 2009; Wichstrom & Wichstrom, 2009). Notably, the findings also highlight the importance of considering not only sports participation, but also the other types of

activities in which adolescents take part, when examining the relationship between sports participation and alcohol-related behaviors (Linver et al., 2009). In addition, the results indicate that there are differences between males and females in terms of the combinations of sports and other activity participation that are associated with changes in PAU over time.

These results from this longitudinal investigation suggest that selective alcohol prevention interventions administered in school-based settings may be enhanced by targeting groups of youths identified based on their participation in school-based sports and other activities. Preliminary intervention efforts administered in the context of school-based sports have been shown to reduce alcohol use and alcohol-related problems, and improve important attitudinal factors influencing alcohol use as well (Goldberg et al., 2000; Werch et al., 2003). The effects of these interventions in reducing alcohol use and alcohol-related behaviors have been modest, however. Additional research is needed to investigate how the findings from the present study can be used to inform such selective alcohol intervention efforts among adolescent sports participants. In particular, examinations of the factors that represent optimal targets for selective interventions among adolescent sports participants who may be at an increased risk for engaging in alcohol-related behaviors are needed in future research.

Taken together, the findings from both components of this dissertation research suggest that, while sports participation may be associated with alcohol-related behaviors among adolescents at the national level, there may be factors at multiple levels of influence that lead to sample-specific variation in the relationship between sports participation and alcohol-related behaviors across different research contexts. It is

possible that factors at the family-, school-, and community-levels may influence the relationship between sports participation and alcohol-related behaviors among adolescents. The findings described in Chapters 2 and 3 suggest, for example, that among the sample of adolescent sports participants from Southwest Georgia, the prevalence of alcohol-related behaviors may be markedly lower than among youths in the state of Georgia and nationally. It may be the case that factors at multiple levels of influence beyond the individual level affected the relationship between sports participation and alcohol-related behaviors within this particular sample. Preliminary studies support this idea, suggesting for example that school- (Hoffman, 2006) and family-level factors (Simpkins, Fredricks, Davis-Kean, & Eccles, 2006) may influence the relationship between sports participation and alcohol-related behaviors. Multilevel research in this area of investigation remains very limited, however, and science on this topic would be strengthened considerably by conducting multilevel investigations examining the potential factors influencing alcohol-related behaviors among adolescent sports participants in the future.

Another extant gap in the research investigating the relationship between sports participation and alcohol-related behaviors among adolescents is the lack of research investigating this relationship during the transition from high school to college athletic participation. Findings from prior research suggest that adolescent sports participants are more likely to drink alcohol than non-sports participants (Eccles et al., 2003; Fredricks & Eccles, 2005; Garry & Morrissey, 2000; Green & Burke, 1995; Hoffmann, 2006; Mays & Thompson, 2009; Miller et al., 2006; Moore & Werch, 2005; Rainey et al., 1996; Wetherill & Fromme, 2007; Winnail et al., 1997). In addition, findings from several

previous studies indicate that intercollegiate athletes are more likely to engage in risky drinking behaviors, compared to college students who do not take part in intercollegiate sports (see Martens, Dams-O'Connor, & Beck, 2006). Currently, however, our understanding of the transition from high school to intercollegiate sports, and the potential factors underlying drinking behaviors throughout this transition, remains very limited (Grossbard et al., 2009; Wetherill & Fromme, 2007). Longitudinal research examining the transition from high school sports to intercollegiate athletics, and the factors influencing alcohol-related behaviors throughout this transition, is needed to advance the science in this area of investigation.

As noted in earlier chapters, the findings of this research should be interpreted in light of a number of important methodological limitations. The first component of this research was conducted among a small, convenience sample of adolescents in Southwest Georgia, and all behaviors were based on participant self-report. These aspects of the study methodology limit the generalizability of the findings to broader populations and the conclusions that can be drawn based on the data. The second component of this research also relied on measures that were based on self-report, potentially introducing respondent bias. In addition, the National Longitudinal Study of Adolescent Health applied a sampling frame that was limited to youths enrolled in school at the time of data collection, and the findings may have also been impacted by attrition over the course of the three waves of data collection.

Despite these limitations, this research makes a substantial contribution to the science on the relationship between sports participation and alcohol-related behaviors among U.S. adolescents. The findings of this research point to a number of potentially

important areas of investigation, which will help to advance the science examining alcohol-related behaviors, and the potential factors underlying these behaviors, among adolescent sports participants. The findings may be useful to inform future empirical studies investigating the relationship between sports participation and alcohol-related behaviors among U.S. adolescents and the results may also help to inform alcohol prevention interventions targeting adolescents who participate in school-based sports.

Chapter 5 References

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List of Tables and Figures

Table 1. Sample Characteristics, Sports Participation, and Alcohol-Related Behaviors by Respondent Sex

	Males (*n* = 287)	**Females** (*n* = 89)	**Sample** (*n* = 378)
Male Sex			76.3%
Age			
≤ 14 years	21.0%	25.8%	22.3%
15 years	24.1%	31.5%	25.8%
16 years	29.7%	22.5%	27.9%
≥ 17 years	25.2%	20.2%	23.9%
Race/Ethnicity*			
Black (Non-Hispanic)	74.2%	56.2%	70.0%
White (Non-Hispanic)	16.4%	24.7%	18.3%
Other	9.4%	19.1%	11.7%
Sports Reported			
Football [a]	82.2%		
Basketball	39.2%	29.6%	36.7%
Track & Field	37.4%	28.4%	35.4%
Baseball/Softball	24.5%	20.5%	23.4%
Soccer*	13.3%	29.6%	17.0%
Wrestling [a]	20.7%		
Volleyball [a]		38.6%	9.0%
Tennis*[†]	3.2%	13.6%	5.6%
Cheerleading/Dance [a]		21.6%	
Other Sport*	18.5%	34.8%	22.3%
Total Sports Mean (SD)	2.55 (1.28)	2.50 (1.36)	2.53 (1.28)
Competition*			
Individual Only	6.3%	17.7%	8.7%
Team Only	43.0%	40.5%	42.3%
Both	50.7%	41.8%	48.9%
Level*			
Freshman/Other	12.4%	22.6%	15.0%
Junior Varsity	19.2%	21.4%	19.6%
Varsity	68.4%	56.0%	65.4%
Collision Sports*	88.9%	49.4%	79.5%
Total Alcohol-Related Behaviors Mean (SD)	0.84 (1.28)	0.73 (1.00)	0.82 (1.22)
Ever Drinking	36.5%	37.2%	36.6%
Early Drinking	9.5%	12.7%	10.1%
Past Month Drinking*	16.6%	7.0%	14.3%
Past Month Heavy Drinking	6.8%	4.6%	6.2%
Past Month Ride with Drunk Driver	14.0%	12.8%	13.9%
Past Month Drink & Drive	3.5%	3.4%	3.7%

* χ^2 test between males and females statistically significant at $p < 0.05$

[†] *p*-value derived from Fisher's Exact Test

[a] No χ^2 test performed because sports were specific to males/females

Table 2. Regression Models for Sports-specific Factors and Alcohol-Related Behaviors

	Ever Drank OR (95% CI)	**First Drink ≤ 12 y/o OR (95% CI)**	**Past Month Drinking OR (95% CI)**	**Past Month Heavy Drinking OR (95% CI)**	**Past Month Ride with Drunk Driver OR (95% CI)**
Competition					
Junior Varsity or Freshman	Reference	Reference	Reference	Reference	Reference
Varsity	2.28 (1.41, 3.69)*	1.20 (0.57, 2.53)	3.75 (1.70, 8.28)*	7.32 (1.65, 32.50)*	1.07 (0.57, 2.01)
Fall Sport	1.40 (0.71, 2.77)	1.82 (0.55, 6.05)	0.66 (0.26, 1.64)	2.23 (0.40, 12.47)	3.13 (0.88, 11.19)
Type					
Individual	Reference	Reference	Reference	Reference	Reference
Team	2.20 (0.83, 5.86)	0.63 (0.13, 2.98)	0.72 (0.16, 3.28)	0.21 (0.02, 2.34)	1.13 (0.25, 5.09)
Both	1.63 (0.60, 4.45)	0.74 (0.16, 3.52)	0.87 (0.18, 4.18)	0.42 (0.04, 4.66)	1.18 (0.26, 5.35)
Collision Sports	0.46 (0.22, 0.98)*[a]	0.83 (0.24, 2.90)	1.68 (0.49, 5.81)	1.41 (0.18, 10.91)	0.99 (0.33, 2.99)
Overall Model Significance [†]	$\chi 2$ [5 df] = 16.43, $p = 0.006$	$\chi 2$ [5 df] = 1.76, $p = 0.88$	$\chi 2$ [5 df] = 12.33, $p = 0.03$	$\chi 2$ [5 df] = 9.80, $p = 0.08$	$\chi 2$ [5 df] = 3.92, $p = 0.56$
Hosmer-Lemeshow $\chi 2$ Test	$\chi 2$ [5 df]= 2.62, $p = 0.86$	$\chi 2$ [5 df] = 3.76, $p = 0.59$	$\chi 2$ [6 df] = 6.68, $p = 0.35$	$\chi 2$ [5 df] = 5.56, $p = 0.47$	$\chi 2$ [6 df] = 2.57, $p = 0.86$

* $p < 0.05$

[a] Parameters were no longer statistically significant when age and ethnicity were included as controls, however these variables did not significantly add to the regression models

[†]Wald chi-square test used for logistic regression models; Overall F-test used for linear regression model

(Table 2 continues on next page)

Table 2 (Continued). Regression Models for Sports-specific Factors and Alcohol-Related Behaviors

	Sum of Alcohol-Related Behaviors *B* (95% CI)	**Sum of Alcohol-Related Behaviors Males Only *B* (95% CI)**	**Sum of Alcohol-Related Behaviors Females Only *B* (95% CI)**
Competition			
Junior Varsity or Freshman	Reference	Reference	Reference
Varsity	0.41 (0.14, 0.68)*[a]	0.50 (0.17, 0.82)* [a]	0.27 (-0.31, 0.85)
Fall Sport	0.18 (-0.22, 0.57)	0.22 (-0.32, 0.77)	0.27 (-0.37, 0.91)
Type			
Individual	Reference	Reference	Reference
Team	0.18 (-0.40, 0.76)	0.42 (-0.45, 1.29)	-0.24 (-1.01, 0.53)
Both	0.17 (-0.42, 0.76)	0.34 (-0.54, 1.23)	0.01 (-0.76, 0.78)
Collision Sports	-0.22 (-0.68, 0.24)	-0.47 (-1.22, 0.28)	0.001 (-0.60, 0.61)
Overall Model Significance [†]	F (5,340) = 2.07, p = 0.07	F (5,262) = 2.27, p = 0.048	F (5,76) = 0.36, p = 0.90
Hosmer-Lemeshow $\chi 2$ Test			

* $p < 0.05$

[a] Parameters were no longer statistically significant when age and ethnicity were included as controls, however these variables did not significantly add to the regression models

[†]Wald chi-square test used for logistic regression models; Overall F-test used for linear regression model

Note: Unstandardized regression coefficients displayed (*B*) for continuous variables

Table 3. Regression Models for Specific School-based Sports and Alcohol-Related Behaviors

	Ever Drank OR (95% CI)	**First Drink ≤ 12 y/o OR (95% CI)**	**Past Month Drinking OR (95% CI)**
Males			
Football	1.06 (0.55, 2.05)	1.58 (0.44, 5.70)	0.84 (0.36, 1.93)
Basketball	0.83 (0.45, 1.42)	1.23 (0.50, 3.06)	1.25 (0.60, 2.58)
Baseball	1.33 (0.75, 2.35)	0.72 (0.26, 2.05)	1.18 (0.59, 2.37)
Track & Field	1.10 (0.45, 1.42)	0.87 (0.36, 2.05)	1.29 (0.65, 2.50)
Soccer	1.11 (0.54, 2.30)	0.77 (0.36, 2.12)	0.90 (0.35, 2.36)
Wrestling	0.59 (0.31, 1.14)	1.22 (0.43, 3.42)	1.11 (0.49, 2.50)
Overall Model Significance†	χ^2 [6 df] = 3.55, p = 0.73	χ^2 [6 df] = 1.40, p = 0.97	χ^2 [6 df] = 1.39, p = 0.97
Hosmer-Lemeshow Test	χ^2 [7 df] = 3.64, p = 0.82	χ^2 [9 df] = 11.46, p = 0.27	χ^2 [7 df] = 1.97, p = 0.96
Females			
Basketball	0.39 (0.12, 1.27)	0.69 (0.14, 3.43)	0.55 (0.05, 5.77)
Cheer/Dance	2.11 (0.62, 7.17)	0.42 (0.04, 3.99)	1.75 (0.25, 12.25)
Soccer	0.62 (0.22, 1.78)	0.48 (0.08, 2.75)	1.13 (0.19, 6.86)
Softball	4.94 (1.29, 18.08)*	5.31 (1.02, 27.64)*	1.12 (1.04, 12.10)*
Track & Field	0.37 (0.12, 1.17)	0.57 (0.10, 3.39)	0.52 (0.05, 5.26)
Volleyball	3.32 (1.07, 10.26)*	2.04 (0.41, 10.16)	1.18 (0.16, 8.41)
Overall Model Significance†	χ^2 [5 df] = 9.76, p = 0.13	χ^2 [6 df] = 5.58, p = 0.47	χ^2 [6 df] = 1.02, p = 0.98
Hosmer-Lemeshow Test	χ^2 [6 df] = 7.73, p = 0.26	χ^2 [7 df] = 2.35, p = 0.93	χ^2 [5 df] = 4.35, p = 0.50

Including age and ethnicity as controls did not impact the significant relationships observed among females.

†Wald chi-square test used for logistic regression models; Overall F-test used for linear regression model

* $p < 0.05$

(Table 3 continues on next page)

Table 3 (Continued). Regression Models for Specific School-based Sports and Alcohol-Related Behaviors

	Past Month Heavy Episodic Drinking OR (95% CI)	**Past Month Ride with Drunk Driver OR (95% CI)**	**Sum of Alcohol-Related Behaviors *B* (95% CI)**
Males			
Football	1.71 (0.36, 8.00)	2.97 (0.85, 10.34)	0.10 (-0.33, 0.53)
Basketball	0.91 (0.29, 2.91)	0.88 (0.37, 2.06)	-0.17 (-0.52, 0.19)
Baseball	0.98 (0.35, 2.79)	0.66 (0.30, 1.43)	0.10 (-0.27, 0.47)
Track & Field	1.41 (0.52, 3.82)	1.36 (0.65, 2.84)	0.10 (-0.25, 0.45)
Soccer	1.13 (0.31, 4.14)	0.67 (0.22, 2.04)	0.01 (-0.45, 0.47)
Wrestling	0.93 (0.28, 3.16)	0.64 (0.25, 1.62)	-0.14 (-0.55, 0.27)
Overall Model Significance[†]	χ^2 (6) = 1.99, p = 0.97	χ^2 (6) = 5.07, p = 0.53	F (6,260) = 0.25, p = 0.96
Hosmer-Lemeshow Test	χ^2 (8) = 8.61, p = 0.38	χ^2 (8) = 6.31, p = 0.61	--
Females			
Basketball	1.38 (0.09, 21.63)	2.44 (0.55, 10.74)	-0.41 (-0.93, 0.11)
Cheer/Dance	4.77 (0.43, 52.46)	1.37 (0.22, 8.39)	0.06 (-0.50, 0.63)
Soccer	0.85 (0.08, 9.02)	1.28 (0.32,5.15)	-0.01 (-0.50, 0.47)
Softball	1.95 (0.14, 28.26)	3.09 (0.65, 14.61)	0.84 (0.22, 1.46)*
Track & Field	0.78 (0.07, 8.82)	0.40 (0.07, 2.39)	-0.50 (-1.02, 0.02)
Volleyball	0.77 (0.06, 10.55)	1.10 (0.24, 5.10)	0.44 (-0.06, 0.94)
Overall Model Significance[†]	χ^2 (6) = 2.03, p = 0.92	χ^2 (6) = 4.38, p = 0.63	F (6,76) = 2.02, p = 0.07
Hosmer-Lemeshow Test	χ^2 (6) = 4.99, p = 0.54	χ^2 [7 df] = 3.64, p = 0.82	--

Including age and ethnicity as controls did not impact the significant relationships observed among females. Unstandardized regression coefficients displayed (*B*) for continuous variables.

[†]Wald chi-square test used for logistic regression models; Overall F-test used for linear regression model

* $p < 0.05$

Table 4. Sample Characteristics, Sports Participation, Alcohol-Related Behaviors, and Perceived Peer Drinking by Respondent Sex

	Males (*n* = 287)	**Females** (*n* = 89)	**Sample** (*n* = 378)
Male Sex	100.0%		76.3%
Age			
≤ 14 years	21.0%	25.8%	22.3%
15 years	24.1%	31.5%	25.8%
16 years	29.7%	22.5%	27.9%
≥ 17 years	25.2%	20.2%	23.9%
Race/Ethnicity*			
Black (Non-Hispanic)	74.2%	56.2%	70.0%
White (Non-Hispanic)	16.4%	24.7%	18.3%
Other	9.4%	19.1%	11.7%
Total Sports Mean (SD)	2.55 (1.28)	2.50 (1.36)	2.53 (1.28)
Team vs. Individual Competition*			
Individual Only	6.3%	17.7%	8.7%
Team Only	43.0%	40.5%	42.3%
Both	50.7%	41.8%	48.9%
Level of Participation*			
Freshman/Other	12.4%	22.6%	15.0%
Junior Varsity	19.2%	21.4%	19.6%
Varsity	68.4%	56.0%	65.4%
Collision Sports*	88.9%	49.4%	79.5%
Total Alcohol-Related Behaviors Mean (SD)	0.84 (1.28)	0.73 (1.00)	0.82 (1.22)
Ever Drinking	36.5%	37.2%	36.6%
Early Drinking	9.5%	12.7%	10.1%
Past Month Drinking*	16.6%	7.0%	14.3%
Past Month Heavy Drinking	6.8%	4.6%	6.2%
Past Month Ride with Drunk Driver	14.0%	12.8%	13.9%
Past Month Drink & Drive	3.5%	3.4%	3.7%
Peer Drinking Mean (SD)	1.86 (2.02)	1.84 (1.72)	1.85 (1.95)

* χ^2 test comparing males and females statistically significant at $p < 0.05$

Table 5. Regression Models for Sports-specific Factors, Perceived Peer Drinking, and Alcohol-Related Behaviors

	Model 1: Sum of Alcohol-Related Behaviors	**Model 2: Sum of Perceived Peer Drinking**	**Model 3: Sum of Alcohol-Related Behaviors w/ Perceived Peer Drinking**	**Model 4: Sum of Alcohol-Related Behaviors Among Males**	**Model 5: Sum of Alcohol-Related Behaviors Among Females**
Male Sex	0.10	-0.10	0.13	--	--
	(-0.25, 0.44)	(-0.59, 0.40)	(-0.18, 0.44)		
Non-Hispanic black	-0.11	-0.63	0.10	0.17	-0.11
	(-0.40, 0.19)	(-1.07, -0.18)**	(-0.17, 0.37)	(-0.17, 0.50)	(-0.58, 0.36)
Age	0.10	0.09	0.06	0.08	-0.006
	(-0.03, 0.24)	(-0.10, 0.28)	(-0.05, 0.18)	(-0.06, 0.23)	(-0.21, 0.20)
Level of Competition					
Junior Varsity or Freshman	Ref.	Ref.	Ref.	Ref.	Ref.
Varsity	0.27	0.95	-0.01	-0.005	0.002
	(-0.05, 0.60)	(0.48, 1.42)***	(-0.31, 0.28)	(-0.36, 0.35)	(-0.51, 0.52)
Fall Sport	0.22	0.32	0.12	0.04	0.23
	(-0.19, 0.63)	(-0.28, 0.93)	(-0.24, 0.49)	(-0.45, 0.53)	(-0.39, 0.86)
Competition Type					
Individual	Ref.	Ref.	Ref.	Ref.	Ref.
Team	0.17	0.64	-0.03	0.08	-0.23
	(-0.41, 0.75)	(-0.21, 1.50)	(-0.55, 0.48)	(-0.68, 0.84)	(-0.97, 0.50)
Both	0.17	0.92	-0.12	-0.07	-0.05
	(-0.42, 0.76)	(0.04, 1.79)*	(-0.65, 0.41)	(-0.84, 0.71)	(-0.80, 0.71)
Collision	-0.25	-0.32	-0.12	-0.10	-0.06
	(-0.74, 0.24)	(-1.04, 0.38)	(-0.55, 0.32)	(-0.80, 0.59)	(-0.65, 0.53)
Perceived Peer Drinking	--	--	0.30	0.33	0.18
			(0.24, 0.37)***	(0.26, 0.40)***	(0.04, 0.32)**
Model F-Statistic	$F(9,338) = 1.67$	$F(9,371) = 5.42$	$F(10,338) = 12.06$	$F(9,261) = 12.78$	$F(9,76) = 1.13$
	$p = 0.10$	$p < 0.001$	$p < 0.001$	$p < 0.001$	$p = 0.36$
R-square	0.04	0.11	0.25	0.29	0.12

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

Note: Unstandardized regression coefficients displayed (*B*)

Table 6. National Longitudinal Study of Adolescent Health, Sample Characteristics

	Sample (*n* = 8,721)
Sex (%)	
Female	53.9
Male	46.1
Wave 1 Age (Mean, SD)	14.7 (1.57)
Race/Ethnicity (%)	
Black (Non-Hispanic)	21.0
Hispanic	15.2
White (Non-Hispanic)	55.8
Other	8.0
Sports Involvement	1.20
Mean (SD)	(1.47)
Any Academic Activity (%)	34.2
Any Music Activity (%)	23.9
Wave 1 Covariates	
Parental Monitoring	5.49
Mean (SD)	(4.51)
Friends Drinking	1.10
Mean (SD)	(1.39)
Parental Alcoholism (%)	15.9

Unweighted means and standard deviations reported

Table 7. Past 12 Months Alcohol Use and Related Consequences by Respondent Sex

	Wave 1		Wave 2		Wave 3	
	Males	**Females**	**Males**	**Females**	**Males**	**Females**
Any Drinking	43.0	43.5	42.7	43.3	74.7	71.2
Binge Drinking	25.2	19.8	29.5	23.4	56.6	40.3
Gotten Drunk	25.6	23.1	29.5	25.4	56.0	45.1
Parent Problems	8.1	7.0	9.0	6.8	--	--
School/Work Problems	2.6	2.1	2.9	2.2	7.8	4.1
Friend Problems	4.5	5.9	5.8	6.3	10.1	5.6
Dating Problems	6.7	7.6	6.6	7.5	11.2	8.6
Regret Act	11.9	12.4	11.3	11.3	--	--
Regret Sex	6.1	6.0	7.0	6.6	17.2	11.7
Hung Over	16.3	15.7	18.5	17.5	46.2	37.3
Sick/Threw Up	14.9	14.	17.1	15.6	37.6	33.9
Physical Fight	6.5	3.4	7.4	3.5	11.8	3.2
Drive Drunk	--	--	6.6	3.4	30.2	15.7
Drunk at School/Work	--	--	--	--	8.0	2.7
Unweighted PAU* (Mean, SD)	1.70 (2.58)	1.60 (2.48)	1.93[a] (2.87)	1.72[b] (2.63)	3.64[a] (3.08)	2.79[b] (2.67)
Weighted PAU*† (Mean, SE)	1.68 (0.11)	1.66 (0.08)	1.94 (0.12)	1.85 (0.09)	3.89 [a] (0.12)	2.99[b] (0.09)

Unweighted percentages are displayed

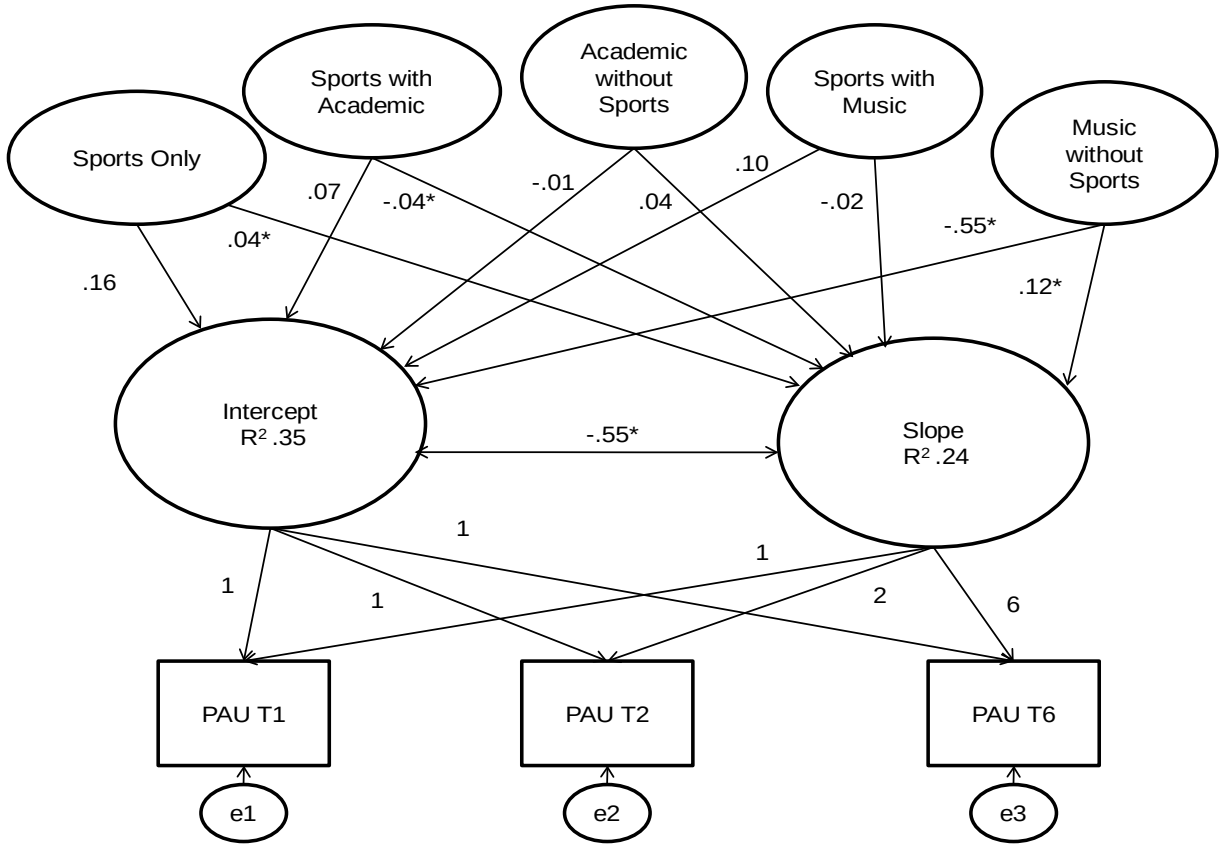
*Means with different superscript letters are significantly different at $p < 0.01$

† Test for mean differences for weighted means derived using contrast statements SAS PROC SURVEYREG

Table 8. Intercorrelations between Variables Included in Latent Growth Models

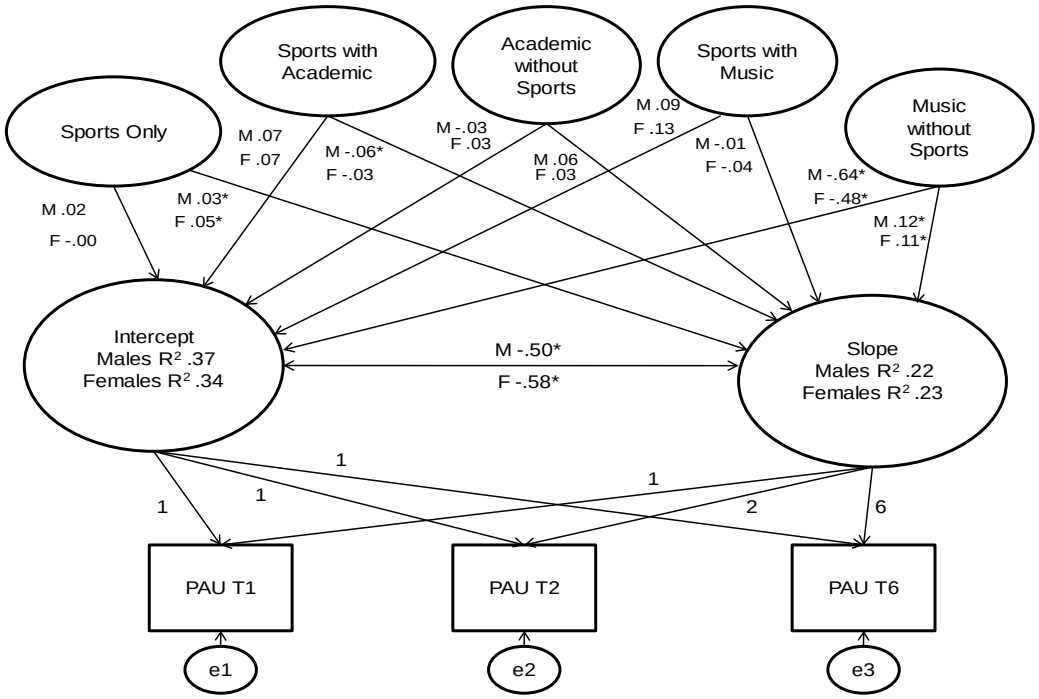
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
1. PAU1	1.00													
2. PAU2	0.58	1.00												
3. PAU3	0.23	0.30	1.00											
4. Sports	0.01	0.03	0.12	1.00										
5. Academic Act. (1=Yes)	-0.01	-0.01	0.04	0.17	1.00									
6. Music (1=Yes)	-0.11	-0.09	0.03	0.07	0.17	1.00								
7. Sport*Music	0.02	0.01	0.06	0.57	0.11	0.12	1.00							
8. Sport* Academic	0.03	0.03	0.06	0.68	0.20	0.07	0.52	1.00						
9. Age	0.28	0.22	-0.02	-0.12	-0.01	-0.13	-0.07	-0.06	1.00					
10. Sex (1=Male)	0.01	0.02	0.15	0.09	-0.14	-0.17	0.03	0.02	0.05	1.00				
11. White	0.10	0.13	0.23	0.07	0.03	.009	0.02	0.04	-0.05	0.01	1.00			
12. Friends' Drinking	0.43	0.33	0.09	-0.04	-0.05	-0.10	-0.02	0.01	0.24	-0.04	0.02	1.00		
13. Parental Alcoholism (1=Yes)	0.08	0.03	0.00	-0.03	-0.05	-0.04	-0.02	-0.04	0.01	-0.03	0.00	0.05	1.00	
14. Parental Monitoring	0.06	0.07	-0.00	-0.04	-0.02	-0.03	-0.03	-0.02	0.19	0.00	-0.01	0.12	0.01	1.00

Figure 1. Latent Growth Model (LGM) for the Sample



LGM among the entire sample (n = 8,721). Model fit: χ^2 [12] = 30.9, p = 0.002, CFI = 1.00, RMSEA = 0.01. Time-invariant (Wave 1) covariates included: Sex, white race, age, parental alcoholism, friends' drinking, & parental monitoring.. Statistically significant paths at $p < 0.05$ are denoted by an asterisk. Error terms e1-e3 represent variability in measured problem alcohol use not explained by the model. Unstandardized coefficients are displayed.

Figure 2. Latent Growth Model (LGM) stratified by Respondent Sex



LGM stratified by respondent sex. Model fit for males (n = 3,814): χ^2 [11] = 36.5, p <0.001, CFI = 0.99, RMSEA = 0.03. Model fit for females *(*n = 4,457*):* χ^2 [11] = 16.9, p = 0.11, CFI =1.00, RMSEA =0.01. Time-invariant (Wave 1) covariates included: white race, age, parental alcoholism, friends' drinking, & parental monitoring. Statistically significant paths at p < 0.05 are denoted by an asterisk. Error terms e1-e3 represent variability in measured problem alcohol use not explained by the model. Unstandardized coefficients are displayed.