DISSERTATION

ALCOHOL-RELATED OUTCOMES AMONG HIGH SCHOOL STUDENTS IN THE SOUTHWESTERN UNITED STATES: SOCIAL-, INTERPERSONAL-, AND SCHOOL-RELATED PROBLEMS

Submitted by

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In partial fulfillment of the requirements

For the Degree of Doctor of Philosophy

Colorado State University

Fort Collins, CO

Summer 2008

COLORADO STATE UNIVERSITY

June 27, 2007

WE HEREBY RECOMMEND THAT THE DISSERTATION PREPARED UNDER OUR SUPERVISION BY ROBERT S. MCNAMARA ENTITLED ALCOHOL-RELATED OUTCOMES AMONG HIGH SCHOOL STUDENTS IN THE SOUTHWESTERN UNITED STATES: SOCIAL-, INTERPERSONAL-, AND SCHOOL-RELATED PROBLEMS BE ACCEPTED AS FULFILLING IN PART REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY.

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ABSTRACT OF DISSERTATION

ALCOHOL-RELATED OUTCOMES AMONG HIGH SCHOOL STUDENTS IN THE SOUTHWESTERN UNITED STATES: SOCIAL-, INTERPERSONAL-, AND SCHOOL-RELATED PROBLEMS

This study examined peer-, family-, and school-related outcomes of adolescent drinking. Two thousand, three hundred and eight Mexican American and White high school students completed the American Drug and Alcohol Survey^{tm} and reported on a variety of measures including age first drunk, current level of binge drinking, and alcohol-related outcomes associated with friends, school, and family. Results indicated that binge drinking is a significant mediator of the relationship between age of drinking onset and school-related outcomes for all Mexican American and some White high school students, while mediation was not found when examining peer- and family-related outcomes. Multiple regression equations also suggest unique effects of age of drinking onset and binge drinking on alcohol-related outcomes. Results are discussed in regard to preventing drinking-related problems by targeting the delay of drinking onset and reducing the frequency of binge drinking behavior, as well as understanding alcohol use at it is related to different adolescent demographic groups.

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CHAPTER I

Introduction

Research has documented numerous problems related to adolescent alcohol use and misuse. According to the literature, a wide variety of correlates of alcohol misuse have been identified for adolescents including family, peer, school, and other factors (Hawkins et al., 1996; Marsden et al., 2005). In most cases these correlates, for example, peer alcohol use behaviors, are presumed to be predictors of alcohol use, although the distinction between predictors and outcomes is not always clearly made. A wide variety of alcohol-related outcomes have been identified for adolescents including alcohol-related injuries, high-risk sexual behavior (Bonomo et al., 2001), drinking and driving (Donovan, 1993), and future alcohol abuse and addiction (D'amico et al., 2005).

There has been a lack of research focusing on alcohol-related outcomes of the social and interpersonal nature, particularly the effects of drinking on friend and family relationships, as well as school-related outcomes. The influence of binge drinking, age of drinking onset, gender, grade, and ethnicity on alcohol-related outcomes should be examined in order to gain an understanding of correlates of alcohol-related outcomes. In this study, the peer-, family-, and school-related outcomes of adolescent drinking, as well as the relationship of the alcohol-use outcomes to early drinking onset and binge drinking frequency, will be addressed. The relationships between the variables will be examined for Mexican American and White high school students, focusing on gender, grade, and ethnicity differences, as literature has shown differences in adolescent alcohol use depending on demographic

variables. Before discussing research findings regarding alcohol misuse correlates and alcohol-related outcomes, the nature of adolescent problem drinking will be outlined.

Distinguishing between Adolescent and Adult Problem Drinking

Adolescents and adults suffer from many of the same adverse consequences as a result of their heavy alcohol use, including legal problems, driving under the influence, and interpersonal conflict. Adults, however, are at risk for additional consequences, such as long-term problems including cancer, cirrhosis of the liver, and coronary artery disease (Bondy, 1996). While many of the consequences of alcohol use overlap for adolescents and adults, previous research identified reasons for problem adolescent drinking and clearly distinguished these issues from those that are experienced by adults.

One reason for this difference is that frequency of alcohol use increases with age, while quantity of consumption declines after adulthood (Harford & Mills, 1978.) Also, according to White (1987), adolescent drinking is characterized by drunkenness, and alcohol-related problems are often related to a single instance rather than chronic consumption. High frequency and low quantity consumption is rare in the adolescent population, and due to the transient nature of their drinking, adolescent alcohol outcomes are unique.

In addition, adolescent drinking problems are distinct from those of adults because adolescent alcohol use, in and of itself, is illegal (Marden & Kolodner, 1977). Alcohol use by adolescents can be categorized as abuse due to the fact that underage drinking is not legal. Also, Donovan and Jessor (1985) found adolescent drunkenness

and general deviant behavior to be related to similar factors, further supporting the notion that adolescent alcohol-related problems are unique. Finally, the amount and frequency of alcohol intake can have different effects on the individual at different developmental levels. Therefore, adolescent and adult alcohol-related problems should not be judged by the same standards (White, 1987).

Problems Associated with Alcohol Misuse

The nature of adolescent problem drinking is different from that of adults in many ways, and is due in part to the level of psychosocial development. The unique nature of adolescent alcohol use has driven research to focus on the negative behaviors and problems associated with this phenomenon. The correlates include adult substance abuse/dependence, drinking and driving, injuries, high-risk sexual behavior, and violence and delinquent behaviors.

The initiation of alcohol use during the teenage years has been shown to be a risk factor for adult drug and alcohol abuse/dependence. Grant and Dawson (1997) found that the earlier young people begin drinking, the more likely they are to become dependent on alcohol. Teenage alcohol use is also related to problem drinking behavior, including repeated binge drinking behavior in adulthood (Jeffirs, Power, & Manor, 2004). In addition, earlier alcohol use precedes the use of illicit drugs (Kandel, 2002), and is associated with the onset of drug-related and psychiatric disorders (McGue et al., 2001).

Adolescents who develop alcohol use disorders (AUDs) are at a particularly high risk for negative behaviors related to drinking. Young people with AUDs are more likely to use other substances, such as marijuana and nicotine, with rates of co-

occurring use as high as 96% in some samples (Martin et al., 1993). The use of alcohol in conjunction with other substances is common, with the combination of alcohol and marijuana being the most common type of polysubstance use for adolescents (Martin et al., 1996).

Another major problem associated with adolescent alcohol use is drinking and driving, which is a significant cause of death for adolescents in the United States. A large national survey found that one in seven Americans age 12 or older had driven under the influence (DUI) in the year prior to the interview, and the likelihood of DUI is double for males as compared to females (National Survey on Drug Use and Health, 2002). Escobedo, Chorba, and Waxweiler (1995) reported that drinking and driving among American high school students increased substantially with frequency of alcohol use. In addition, students who began drinking at an early age were more likely to drink and drive than later onset drinkers.

Research has focused on drinking and driving, as well as riding with an intoxicated driver as major health risks related to alcohol use (Escobedo et al., 1995). According to the U.S. Department of Transportation (1999), approximately 20% of drivers under the age of 21 who were involved in fatal motor vehicle accidents had positive blood alcohol levels. Zador (1991) reported that, at all blood alcohol concentration levels, young people who drink and drive are more at risk for fatal crashes than older drinking drivers.

Thatcher et al. (1997) examined the relationship between high risk driving behavior and alcohol for adolescent males and females. Alcohol use for twelfth-grade females was found to be a predictor of serious traffic offenses, and alcohol

misuse was an indicator of both serious traffic offenses and crashes resulting in injuries. For males, alcohol misuse for twelfth-grade students predicted single motor vehicle crashes in the first two year with a driver's license, along with several other negative driving outcomes.

Another category of adverse correlates of adolescent alcohol use is high risk sexual behavior. Strunin and Hingson (1992) surveyed a group of adolescents between the ages of 16 and 19 in Massachusetts. The results showed that of the 66% of teenagers who reported having engaged in sexual intercourse, 64% had sex after drinking. Also, 17% used condoms less often after drinking, and 49% of the adolescents were more likely to have sex if their partner was drinking. Similarly, Bonomo et al. (2001) reported that 15% of the 16-17 year olds surveyed in their study reported having unprotected sex, or having sex and later regretting it while under the influence of alcohol in the past year.

Finally, adolescent drinking has been shown to be associated with violence, injuries related to fighting, as well as unintentional injuries. Joffe (1988) reported that two of the top five leading causes of death for adolescents, homicide and suicide, are correlated with alcohol use. In terms of nonlethal violent behavior, teenage drinking is associated with both weapons carrying and physical fighting (Dukarm, Byrd, Auinger, & Weitzman, 1996). Valois et al. (1995) found that one of the most important correlates of carrying weapons and serious fighting for adolescents is binge drinking behavior. Additionally, alcohol use was found to be an independent risk factor for not only violent behaviors, but delinquent behaviors as well (Komro et al., 1999).

Swahn et al. (2004) preformed a study investigating the association between alcohol consumption and adolescent risk for physical fighting and injuries. The results indicated that 37% of the drinkers reported fighting, 24% reported injuring others during fights, and 10% reported being injured in fights. A correlation was discovered between drinking alcohol alone and injuring others in fights, as well as involvement in fights. Also, teenagers in the study who reported that they binge drink, drink frequently, or engage in problem drinking were more likely to be involved in all three of the measured fighting related outcomes.

Although alcohol use has been found to be associated with violence and injuries related to violence, studies have shown an association between drinking and unintentional injuries as well. Spirito et al. (1997) examined injury and substance use at the time of injury in a sample of high school students. Alcohol was reported to be often involved in injuries such as cuts and falls. In addition, unintentional injuries resulting in medical care, notably pedestrian injuries, occurred when alcohol use was involved.

In summary, teenage alcohol misuse is associated with a variety of negative behaviors and problems. These correlates include abuse/dependence, risky behaviors, violence, and injuries. It is important to consider these problems associated with adolescent drinking, as well as other psychosocial issues that impact home and school functioning.

Alcohol Misuse: Family, Peer, and School Correlates

Various family, peer, and school factors are related to adolescent alcohol misuse. In the category of family factors, poor family management practices, such as

inadequate child monitoring and inconsistent discipline, are associated with alcohol misuse (Peterson et al., 1994). Additionally, the absence of closeness between child and parent is a correlate of alcohol use (Brook et al., 1990). Parental drinking frequency has also been associated with the frequency that their adolescents drink (Fergusson et al., 1995).

A variety of peer factors are related to adolescent alcohol misuse. A higher level of peer involvement in alcohol use is associated with higher levels of personal alcohol use for adolescents (Duncan et al., 1995; Newcomb & Bentler, 1986). Also, Jackson (1997) indicated that having a best friend who has tried alcohol and perceiving that alcohol use is prevalent in one's social group is related to experimenting with alcohol. A relationship has also been found between adolescents' drinking regularly and affiliation with older peers with established drinking patterns and favorable drinking norms (Keefe, 1994).

Problem behaviors at school are related to adolescent alcohol and drug misuse as well. A strong relationship was found between frequency of problems at school and drinking frequency (Blum, Beuhring, & Rinehart, 2000). In addition, Johnston et al. (1985) reported a higher level of drug use for those students with a lower commitment to school. Truancy and being expelled from school have also been found to be related to high levels of drinking (Marsden et al., 2005). Research clearly shows that family, peer, and school factors are strongly related to adolescent alcohol misuse. Studies have also specifically examined the negative social-, interpersonal-, and school-related outcomes of adolescent drinking. Early work in this area of research focused on categorization of types of alcohol-related outcomes.

Categorization of Alcohol-Related Outcomes

White (1987) investigated the dimensional structure of adolescent problem drinking in four factors: heavy use intensity or intake, frequent intoxication, using alcohol for reasons of escape, and experience of negative consequences. Models were developed to examine the relationship between the factors. Comparison of models showed that negative consequences and use intensity were the two distinct factors of alcohol-related problems, and they were moderately correlated for individuals in mid- to late-adolescence (White). Similar results were found supporting the two factor model regarding mid- to late-adolescence and drug use behavior (Newcomb & Bentler, 1988). White's findings were also replicated using a younger sample of adolescents (age 12-14), showing that (1) drinking-quantity frequency and (2) the experience of behavioral and legal problems as a result of alcohol consumption are two distinct, moderately correlated factors that fit for both genders (Smith et al., 1995).

The previous studies also set a precedent for categorization of social-, interpersonal-, and school-related problem that result from alcohol use. White (1987) used a latent measure composed of 20 consequences (such as friends and neighbors avoiding the individual, or having to see school personnel) to capture the issues associated with adolescent drinking. Smith et al. (1995) also examined a broad range of alcohol-related problems of a social and interpersonal nature, including legal problems, problems with friends, problems with parents, and fighting problems. Latent measures of the interpersonal nature used in the research of Newcomb and Bentler (1988) further parsed the consequences of alcohol problems, and included

"relationship problems," "work problems," and "family problems." In conclusion, previous literature has categorized adolescent alcohol-related outcomes into problems associated with family, friends, work, and school. Similarly, in the current study, alcohol-related outcomes variables will be created using summed scales of consequences related to drinking.

Alcohol-Related Outcomes: Social-, Interpersonal-, and School-Related Problems

Clapp and Shillington (2001) developed path models of three alcohol-related consequences (school or work problems, loss of control (such as drinking more than intended), and relationship problems), and their correlates. Results of the path analysis for the school/work problem index indicated that adolescents who drank in private contexts were less likely to experience alcohol-related problems at work or school. In addition, the greater the intensity of alcohol use, the greater number of work or school related problems. Similarly, intensity of alcohol use was the strongest predictor of loss of control, and drinking in private was negatively correlated with the loss of control variable. The results of the relationship problem model indicated that alcohol use intensity is the greatest predictor of relationship problems. For all three of the models, age of first drink was negatively correlated with alcohol use intensity, indicating that the earlier an individual began drinking, the higher the level of current alcohol use. Also, (1) age of first drink, (2) gender, and (3) age were indirectly related to the alcohol-related outcomes through the alcohol intensity variable. The path models indicated that, in terms of gender specificity, males drank with more intensity. Ethnicity was not included in the models because it was no longer

significant after alcohol intensity was regressed on it and other variables (Clapp & Shillington, 2001).

A relationship between the systems of the Problem-Behavior Theory (Jessor & Jessor, 1977) and problem drinking behavior was found by Donovan (1999). Problem drinking behavior was constructed of four components: alcohol intake, frequency of drunkenness, negative consequences of drinking, and driving after drinking. The negative consequences of drinking were assessed using questions that examined how many times an individual had family, school, or work difficulties, problems with friends or dating relationships, legal troubles, and incidences of driving while intoxicated. Results showed that in the Behavior System of the Problem-Behavior Theory, less frequent attendance at religious services, lower school grades, more frequent marijuana use and delinquent-type behavior were associated with greater problem drinking. Importantly, there was relatively little difference for males and females in the psychosocial and behavioral factors that are related to problem drinking (Donovan, 1999).

The relationship between alcohol use and delinquent behaviors, including school-related problems, was the focus of a study by Barnes et al. (2002). The research focused on gender, age, and ethnic differences in illicit substance use and delinquent behavior that is associated with alcohol use. Delinquency was measured using six items, which included the number of days of cutting class in the past month, and the number of times in the past school year that an individual skipped a day of school, was sent to the principal or other school authority due to conduct problems, took money, beat someone up, or carried a weapon. Results indicated that Whites

and Hispanics have higher levels of alcohol consumption, binge drinking, and illicit drug use than other ethnic groups in the study (Blacks and West Indians), but White adolescents showed a significantly lower level of self-reported delinquency than other ethnic groups. Also, the findings of Barnes et al. (2002) supported other research that found alcohol misuse to be strongly related to problems such as illicit drug use and delinquency. Additionally, results showed that early onset of drinking is associated with delinquency and illicit drug use when other factors are held constant, which puts males at higher risk for these problems due to their earlier initiation of drinking as compared to females (Barnes et al.).

Ellickson et al. (2003) conducted a longitudinal study examining the behavioral problems associated with alcohol use at grades 7 and 12, and age 23. The participants, identified in grade 7, were divided into three categories: early drinkers (drank 3 or more times in the past year or drank in the past month), early nondrinkers (never drank), and early experimenters (drank less than 3 times in past year and never in the past month). Results indicated that, at grade 7, early drinkers were more likely to be having school problems, stealing, and using illicit drugs. At age 23, the early drinkers remained at higher risk for a variety of problems as compared to the nondrinkers and experimenters, including substance use, illegal activity, unreliable work attendance, and violent behavior (Ellickson et al.).

Wells et al. (2004) described drinking at age 16 using four latent classes, and subsequently examined alcohol-related outcomes for these classes at ages 16-21, and ages 21-25. The four latent classes represented level of drinking severity, ranging from those who consumed no alcohol in the last three months (class 1) to those who

drank often, labeled as alcohol abusers (class 4). Drinking-related outcomes were chosen to represent domains of functioning in late adolescence and early adulthood: substance dependence, alcohol-related outcomes, education and employment, mental health, sexual relationships, and offending (reported legal offenses). Results indicated that the latent classes appeared to lie along a single dimension that predicted outcomes across all of the aforementioned categories. Alcohol consumption, dependence, drinking and driving offenses, and illicit substance use during ages 16-21 and 21-25 increased with the severity of drinking in the latent class. Also, suicidal ideation and attempts increased with latent class for the period 16-21 years of age, and the same trend was seen for major depression for both periods. Additionally, number of sexual partners, sexually transmitted diseases, pregnancy, as well as violent and property offenses increased linearly for the latent classes later in life (Wells et al., 2004).

In conclusion, it is evident that alcohol use is related to a number of social-, interpersonal-, and school-related problems. Studies have found that the level of alcohol intake, such as binge drinking, and the age of onset of alcohol use are associated with the severity of alcohol-related outcomes. There does not appear to be a difference, however, in the type of alcohol-related outcomes observed for males and females. Additionally, age of first drink was found to be indirectly related to alcohol-related outcomes through alcohol use intensity. In order to better understand the nature of the correlates of alcohol-related outcomes, each of these variables will be outlined in further detail.

Binge Drinking

Binge drinking is commonly defined as consuming five or more drinks on the same occasion, or in a three to five hour period, during the last month (The National Institute in Drug Abuse, 2002; Oetting & Beauvais, 1990). Although binge drinking has been categorized as an alcohol-related outcome for adolescents, it has also been identified as a significant risk factor for a number of negative consequences for adolescents in the United States as well (U.S. Department of Health and Human Services, 2000). Binge drinking is prevalent among adolescents in the U.S., as is demonstrated by the results of the National Survey on Drug Use and Health (NSDUH). Of the participants age 12 or older surveyed, 22.9% engaged in binge drinking at least once in the past 30 days, which is equivalent to approximately 54 million people (National Institute on Drug Abuse, 2002). Additionally, according to the NSDUH (2002), when specifically examining the data for adolescents and young adults (age 12-20), 19.3% of the participants in this demographic were binge drinkers, and 6.2% were identified as heavy drinkers (defined as five or more instances of binge drinking in the last 30 days).

Binge drinking is associated with many problematic behaviors due to the resultant impairment in judgment (McGinnis & Foege, 1993). The National Institute on Drug Abuse (2002) identified risky sexual activity as one problem behavior associated with binge drinking, along with driving under the influence and illicit drug and tobacco use (U.S. Department of Health and Human Services, 2000). Also, Koss and Dinero (1989) identified date rape as a significant problem related to binge drinking.

A relationship between high risk sexual activity and alcohol use, particularly binge drinking, has been found in several studies. Dunn et al. (2003) found that the tendency to initiate sexual activity and have multiple partners is more likely for binge drinkers. Also, because sex is taking place after alcohol consumption, adolescents are less likely to engage in safe sex because judgment is impaired (Duncan & Duncan, 1996). Similarly, Castilla et al. (1999) found that condom use is less likely for heavy alcohol users than light users or those who abstain from alcohol, placing them at higher risk for HIV.

Binge drinking has also been found to be associated with the use of illicit drugs and tobacco, as well as driving under the influence. According to the NSDUH, 16.6% of participants age 12 or older who reported binging at least once in the last 30 days also reported illicit drug use. Also, 32.6% who binged five or more times in the last month reported using an illegal substance. In terms of tobacco use, Johnson et al. (2000) found that adolescent smokers are more likely to be binge drinkers, and increasing rates of smoking are associated with increasing rates of binge drinking for adolescent males, but not adolescent females. Additionally, among American high school students, drinking and driving increased as the frequency of alcohol use and binge drinking increased (Escobedo et al., 1995).

Early Onset Drinking

Age of drinking onset has been found to have a strong correlation with binge drinking behavior as well as alcohol-related outcomes. Early drinking onset, defined as initiating drinking at age 12 or younger, is another factor that has been found to be associated with problematic drinking and adverse consequences. Retrospective

clinical studies have indicated that early drinking onset is a precursor to early onset of abuse and dependence (Andersson & Magnusson, 1988; von Knorring, Palm, & Andersson, 1988). Gruber et al. (1996) examined the alcohol use patterns of high school students and their relationship to age of drinking onset. The drinking behaviors of adolescents who initiated alcohol use at age 12 or younger differed significantly from the behavior of those who began drinking after age 12. Early onset drinkers, both male and female, were found to binge more frequently, and showed a higher incidence of getting drunk weekly.

In terms of gender-specific findings for early onset drinkers, Gruber et al. (1996) reported males who initiated alcohol use at age 12 or younger were more likely to experience the negative sequelae of use than later onset drinkers, including tolerance, blackouts, and dependence. Also, early onset males, as compared to later onset males, were more likely to be absent from school or work, usually or always drank before sex, and lost a partner due to drinking. Early onset females were also found to be more likely to have blackouts, be absent from school or work, and lose a partner due to drinking than their later onset counterparts (Gruber et al.). It is clear that early onset drinking is associated with severe negative consequences. While males and females who initiate drinking at age 12 or younger experience similar drinking-related outcomes, males report a broader range of problems as a result of their alcohol use.

As a result of early drinking onset and binge drinking behavior, the likelihood of negative consequences increases (Chassin, Pitts, & Prost). Adolescents whose binge drinking occurred at a high frequency and began in early adolescence were

found to be at the greatest risk for adverse consequences and were most likely to develop abuse and dependence as young adults. In addition, this group, identified as the early-heavy group, showed elevations in parent alcoholism, adolescent drug use, and in males, externalizing symptoms (Chassin, Pitts, & Prost, 2002).

Research has indicated further gender and ethnic differences in the realm of early onset drinking. As mentioned previously, Gruber et al. (1996) reported gender differences in the outcomes of use for early onset males and females. Donovan et al. highlighted further support for the presence of differences between male and female early initiators. According to the Partnership Attitude Tracking Study (PATS), boys were more likely than girls to have had experience with alcohol in a fourth through sixth grade sample (approximately 20% of boys and 10% of girls had tried alcohol). Ethnic differences were found among the elementary school students on the PATS. Donovan et al. (2004) reported the following percentages of fourth through sixth grade students who had tried more than a sip of alcohol in their lives (1999 PATS survey): 14.8% White, 15.4% Black, and 18.4% Hispanic. Alcohol experience was found to be higher for Hispanic than White elementary students in three of the four PATS from 1996-1999.

Callas et al. (2004) identified psychosocial factors associated with alcohol use among early adolescents, and found one factor differed by gender. Participants in the seventh and eight grades were surveyed regarding alcohol and drug use behaviors, as well as expectancies about alcohol effects, perceived alcohol norms, perceived prevalence of alcohol use, and confidence in ability to refuse alcohol. Results showed that for early onset drinkers, factors related to the risk of drinking included

cigarette smoking, marijuana use, negative expectancies about alcohol (negative physical, social, and affective consequences), and parents' acceptance of drinking. In addition, gender, positive alcohol expectancies, and lack of confidence in ability to refuse alcohol significantly interacted with peer's disapproval of alcohol use (Callas et al.).

Research has also investigated the effects of age of alcohol use initiation and psychosocial risk factors on alcohol misuse (Hawkins et al., 1997). Participants were recruited in grade 5 and followed on a yearly basis for the following seven years in order to examine alcohol misuse and its correlates. The study found that a younger age of alcohol use initiation was strongly related to a higher level of alcohol use at ages 17-18. Also, age of alcohol initiation mediated the effects of numerous factors, including parent drinking, peer alcohol initiation, school bonding, and ethnicity on level of alcohol misuse in later adolescence (Hawkins et al.).

Early drinking onset is clearly related to higher levels of binge drinking behavior as well as alcohol-related outcomes of an interpersonal and social nature. According to the findings of Clapp and Shillington (2001), the nature of the relationship between early drinking onset and severity of alcohol-related outcomes is indirect, through alcohol use frequency. Therefore, binge drinking may act as a mediator of the relationship between age of drinking onset and peer-, family-, and school-related outcomes.

Ethnicity, Gender, and Grade

As noted previously, alcohol-related problems have been shown to vary by gender and ethnicity. The relationship between gender, ethnicity, and alcohol use,

particularly binge drinking, has been the center of some research studies. Past studies examining the differences in drinking patterns between Mexican Americans and Whites have shown that older White students drink more frequently than Mexican American students, and the rates of binge drinking differ over time (Swaim et al., 2004). Although Mexican American and White boys reported comparable levels of binge drinking, White girls reported higher levels of binge drinking than their Mexican American counterparts (Bachman et al., 1991). Additionally, during 8th grade, Mexican American girls and boys reported higher levels of binge drinking, a trend that reverses by 12th grade, where Whites reported higher levels of binge drinking behavior (Wallace et al., 2002).

Results of Swaim et al. (2004) indicated that Mexican American students reported lower frequency of alcohol use than did White students, except in the binge drinking category, where both Mexican American boys and girls reported higher levels of binge drinking. The difference occurred only at the younger grade level for girls, but at several grade levels for boys, demonstrating that grade level should be taken into consideration when examining these variables.

Related to gender, Swaim et al. (2004) reported unexpected results in terms of female alcohol use. It was expected that boys would report higher levels of alcohol use than girls across all age groups. However, girls reported higher levels of alcohol use than boys among younger students. This trend reversed by the later high school years, particularly for the Mexican American participants. Based on these findings, alcohol-related problems are likely to continue for older Mexican American adolescent males, and the increase in alcohol use rates for Mexican American girls

may lead to an increase in future alcohol-related problems for this group (Swaim et al.).

Grade, gender, and ethnicity have been shown to play a role in the frequency of alcohol-related outcomes, as well as binge drinking behavior. As mentioned previously, binge drinking behavior may act as a mediator between age of drinking onset and alcohol-related outcomes. Early onset drinking is associated with higher levels of binge drinking and alcohol-related outcomes. However, the strength of the relationship between age of drinking onset and frequency of alcohol-related outcomes is expected to lessen, or not exist, without higher levels of binge drinking. This prediction is based on a stronger correlation between levels of binge drinking and alcohol-related outcomes than age of drinking onset and alcohol-related outcomes. Additionally, the relationship between binge drinking, age of drinking onset, and alcohol use outcomes will be examined based on grade, gender, and ethnicity of the high school students.

Current Study

The purpose of the current study is to investigate social-, interpersonal-, and school-related outcomes of alcohol use behaviors. The alcohol-related problems will be examined based on the frequency of binge drinking behavior, age of drinking onset, grade, gender, and ethnicity. It is hypothesized that higher frequencies of binge drinking and early onset drinking are associated with higher levels of alcohol-related outcomes. In addition, based on the findings of Clapp and Shillington (2001), the frequency of binge drinking is expected to mediate the relationship between age of drinking onset and alcohol-related outcomes. Furthermore, grade, gender, and

ethnicity will be examined to determine if they are associated with the mediated relationship.

Whether frequency of binge drinking behavior mediates the relationship between age of drinking onset and school-, peer-, and family-related problems will be studied as well. It is hypothesized that the initiation of drinking at age 12 or younger is associated with higher levels of binge drinking, and in turn, a higher incidence of school-, peer-, and family-related problems. Due to the fact that the relationships between age of drinking onset, frequency of binge drinking, and alcohol-related outcomes have not been researched based on demographic variables, the current study will answer the research question regarding whether the mediation equation will vary based on grade, gender, and ethnicity.

CHAPTER II

Method

Participants

Participants were from the first wave of a two-wave prospective study investigating alcohol use and related problems among Mexican American and nonHispanic White adolescents from schools in southwestern states. The students participating in the study (30% of all eligible students) received parental consent for a survey of alcohol use, substance use, and correlates of these behaviors. The survey included students ranging from 7th to 12th grade, but the current study considered only 9th to 12th grade students (high school age youth) who self-identified as Mexican American or nonHispanic White. The sample consisted of 646 female and 520 male Mexican American students, and 638 female and 504 male nonHispanic White students. Of the 2,308 high school students in the study, 55.6% were female and 50.5% were Mexican American. The percentage of participants by grade was as follows: 9th grade (24.2%), 10th grade (24.4%), 11th grade (27.3%), and 12th grade (24.1%).

Procedure

Recruitment of schools. A two-stage stratified random sampling method was used to identify schools from five southwestern states (California, Arizona, New Mexico, Colorado, and Texas). The qualifying communities had a population of 2,500 or greater, and had at least a 10 percent population of Mexican Americans. These criteria resulted in an initial sampling frame of 735 communities (based on U.S. Census data, 1990) which were then grouped into three population strata: (1)

2,500-10,000 (2) 10,001-50,000 (3) 50,001 and over. Twenty-one communities were subsequently recruited, resulting in five communities from stratum one, seven from stratum two, and nine from stratum three. High schools were selected at random from within the communities.

Informed consent. In order to acquire parental consent, students took home a consent form to be signed by the parent and returned to school by the student. Teachers reminded students to give consent forms to parents for a signature and to return them, and were notified that if theirs became lost or unavailable, another consent form could be taken home. The class that returned the highest number of consent forms was given a party as a group incentive. Given the large number of schools involved and the proximity to the end of the school year, it was not possible to make individual contacts with parents, nor was it possible to send out repeated waves of the consent forms.

Data collection. Classroom teachers administered the surveys to those students who obtained parental consent. The students were first informed that participation was not mandatory, and that all materials were confidential. After administering the standardized instructions, the teachers then moved to and remained in another area of the classroom where they could not observe student responses. Prior to completion of the surveys, a cover sheet with identifying information was separated from the rest of the materials and placed in an envelope that was immediately sealed. The surveys were placed in a separate envelope and sealed. Both envelopes were mailed directly to the research center for processing. The questionnaires, upon arriving to the research center for processing, were subjected to

40 consistency and reliability tests for random markings or exaggeration (Oetting & Beauvais, 1990).

Measure

The survey is an adaptation of the American Drug and Alcohol Survey™ (ADAS; Oetting & Beauvais, 1990). The original ADAS was designed to measure substance use and its correlates, and the adaptation of the survey included items to assess alcohol use and the incidence of problems associated with drinking. This included three new items on binge drinking and 27 items that inquired about the occurrence of various problems associated with alcohol use. The focus of the current study is on items that assessed alcohol-related outcomes, binge drinking, and age of drinking onset.

The alcohol-related problems were divided into three categories: school-, peer-, and family-related problems. The variables are summed scales composed of various items representing outcomes that are a result of alcohol use. Respondents read the following statement: "Has your drinking alcohol ever caused you any of the following problems?", and were asked to "mark all that apply." The school-related problems variable is composed of the following statements: "be disciplined at school," "be suspended from class," "made me late for class," "detention or be held in at school," "got into a fight at school," "made me ditch school," and "hurt my school work." The following statements compose the peer-related problems variable: "made a friend mad at me," "damaged a friendship," and "made my friends afraid of me." The family-related problems variable is composed of the following three statements:

"got into a fight with parents," "got me grounded," and "got me punished by my parents."

Binge drinking was measured by asking participants: "During the last 30 days on how many occasions did you have 5 or more drinks in a 3 to 5 hour period?" The responses range from "0" to "10 or more." The age of first intoxication variable was measured by asking the respondent the age at which he or she first got drunk, with responses ranging from "seven or younger" to "19 or older."

Assessment of Potential Sampling Bias

Bias for demographic characteristics of the sample and for estimates of outcome variables of interest can result due to the written consent procedures used for school-based surveys (Anderman et al., 1995; Dent et al., 1997). Dent and colleagues, however, found no significant bias in the report of substance use by adolescents when a sample of students for whom written consent was obtained was compared to a sample that included both adolescents who received written consent, and those for whom consent was obtained through follow-up telephone consent. The assessment of demographic characteristics indicated that fewer boys were surveyed in the written consent sample, but results showed no significant bias for Hispanics or Whites (Dent et al., 1997).

Swaim et al. (2004) performed two tests for selection bias, the first of which examined whether the distributions of gender and ethnicity for the obtained sample differed from the distributions for the population of enrolled students in the 55 schools. The gender distribution of students who completed the surveys was 44% boys and 56% girls, while the distribution of the population of enrolled students was

51% boys and 49% girls. Therefore, the sample based on written consent contained fewer boys than the percentage in the enrolled population, as was found in Dent et al. (1997). In terms of ethnicity, the percentage sampled was 60% Mexican American and 40% White, while the enrolled population was 63% Mexican American and 37% White. The 3% difference represents a small downward bias in the number of Mexican American students sampled.

The second test for bias compared the obtained sample to a nationally representative adolescent sample to determine if the limited bias in demographic characteristics affected estimates of alcohol use. Using data from the Monitoring the Future Study from the same year the current data was collected, rates of alcohol use in the last 30 days for the obtained sample were compared to those of the national sample at 8^{th}, 10^{th}, and 12^{th} grade (Johnston, O'Malley, & Bachman, 1998). Differences in percentages for rates of alcohol use in the past 30 days between the obtained sample and the nationally representative sample were 2% for 8^{th} graders, 1% for 10^{th} graders, and 1.1% for 12^{th} graders. Despite the fact that Monitoring the Future is not an ideal comparison for the current data due to the national versus regional nature, it is the best available data for the comparison for adolescent substance use. The small differences in alcohol use between the obtained data and that of the nationally representative sample show that the biases in gender and ethnicity did not affect rates of current alcohol use substantially.

Analyses

Equations were created to investigate the mediating effect of binge drinking on the relationship between age of drinking onset and each of the alcohol-related

outcomes individually (family, peer, and school). The mediated relationships were examined by grade, gender, and ethnicity. The Sobel (1982) test and the procedures for mediation outlined by Baron and Kenny (1986) were used in order to determine the significance of the indirect effect of age of drinking onset on alcohol-related outcomes via frequency of binge drinking. If binge drinking was not found to be a mediator, multiple regression models were employed in order to examine the effects of regressing each alcohol-related outcome on binge drinking behavior and age of drinking onset.

Mediation was tested using the steps proposed by Baron and Kenny (1986). In order to test for mediation, three regression equations were computed. The first step involved regressing the mediator, frequency of binge drinking, on the independent variable (IV), age of drinking onset, to determine if the IV was associated with mediator. Step two entailed determining if the IV was related to the dependent variables (DV) by regressing the alcohol-related outcomes on age of drinking onset. The third step to test for mediation involved regressing the DV on both the IV and the mediator. If all of the regression equations from steps one through three produced significant results, then mediation was present if the relationship between the IV and the DV was less in the third step compared to the second. If age of drinking onset had no relation to the alcohol-related outcomes when frequency of binge drinking was controlled, then the relationship was fully mediated. Partial mediation took place if the relation to age of drinking onset was reduced, but remained significant when frequency of binge drinking was controlled. Sobel's test

was used to measure the change in the beta weight after the mediator was included in the regression equation.

If the regression equations did not meet the criteria for mediation, the dependent variable was regressed on binge drinking and age of drinking onset in order to determine the unique effects of the independent variables. The models were specified as follows:

$$\text{School Outcomes} = b_0 + b_1 \text{ (drinking onset)} + b_2 \text{ (binge drinking)} + e$$

$$\text{Peer Outcomes} = b_0 + b_1 \text{ (drinking onset)} + b_2 \text{ (binge drinking)} + e$$

$$\text{Family Outcomes} = b_0 + b_1 \text{ (drinking onset)} + b_2 \text{ (binge drinking)} + e$$

Drinking onset was treated as a dichotomous variable and binge drinking was treated as a continuous variable in the mediation and multiple regression models. Dichotomizing age of drinking onset allows for direct comparisons between the results presented here and the findings of other research that identifies children that initiate drinking at age 12 or younger as at-risk for problems (Gruber et al, 1996, Donovan et al., 2004). The intercept for the model (b_0) represents the average level of alcohol-related outcomes for all of the participants. Each of the three models shown above was employed separately based on gender, grade, and ethnicity for those equations that did not meet the criteria for mediation.

CHAPTER III

Results

Descriptive Statistics and Correlations

Overall, the mean age at which the adolescents first got drunk was 13.7 years old (SD = 2.18), and the participants engaged in binge drinking an average of 2.50 times (SD = 2.43) in the past month. Rates of binge drinking, as well as means and standard deviations for age of drinking onset and alcohol-related outcomes are presented in Table 1. The aforementioned variables are displayed by gender, early versus later drinking onset, and ethnicity.

Correlational information for the model variables is provided in Table 2. The zero-order correlations for age of drinking onset, binge drinking behavior, and alcohol-related outcomes are presented. Zero-order correlation information for White adolescents can be found above the diagonal, while correlations below the diagonal are for Mexican American participants. The trends for significant correlations are very similar for both ethnicities, with one notable exception. Although there is a significant negative relationship between age of drinking onset and family-related outcomes of alcohol use for Mexican Americans, the correlation is not significant for White high school students.

Table 3.1

Descriptive Statistics for Model Variables by Gender, Age of Drinking Onset, and Ethnicity

Variable	Male								Female							
	Early Onset (12 or younger)				Late Onset (13-19)				Early Onset (12 or younger)				Late Onset (13-19)			
	Mexican American (N=124)		White (N=114)		Mexican American (N=396)		White (N=390)		Mexican American (N=127)		White (N=110)		Mexican American (N=519)		White (N=528)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Binge Drinking Frequency	4.13	3.28	3.19	2.89	3.04	2.80	2.53	2.40	2.89	2.66	2.64	2.68	1.93	1.69	1.98	1.94
Age First Time got Drunk	10.01	1.85	10.01	1.95	14.54	1.20	14.52	1.20	10.78	1.60	10.51	1.91	14.59	1.27	14.56	1.12
Peer Outcome	0.31	0.45	0.25	0.41	0.21	0.38	0.16	0.34	0.34	0.45	0.30	0.44	0.27	0.39	0.28	0.40
School Outcome	0.20	0.22	0.16	0.22	0.11	0.18	0.07	0.16	0.21	0.24	0.15	0.21	0.11	0.19	0.07	0.15
Family Outcome	0.26	0.44	0.21	0.42	0.21	0.40	0.19	0.39	0.37	0.49	0.36	0.52	0.25	0.44	0.28	0.47

Table 3.2

Zero-Order Correlations for Age of Drinking Onset, Binge Drinking, and Alcohol-Related Outcomes

	Grade	Age First Time Got Drunk	Binge Drinking Frequency	Peer Outcome	School Outcome	Family Outcome
Grade		0.30**	0.06*	-0.03	-0.02	-0.00
Age First Time Got Drunk	0.27**		-0.16**	-0.09**	-0.21**	-0.04
Binge Drinking Frequency	0.11**	-0.20**		0.14**	0.28**	0.15**
Peer Outcome	0.10	-0.08**	0.15**		0.31**	0.21**
School Outcome	-0.03	-0.20**	0.28**	0.29**		0.38**
Family Outcome	0.03	-0.08**	0.08**	0.08**	0.25**	

Note. Zero-order correlations for White participants can be found above the diagonal. Information below the diagonal represents zero-order correlations for Mexican Americans.
*p< .05, **p < .01.

Mediation Equations

The mediating effect of binge drinking on the relationship between age of drinking onset and alcohol-related outcomes was tested using 24 separate regression equations. Mediation was tested for each alcohol-related outcome (family, peer, and school) based on the three dichotomous variables: grade (9^{th} and 10^{th} grade versus 11^{th} and 12^{th} grade), gender, and ethnicity. Age of drinking onset was treated as a dichotomous variable in the equations: early drinking onset (reported first time drunk at age 12 or younger) and later onset drinking (reported first time drunk at age 13-19). Binge drinking frequency was treated as a continuous variable. As mentioned in the Method section, each of the alcohol-related outcome variables was summed within problem type (family, peer, and school). Due to the fact that these variables are not normally distributed, a log transformation was created for each outcome. Therefore, rather than having a dichotomous variable, a continuous variable was formed that will allow for the use of standard regression analysis, as opposed to logistic regression.

Of the 24 regression equations examined, 6 resulted in significant mediating effects. The mediating effect of binge drinking on the relationship between age of drinking onset and school-related outcomes for White males, grades 9-10 is presented in Table 3. Steps one and two of testing indicated that age of drinking onset significantly affected binge drinking ($F = 17.05, p < .001$), as well as school-related drinking outcomes ($F = 18.46, p < .001$). Regressing drinking outcomes on age of onset and binge drinking yielded significant results ($F = 32.89, p < .001$), and the effect of age of onset on school-related outcomes was reduced, but remained

Table 3.3

The Mediating Effect of Binge Drinking on the Relationship between Age of Drinking Onset and School-Related Outcomes: White Males, Grades 9-10.

	Age First Time got Drunk (Independent Variable)	Binge Drinking Frequency (Mediator)[a]	School Outcome (Dependent Variable)
Age First Time got Drunk (Independent Variable)		-0.26***	-0.27*** (-0.17***)
Binge Drinking Frequency (Mediator)	-0.26***		0.44*** (0.40***)
School Outcome (Dependent Variable)	-0.27*** (-0.17***)	0.44*** (0.40***)	

Note. Beta weights are listed for the mediation equation. Numbers in parentheses represent beta weights computed after the mediator was included in the regression equation. [a] Binge drinking frequency is a partial mediator of the relationship between age first time got drunk and school outcome, Sobel z-value = -3.50***.
***p < .001.

significant. Therefore, binge drinking partially mediated the relationship between age of drinking onset and school-related drinking outcomes for this subset of the sample.

Similarly, binge drinking was a partial mediator of the relationship between age of drinking onset and school-related outcomes for 11th and 12th grade White females. Both school-related outcomes ($F = 11.56, p < .01$) and binge drinking ($F = 11.93, p < .001$) were related independently to age of drinking onset for this group of adolescents. When binge drinking was entered into the equation after age of drinking onset ($F = 17.39, p < .001$), the association between age first drunk and school-related outcomes was significantly reduced, but the beta remained significant, thus resulting in partial mediation (Table 4).

The mediational relationships for school-related outcomes for Mexican American male high school students are presented in Tables 5 and 6. For the 9th and 10th grade males, age of drinking onset is significantly related to binge drinking ($F = 6.63, p < .05$), as well as drinking outcomes ($F = 6.40, p < .05$). Table 5 shows the association between age of drinking onset and school-related outcomes of alcohol was reduced and no longer significant when binge drinking was entered into the equation ($F = 15.37, p < .001$). Thus, binge drinking behavior fully mediated this association. Results for Mexican American males, grades 11-12, are presented in Table 6. Initial steps of mediation testing indicated that binge drinking ($F = 9.14, p < .01$) and school-related outcomes ($F = 14.72, p < .001$) were both affected by the independent variable, age of drinking onset. Binge drinking was a partial mediator of the relationship between age first drunk and school-related

Table 3.4

The Mediating Effect of Binge Drinking on the Relationship between Age of Drinking Onset and School-Related Outcomes: White Females, Grades 11-12.

	Age First Time got Drunk (Independent Variable)	Binge Drinking Frequency (Mediator)[a]	School Outcome (Dependent Variable)
Age First Time got Drunk (Independent Variable)		-0.19***	-0.18*** (-0.14*)
Binge Drinking Frequency (Mediator)	-0.19***		0.28*** (0.25***)
School Outcome (Dependent Variable)	-0.18*** (-0.14*)	0.28*** (0.25***)	

Note. Beta weights are listed for the mediation equation. Numbers in parentheses represent beta weights computed after the mediator was included in the regression equation. [a] Binge drinking frequency is a partial mediator of the relationship between age first time got drunk and school outcome, Sobel z-value = -2.80**.
*p < .05, **p < .01, *** p < .005.

Table 3.5

The Mediating Effect of Binge Drinking on the Relationship between Age of Drinking Onset and School-Related Outcomes: Mexican American Males, Grades 9-10.

	Age First Time got Drunk (Independent Variable)	Binge Drinking Frequency (Mediator)[b]	School Outcome (Dependent Variable)
Age First Time got Drunk (Independent Variable)		-0.16*	-0.16* (-0.11)
Binge Drinking Frequency (Mediator)	-0.16*		0.31*** (0.30***)
School Outcome (Dependent Variable)	-0.16* (-0.11)	0.31*** (0.30***)	

Note. Beta weights are listed for the mediation equation. Numbers in parentheses represent beta weights computed after the mediator was included in the regression equation. [b] Binge drinking frequency is a full mediator of the relationship between age first time got drunk and school outcome, Sobel z-value = -2.31*.
*p < .05, ***p < .001.

Table 3.6

The Mediating Effect of Binge Drinking on the Relationship between Age of Drinking Onset and School-Related Outcomes: Mexican American Males, Grades 11-12.

	Age First Time got Drunk (Independent Variable)	Binge Drinking Frequency (Mediator)[a]	School Outcome (Dependent Variable)
Age First Time got Drunk (Independent Variable)		-0.18**	-0.23*** (-0.17**)
Binge Drinking Frequency (Mediator)	-0.18**		0.33*** (0.30***)
School Outcome (Dependent Variable)	-0.23*** (-0.17**)	0.33*** (0.30***)	

Note. Beta weights are listed for the mediation equation. Numbers in parentheses represent beta weights computed after the mediator was included in the regression equation. [a] Binge drinking frequency is a partial mediator of the relationship between age first time got drunk and school outcome, Sobel z-value = -2.55**.
**p < .01, ***p < .001.

drinking outcomes. The association between age of drinking onset and school-related outcomes was significantly reduced, while the beta weight remained significant ($F = 21.80, p < .001$).

Binge drinking was a partial mediator of the relationship between age of drinking onset and school-related outcomes for Mexican American female high school students as well. Table 7 indicates the association between age of drinking onset and school-related outcome of alcohol was reduced, but remained significant when binge drinking was included in the equation for grades 9-10 ($F = 16.60$, $p < .001$). A reduction in beta weight for this relationship was discovered for the 11^{th} and 12^{th} grade females' model as well ($F = 18.06, p < .001$), presented in Table 8. Therefore, for Mexican American females, the strength of the relationship between age first drunk and school-related drinking outcomes was lessened when binge drinking was included in the model.

Multiple Regression Equations

Results for the multiple regression models are presented in Tables 9-16. The Relationship between age of drinking onset and binge drinking behavior on peer- and family-related outcomes of drinking for 9^{th} and 10^{th} grade, White males are presented in Table 9. The peer-related outcomes ($F = 4.88, p < .01$) and family-related outcomes ($F = 12.66, p < .01$) models were significant. Results indicate that the rates of both types of alcohol-related outcomes were higher when age of drinking onset was age 12 or younger (as compared to 13 or older), and binge drinking levels increased. The proportion of variance in peer-related outcomes explained through the model was 4.1%, while age of onset and binge drinking explained

Table 3.7

The Mediating Effect of Binge Drinking on the Relationship between Age of Drinking Onset and School-Related Outcomes: Mexican American Females, Grades 9-10.

	Age First Time got Drunk (Independent Variable)	Binge Drinking Frequency (Mediator)[a]	School Outcome (Dependent Variable)
Age First Time got Drunk (Independent Variable)		-0.17**	-0.15** (-0.11*)
Binge Drinking Frequency (Mediator)	-0.17**		0.28*** (0.26***)
School Outcome (Dependent Variable)	-0.15** (-0.11*)	0.28*** (0.26***)	

Note. Beta weights are listed for the mediation equation. Numbers in parentheses represent beta weights computed after the mediator was included in the regression equation. [a] Binge drinking frequency is a partial mediator of the relationship between age first time got drunk and school outcome, Sobel z-value = -2.71**.
*p < .05, **p < .01, ***p < .001.

Table 3.8

The Mediating Effect of Binge Drinking on the Relationship between Age of Drinking Onset and School-Related Outcomes: Mexican American Females, Grades 11-12.

	Age First Time got Drunk (Independent Variable)	Binge Drinking Frequency (Mediator)[a]	School Outcome (Dependent Variable)
Age First Time got Drunk (Independent Variable)		-0.23***	-0.26*** (-0.22***)
Binge Drinking Frequency (Mediator)	-0.23***		0.24*** (0.19***)
School Outcome (Dependent Variable)	-0.26*** (-0.22***)	0.24*** (0.19***)	

Note. Beta weights are listed for the mediation equation. Numbers in parentheses represent beta weights computed after the mediator was included in the regression equation. [a] Binge drinking frequency is a partial mediator of the relationship between age first time got drunk and school outcome, Sobel z-value = -2.78**.
**p < .01, ***p < .001.

Table 3.9

Multiple Regression Table for the Effects of Age of Drinking Onset and Binge Drinking Behavior on Alcohol-Related Outcomes for White Males, Grades 9-10 (N = 232).

Variable	Peer-Related Outcomes** $R^2 = .041$		Family-Related Outcomes** $R^2 = .100$	
	B	*SE B*	*B*	*SE B*
Intercept (b_0)	0.19**	(0.05)	0.08	(0.17)
Drinking Onset (b_1)	-0.08	(0.05)	-0.03	(0.06)
Binge Drinking (b_2)	0.02*	(0.01)	0.05**	(0.01)

* $p < .05$, ** $p < .01$.

10.0% of the variance in the family-related outcomes.

Table 10 demonstrates that for White males in grades 11-12, the multiple regression models for peer-related ($F = 1.38, p = 0.253$) and family-related ($F = 0.90, p = 0.41$) outcomes are not significant. The school-related outcomes model, however, was significant ($F = 10.46, p < .01$), indicating that early drinking onset and increasing frequency of binge drinking behavior were associated with higher levels of fighting with parents, as well as being grounded and punished by parents. The variables explained 7.2% of the variance in school-related outcomes of drinking for this particular group.

All three multiple regression models examined for White females, grades 9-10 were significant. The family-related outcomes ($F = 4.93, p < .01, R^2 = 0.031$) and school-related outcomes ($F = 9.72, p < .01, R^2 = 0.060$) models yielded results consistent with hypotheses, showing increased levels of alcohol-related outcomes for early onset drinkers, and increasing frequency of binge drinking (Table 11). The peer-related outcomes model ($F = 5.88, p < .01, R^2 = 0.037$), however, indicated that levels of drinking outcomes increased with higher levels of binge drinking and later onset drinking.

Peer-related ($F = 7.15, p < .01$) and family-related ($F = 5.39, p < .01$) outcomes models were found to be significant for 11^{th} and 12^{th} grade, White females. The variance in drinking related outcomes explained by these models was 4.2% and 3.2%, respectively. Table 12 shows the age of drinking onset and binge drinking coefficients associated with each model. Similar to the results found for the White

Table 3.10

Multiple Regression Table for the Effects of Age of Drinking Onset and Binge Drinking Behavior on Alcohol-Related Outcomes for White Males, Grades 11-12 (N = 272).

Variable	Peer-Related Outcomes		Family-Related Outcomes		School-Related Outcomes** $R^2 = .072$	
	B	*SE B*	*B*	*SE B*	*B*	*SE B*
Intercept (b_0)	0.21**	(0.06)	0.18	(0.06)	0.10**	(0.03)
Drinking Onset (b_1)	-0.07	(0.06)	0.06	(0.07)	-0.07**	(0.03)
Binge Drinking (b_2)	0.01	(0.01)	0.01	(0.01)	0.01**	(0.00)

* p<.05, **p<.01.

Table 3.11

Multiple Regression Table for the Effects of Age of Drinking Onset and Binge Drinking Behavior on Alcohol-Related Outcomes for White Females, Grades 9-10 (N = 306).

Variable	Peer-Related Outcomes** $R^2 = .037$		Family-Related Outcomes** $R^2 = .031$		School-Related Outcomes** $R^2 = .060$	
	B	*SE B*	*B*	*SE B*	*B*	*SE B*
Intercept (b_0)	0.22**	(0.06)	0.24**	(0.06)	0.10**	(0.02)
Drinking Onset (b_1)	0.01	(0.06)	-0.03	(0.06)	-0.06**	(0.02)
Binge Drinking (b_2)	0.04**	(0.01)	0.04**	(0.01)	0.02**	(0.01)

* p<.05, **p<.01.

Table 3.12

Multiple Regression Table for the Effects of Age of Drinking Onset and Binge Drinking Behavior on Alcohol-Related Outcomes for White Females, Grades 11-12 (N = 332).

Variable	Peer-Related Outcomes** $R^2 = .042$		Family-Related Outcomes** $R^2 = .032$	
	B	*SE B*	*B*	*SE B*
Intercept (b_0)	0.14*	(0.07)	0.28**	(0.09)
Drinking Onset (b_1)	0.04	(0.07)	-0.08	(0.09)
Binge Drinking (b_2)	0.04**	(0.01)	0.04**	(0.01)

* $p < .05$, ** $p < .01$.

females in 9th and 10th grade, the models indicated a higher level of family-related drinking outcomes for early onset drinkers and higher binge drinking levels, but later onset drinking and higher frequencies of binge drinking were associated with higher levels of peer-related outcomes of alcohol use.

The results of the peer-related outcomes equations for 9th and 10th, as well as 11th and 12th grade females indicate higher levels of alcohol-related outcomes for later onset drinkers. The results of these two equations, however, should not be interpreted due to a suppression effect. The age of drinking onset coefficients in the multiple regression equations were positive therefore suggesting higher levels of peer-related outcomes for adolescents who began drinking after 12 years of age. However, the zero-order correlations for the age of drinking onset and peer-related outcomes variables were in the negative direction for all White female high school students. Therefore, it would not be prudent to interpret the results of the peer-related outcomes equations for White females.

The results for the multiple regression models examining 9th and 10th grade as well as 11th and 12th grade Mexican American males are presented in Tables 13-14. For both groups, peer-related drinking outcomes models were significant, while the family-related outcomes models were not significant. The ANOVA results for Mexican American males, grades 9-10 are as follows: peer-related outcomes ($F = 13.15, p < .01$) and family-related outcomes ($F = 0.647, p = 0.524$). The peer-related outcomes model showed that 9.6% of the drinking outcomes associated with peers were explained by age of drinking onset and binge drinking behavior.

Table 3.13

Multiple Regression Table for the Effects of Age of Drinking Onset and Binge Drinking Behavior on Alcohol-Related Outcomes for Mexican American Males, Grades 9-10 (N = 251).

Variable	Peer-Related Outcomes** $R^2 = .096$		Family-Related Outcomes	
	B	*SE B*	*B*	*SE B*
Intercept (b_0)	0.13*	(0.05)	0.19**	(0.06)
Drinking Onset (b_1)	-0.06	(0.05)	-0.01	(0.06)
Binge Drinking (b_2)	0.04**	(0.01)	0.01	(0.01)

* $p < .05$, ** $p < .01$.

Table 3.14

Multiple Regression Table for the Effects of Age of Drinking Onset and Binge Drinking Behavior on Alcohol-Related Outcomes for Mexican American Males, Grades 11-12 (N = 269).

Variable	Peer-Related Outcomes** $R^2 = .031$		Family-Related Outcomes	
	B	*SE B*	*B*	*SE B*
Intercept (b_0)	0.27**	(0.07)	0.23**	(0.07)
Drinking Onset (b_1)	-0.09	(0.06)	-0.07	(0.06)
Binge Drinking (b_2)	0.02*	(0.01)	0.01	(0.01)

* $p < .05$, ** $p < .01$.

Mexican American males, grades 11-12 ANOVA results are: peer-related outcomes ($F = 4.29, p < .01, R^2 = 0.031$) and family-related outcomes ($F = 1.91, p = 0.151$).

Finally, multiple regression models were computed for Mexican American females as well. Table 15 shows that levels of family-related outcomes ($F = 6.34$, $p < .01$, $R^2 = 0.037$) of drinking are higher when early onset drinking and higher frequencies of binge drinking were involved for Mexican American females in 9th and 10th grade. The model examining peer-related outcomes was not significant for this group ($F = 2.48, p = 0.085$). For 11th and 12th grade Mexican American females, peer-related ($F = 3.83, p < .05$) and family-related ($F = 3.33, p < .05$) outcomes models were both significant, and the proportions of variance were 2.4% and 2.1%, respectively (Table 16). Early onset drinking and higher frequencies of binge drinking were associated with higher levels of drinking outcomes for both models for this group.

Table 3.15

Multiple Regression Table for the Effects of Age of Drinking Onset and Binge Drinking Behavior on Alcohol-Related Outcomes for Mexican American Females, Grades 9-10 (N = 333).

Variable	Peer-Related Outcomes		Family-Related Outcomes** $R^2 = .037$	
	B	*SE B*	*B*	*SE B*
Intercept (b_0)	0.32**	(0.06)	0.34**	(0.06)
Drinking Onset (b_1)	-0.08	(0.05)	-0.17**	(0.06)
Binge Drinking (b_2)	0.02	(0.01)	0.02	(0.01)

* $p < .05$, ** $p < .01$.

Table 3.16

Multiple Regression Table for the Effects of Age of Drinking Onset and Binge Drinking Behavior on Alcohol-Related Outcomes for Mexican American Females, Grades 11-12 (N = 313).

Variable	Peer-Related Outcomes* $R^2 = .024$		Family-Related Outcomes* $R^2 = .021$	
	B	*SE B*	*B*	*SE B*
Intercept (b_0)	0.21**	(0.07)	0.23**	(0.08)
Drinking Onset (b_1)	-0.01	(0.06)	-0.02	(0.07)
Binge Drinking (b_2)	0.03**	(0.01)	0.04**	(0.02)

* $p < .05$, ** $p < .01$.

CHAPTER IV

Discussion

The findings of this study indicate that binge drinking and age of drinking onset are factors to consider when investigating peer-, school-, and family-related outcomes of alcohol use in adolescents. Importantly, the gender, grade, and ethnicity of the high school students should be considered when examining drinking related outcomes, as results were different for each demographic group. Binge drinking behavior was found to mediate the relationship between age first drunk and school-related outcomes for some of the demographic groups, but the mediating effects of binge drinking were not found for the equations involving peer- and family-related drinking outcomes. However, the associations discovered between age first drunk, binge drinking, and alcohol-related outcomes for all the demographic groups provide valuable insight into adolescent drinking behavior. These findings suggest that when developing prevention and treatment efforts, it is crucial to consider not only age of drinking onset and binge drinking behavior, but gender, ethnicity, and grade level as well.

Mediation Equations

Several aspects of the results of this study deserve comment. First of all, it was hypothesized that binge drinking behavior mediates the relationship between age of drinking onset and all three types of alcohol-related outcomes. Results, however, indicate that mediation only took place for school-related outcomes, and was limited to 6 of the 8 demographic groups. Mediation was significant for all Mexican

American high school students in the study, along with 9th and 10th grade White males, as well as 11th and 12th grade White females.

Overall, the significant findings of the mediation equations point to the fact that the strength of the relationship between early drinking onset and school-related outcomes is lessened, or does not exist without higher levels of binge drinking behavior. The only groups for which the mediating effect of binge drinking on school-related outcomes was not found are White females in 9th and 10th grade and White males in 11th and 12th grade. The absence of mediation for these two demographic groups indicates there is a relationship between early drinking onset and school-related outcomes independent of frequency of binge drinking.

The relationship between age of drinking onset and school-related outcomes was dependent on higher levels of binge drinking for all Mexican Americans, and most White high school students in the study. The reason why binge drinking did not mediate the relationship for younger White female and older White male high school students deserves explanation. It appears that there is a direct relationship between age first drunk and school-related outcomes, and therefore, other factors may mediate this relationship. One plausible alternative mediating factor may be frequency of alcohol use, as opposed to binge drinking behavior. Swaim et al. (2004) found that White high school students reported a higher frequency of alcohol use, except in the binge drinking category, where Mexican American males and females reported higher levels of binge drinking. Additionally, among younger students, girls report higher levels of alcohol use than boys (Swaim et al.). Therefore, frequency of alcohol use,

rather than binge drinking behavior, may be a factor to consider when examining school-related outcomes for White adolescents.

Another possible explanation for the lack of a significant mediating effect of binge drinking for White students may be explained by the results of Gruber et al. (1996). Their study, which examined only White high school students, found that early drinking onset is directly associated with higher levels of absence from school for both males and females. This finding supports a direct, unmediated correlation between early drinking onset and school-related outcomes. It is possible that frequent absence from school, and other drinking-related problems, may be present without high frequencies of binge drinking for some early onset drinking White high school students. Future research inquiry should examine whether there are differences by ethnicity in a variety of school-related outcomes of alcohol use for early onset drinkers.

The lack of a mediating effect of binge drinking in the peer- and family-related drinking outcomes equations may be explained by considering the nature of drinking onset for the different demographic groups. This can be accomplished by taking a look at the findings of the multiple regression equations when mediation was not found. These results show that the strength of the relationship between early drinking onset and peer- and family-related problems exists without the presence of high levels of binge drinking.

Multiple Regression Equations

Multiple regression models were computed for the different demographic groups where mediation was not discovered, yielding important information about the relationship between age of drinking onset and binge drinking behavior for adolescents. First of all, although binge drinking did not mediate the relationship between age first drunk and peer- and family-related outcomes of drinking for White males in grades 9-10, the multiple regression models indicated significant effects of the variables on drinking outcomes. For this group, early drinking onset and higher levels of binge drinking were associated with a higher level of peer- and family-related outcomes, as hypothesized.

The case was not the same, however, for 11th and 12th grade White males. Results showed that higher levels of binging and early drinking onset were associated with school-related outcomes, but the equations were not significant for peer- and family-outcomes of drinking. Although mediation was not found for the school-related outcomes of drinking model for this demographic group, both early onset drinking and higher levels of binge drinking are significantly associated with school-related outcomes of drinking, as expected. The model including age of drinking onset and binge drinking is not significant for family- and peer-related alcohol use outcomes, and other factors, therefore, must be considered.

As mentioned previously, it is possible that for 11th and 12th grade White males, higher frequency of alcohol use may be a more important factor in alcohol-related outcomes for this population. Additionally, older White males may have more experience with drinking, and therefore may be more accustomed to controlling

behavior while drinking and reducing harmful interpersonal outcomes of alcohol use. As a result, they may not encounter as many negative outcomes of drinking with family and friends. Also, it is possible that these White males in their late high school years may experience less parental monitoring, thus experiencing fewer family-related outcomes of drinking. Furthermore, Barnes et al. (2002) reported that White adolescents had a lower overall level of self-reported delinquency behaviors compared to other ethnicities. A lower level of self-reporting of alcohol-related problems for the White adolescents may have had an effect on the results of this study as well.

The results of the drinking outcomes models for White female high school students also deserve comment. Models for all three types of drinking outcomes were found to be significant for 9th and 10th grade White females. The effects of age first drunk and binge drinking on family- and school-outcomes equations were in line with hypotheses. Additionally, the family-related outcomes model for 11th and 12th grade White females was significant and as expected, more alcohol-related family problems were associated with early drinking onset and higher levels of binge drinking. The peer-related outcomes models were also significant for both groups of White females. The equations cannot be interpreted, however, as suppression effects were evident.

The findings related to Mexican American males were the same across all grade levels. One important aspect of this group to note is the fact that early onset drinking and higher levels of binge drinking were found to be related to higher levels of peer-related outcomes, but the models were not significant for family-related outcomes. Age first drunk and binge drinking behavior influence peer-related

outcomes for Mexican American male high school students, but factors explaining family-related outcomes remain unclear.

The relationship between these variables for Mexican American females, unlike the males, differs across grade levels. Results indicate that higher levels of binging and early onset drinking are associated with higher levels of family-related outcomes for all Mexican American female adolescents in the study. However, the multiple regression model was significant for alcohol use outcomes involving peers for 11th and 12th grade females, but not those in 9th and 10th grade. The findings for Mexican American adolescents are noteworthy for two reasons. First of all, age of drinking onset and current level of binge drinking significantly affect the variability in family-related outcomes for Mexican American females, but not for males. Second, Mexican American participants reporting early onset and higher levels of binge drinking reported higher levels of peer-related outcomes regardless of gender or grade, with the exception of Mexican American females in 9th and 10th grade.

Mexican American male high school students are not experiencing family-related outcomes of drinking based on age of drinking onset and binge drinking behavior. Similar to 11th and 12th grade White males, the lack of significant findings for Mexican American males may be due to excluding factors such as frequency of alcohol use in the equation. Other factors, however, may be involved. The fact that Mexican American females, but not males, are experiencing family-related outcomes indicates that there may be different gender expectations for age of drinking onset and binge drinking behavior. Peer and parental acceptance of alcohol use for Mexican

Americans may be more prevalent for males than females, thus reducing the likelihood that these adolescent males will encounter or report problems.

Additionally, peer-related outcomes for Mexican American females in 9th and 10th grade are not explained by age of drinking onset and binge drinking behavior. This is particularly surprising because younger Mexican American females report higher levels of binge drinking than their White counterparts in early high school. Also, Mexican American females report higher levels of alcohol use in earlier high school years as opposed to later high school years (Swaim et al., 2004). Therefore, the nonsignificant results for the peer-related outcomes equations may be due to peer acceptance of alcohol use, or minimization of problem behavior related to drinking for Mexican American females in the early high school years.

Limitations of the Study

Significant mediating effects of binge drinking were found when examining the relationship between age of drinking onset and alcohol-related outcomes. In addition, many significant associations were found between age first drunk, binge drinking, and drinking outcomes. Some aspects of this study, however, could be noted as possible limitations. First of all, the findings reported here are based on retrospective data, and represent a cross-section of the adolescents' alcohol-related behaviors. Inferring causal components of binge drinking behavior and age of drinking onset are beyond the scope of this research due to the cross-sectional nature of the data, and associations between variables are correlational in nature only. Additionally, because the adolescents participating in the survey were asked to recall information regarding past alcohol use behaviors, the self-report of the participants

may not be accurate in some cases. In order to mitigate these limitations, future investigations regarding alcohol use behaviors should be longitudinal in nature, periodically tracking adolescents' current behaviors from late elementary school years through the latter teenage years.

Another limitation to note is the discrepancy in sample size between early onset versus later onset drinkers. The current study treated age first drunk as a dichotomous variable in order to create distinct groups of adolescent drinkers as opposed to examining age of onset as a continuous variable. As mentioned in the methods section, this allows for direct comparisons between the results presented here and the findings of other research that have identified initiating drinking at age 12 or younger as problematic (Gruber et al, 1996, Donovan et al., 2004). However, due to the smaller number of early versus later onset drinkers, dichotomizing age of onset limits the reliability of the associations, and may hinder the detection of statistical associations as well. Future studies could improve upon this limitation by obtaining a larger sample of participants that initiate drinking at age 12 or younger. This could be accomplished by gathering survey data from adolescents in settings other than high schools, such as residential treatment placements, as well as juvenile detention and correctional facilities.

The results of the current study are limited in terms of generalizability as well. The survey participants examined in the study were Mexican American and non-Hispanic White high school students from southwestern states. Caution should be used when generalizing these findings, as the application of the results to adolescents of other ethnicities, or to Mexican American and White high school students in other

regions of the country should be done with careful discretion. Research focusing on alcohol-related outcomes, binge drinking, and age of drinking onset in different regions of the United States, including different ethnic groups, would give a broader and deeper scope to these findings.

Implication and Conclusions

Findings of the study reiterate the importance of targeting age of drinking onset and binge drinking behavior when attempting to curb adverse outcomes of adolescent drinking. When developing interventions to reduce the frequency of alcohol-related outcomes, it is crucial to recognize the unique effects of these variables on the different types of outcomes of drinking. In addition, interventions should be tailored based on ethnicity, gender, and grade of the high school students in order to maximize efficacy. Furthermore, the impact of age of drinking onset and binge drinking frequency is different depending on the type of alcohol-related outcome the demographic group, which should be considered when creating and implementing alcohol-related programs.

For example, the mediation equations show that higher levels of binge drinking have a greater impact on school-related outcomes than age of drinking onset. This highlights the tremendous importance of targeting the reduction of binge drinking levels in order to reduce the prevalence of school disciplinary and academic problems for adolescent drinkers. The findings of the multiple regression equations support the reduction of binge drinking, as well as delaying the onset of alcohol use in adolescents to after 12 years of age. Alcohol use education and intervention curricula may benefit from focusing on the fact that there is a potential for relationship

problems with family and friends when adolescents begin drinking at age 12 or younger and binge drink often. Also, alcohol use prevention and psychoeducational efforts should begin as early as the latter grades of elementary school in order that children are made aware of the potential social and interpersonal effects of drinking before they are exposed to alcohol use opportunities.

Although the mediation and multiple regression equations provide valuable information regarding alcohol-related outcomes in adolescence, age of drinking onset and binge drinking behavior are responsible for small percentages of the variance in peer-, school-, and family-related outcomes. Therefore, future research, prevention, and treatment efforts should also target other variables in order to increase the programs' efficacy. For example, other influences on alcohol-related outcomes, such as frequency of alcohol use as opposed to binge drinking behavior, peer use behaviors, as well as peer and family acceptance of drinking, should be investigated.

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