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An Investigation of the Relationships between Violence Exposure, Internalizing and
Externalizing Problems, and Adolescent Alcohol Use

by

Gregory Lloyd Forehand

A dissertation submitted in partial fulfillment of the
requirements for the degree of

Doctor of Philosophy
in
Social Work and Social Research

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ABSTRACT

Adolescent Alcohol Use (AAU) is widespread and potentially harmful to the health of youth. Substantial research and theoretical development suggest that both violence exposure and internalizing and externalizing problems of adolescents are associated with AAU. The primary purpose of this study was to examine the roles of internalizing and externalizing problems in adolescents to determine if the two types of symptoms are differential mediators of the link between violence exposure and AAU for females and males. Using Developmental Systems Theory as a framework, three primary hypotheses were examined: 1) Increased violence exposure at home and in the community are associated with increased AAU in both females and in males; 2) Internalizing problems mediate the relationship between home/community violence exposure and AAU for females; and 3) Externalizing problems mediate the relationship between home/community violence exposure and AAU for males.

The secondary dataset that was utilized to test the hypotheses is a product of the 1995 National Survey of Adolescents in the United States. It includes a national probability sample of 3,161 adolescents and a probability oversample of 862 adolescents residing in urban areas for a total of 4,023 adolescents between the ages of 12 and 17. The data were collected by telephone interviews with the adolescents.

The findings indicated that, for the most part, witnessing and experiencing physical and sexual violence across home and community contexts were associated with increased levels of AAU for both females and males. Internalizing problems mediated the relationship between sexual abuse and AAU for both females and males. Externalizing problems did not mediate the relationship between violence exposure and AAU for males

or females. The findings suggest that internalizing and externalizing problems may play similar roles in females and males.

The findings also indicated that home violence exposure accounts for unique variance in AAU beyond community violence exposure, but that community and home violence exposure do not interact to contribute to the highest level of AAU. Both number of different types of sexual victimization and number of different types of physical victimization at home were related to AAU.

Implications for social work are discussed. The primary implication for Development Systems Theory is that differential pathways for females and males from environmental stress, in particular violence exposure, to increases in AAU may not be needed. Social work programs aimed at preventing and intervening in AAU should include components that address not only the use itself, but also the level of violence the adolescent has been exposed to, as well as any internalizing problems the adolescent may be experiencing. Future research should continue to examine how risk factors operate to influence AAU.

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Chapter 1

Introduction

Alcohol use in our society is widespread and potentially harmful to the health of both youth and adults. In an analysis of data from the 2001 National Household Survey on Drug Abuse, which draws from a sample representing over 98% of the United States population, Kandel and Yamaguchi (2002) found that the lifetime prevalence of alcohol use was almost 90% for 18 to 40 year olds. Using the same survey, Roy and Ksir (1999) found over 60% in this age group used alcohol in the past 30 days. These data indicate that a great majority of Americans have used alcohol and most continue to use alcohol.

Of more concern, 24% of the United States population report symptomology that qualifies them for an abuse or dependence diagnosis at some point during their lives (Kessler et al., 1997). Furthermore, among the substance abuse disorders, alcohol use disorders (AUDs) are most common (Kessler et al., 1997). Alcohol abuse is associated with substantial health risks, including other substance use, suicide attempts, motor-vehicle accidents, and illness (DeAngelis, 2004; Kandel, 2002).

Despite the fact that its use in this country is legally prohibited prior to 21 years of age, experimentation with alcohol usually begins during adolescence (Johnston et al., 2006; Roy & Ksir, 1999). In addition, behavioral patterns of abuse and dependence typically emerge during this developmental stage and are associated with abuse and dependence as an adult (Chassin, Pitts, & Prost, 2002). Therefore, social work efforts aimed at preventing AUDs should begin with a complete understanding of the factors associated with adolescent alcohol use (AAU).

In this paper, I provide a thorough examination of AAU and, in particular, its relationships with exposure to violence in the family and in the community (neighborhood and school) and with adolescent internalizing problems (problems with internal states, such as depression and anxiety) and externalizing problems (problems that disrupt the environment, such as fighting and stealing). Based on a review of the literature, I conducted a study examining the association of violence exposure in home and community and AAU and the roles of adolescent internalizing and externalizing problems as mediators. There is evidence of an association between witnessing violence or being victimized (both physically and sexually) and AAU (there are 24 studies cited in Table 1 that support this association). However, the nature of this association is not well understood; adolescent internalizing problems may be the mechanism that explains the association for females and adolescent externalizing problems may be the mechanism that explains the association for males.

In addition to examining the association of violence exposure to AAU and examining two mechanisms to explain the relationship, I also examined the individual, additive, and interactional contributions of community (school and neighborhood) and home violence to AAU. My primary interest in this analysis was home violence and how it contributes to AAU beyond community violence and in combination with community violence. In addition, the contributions of each type of home violence exposure to AAU were examined.

I initially synthesize the existing literature on AAU. Specifically, I discuss the conceptualization, operationalization, and prevalence of AAU, as well as differences in use by age, gender, ethnicity, and geographic location. I also discuss the correlates of

AAU from a multisystems risk and resilience perspective (Fraser, 1997) and review programs that have proven to be effective for AAU prevention and intervention. This review is also organized within Fraser's (1997) multisystems framework. I next present existing theories of AAU and the empirical support for these theories, with a focus on developmental systems theory (Zucker, 1994). In summary, the correlates of, prevention and intervention efforts with, and theories for AAU are all organized within the same multisystems framework in order to provide a consistent platform from which to examine these aspects of AAU.

I then focus on one correlate of AAU: Violence exposure. I provide a section on the prevalence of violence exposure in the home and community (school and neighborhood). I then examine the relationship of violence exposure to AAU. I next turn to adolescent internalizing problems as a mediator of this relationship and develop the case for an association between violence exposure and internalizing problems and between internalizing problems and AAU. I present theoretical viewpoints for why internalizing problems may be a mediator of the violence exposure – AAU link and delineate why this is primarily expected for female adolescents. I then turn to adolescent externalizing problems as a mediator for males and develop the case for an association between violence exposure and externalizing problems and externalizing problems and AAU. I present theoretical viewpoints for why externalizing problems may be a mediator primarily for males. In all of these areas, as I have noted, I not only review the relevant literature but also consider relevant theoretical perspectives that explain the proposed links among the variables being examined. Next, I present my hypotheses and outline the methodology I utilized to test them. Finally, the results are described followed by a

discussion of the results and their implications for social work practice, policy, and research.

Chapter 2

Review of Adolescent Alcohol Use Literature

Conceptualization

AAU is typically conceptualized in the existing literature on youth as the consumption of alcohol-containing products by a person who is between the ages of 12 and 18. However, because some experimentation during this age is common (Johnston et al., 2003) and is not necessarily associated with negative outcomes, social workers are usually more concerned with adolescents who are at risk for, or who have developed, an AUD.

The existing AUDs are dependence and abuse. Dependence is conceptualized as a cluster of cognitive, behavioral, and physiological symptoms indicating that the individual continues use of alcohol despite significant substance-related problems. Abuse is conceptualized as a maladaptive pattern of alcohol use manifested by recurrent and significant adverse consequences of use (e.g., failure to fulfill major role obligations and legal or personal problems). Although abuse is considered to be less serious than dependence, it may lead to dependence (American Psychiatric Association, 2000).

Alcohol intoxication usually precedes abuse and dependence. Intoxication is conceptualized as the “presence of clinically significant maladaptive behavioral or psychological changes (e.g., inappropriate sexual or aggressive behavior, mood lability, impaired judgment, and impaired social or occupational functioning) that develop during, or shortly after, the ingestion of alcohol” (American Psychiatric Association, 2000, p. 214). The severity of intoxication depends largely, among other factors, on the level of

the dose and the duration of dosing. Generally speaking, the more alcohol consumed within a given period of time, the more intoxicated an adolescent will become.

In this paper, I conceptualize AAU as any alcohol use by an individual between the ages of 12 and 18. Research suggests that any alcohol use during adolescence is a risk factor for later alcohol problems (Grant & Dawson, 1997). Furthermore, because use precedes intoxication, and intoxication most often precedes abuse and dependence, it follows that any use places an adolescent at risk for the development of an AUD. However, in any given case, there are many variables (e.g., family SES or parent drinking behavior) other than simply consuming alcohol that may affect whether an AUD develops.

Operationalization

AAU has primarily been operationalized in the existing literature through self-report surveys. Typical survey items include: Ever had a drink of alcohol; had a drink of alcohol in the last year; had a drink of alcohol in the last 30 days; ever been drunk; and ever had five or more drinks on one occasion (Grunbaum et al., 2002; Johnson et al., 2003). These items measure level of use in terms of lifetime incidence, how recent the use was, and the amount of alcohol consumed.

Less common operational definitions of AAU have occurred through parent surveys or contact with law enforcement due to alcohol use. Similar to adolescent self-report surveys, parent surveys usually include items that measure use in terms of how recent the use was and the amount used. Contact with law enforcement most often includes whether or not an adolescent has been arrested for alcohol use or the number of arrests for alcohol-related offenses.

Adolescents have been found to be valid and reliable reporters of their own alcohol use (Brown & Zimmerman, 2004; Lintoneni, Ahlstrom, & Metso, 2004). In addition, adolescent self-report surveys are considered to be more valid and reliable than parent surveys or contact with law enforcement due to alcohol use. Because AAU is usually discouraged by parents and is illegal, adolescents may attempt to conceal their use from parents and law enforcement agents. As a result, parents and law enforcement agencies are likely to underestimate the rate of AAU (Cantwell, Lewishon, Rohde, & Seeley, 1997).

Prevalence

The Youth Risk Behavior Survey (YRBS; Centers for Disease Control, 2009a) monitors priority health risks, including AAU, in youth across the United States. It has been conducted every two years since 1991 and yields representative data of 9th through 12th grade students in the nation. The survey results indicate a decline in the percentage of AAU from 1991 to 2009, with 81.6% of adolescents reporting that they had at least one drink of alcohol in their lifetime in 1991 compared to 72.5% in 2009 and 50.8% reporting that they had at least one drink of alcohol in the last 30 days in 1991 compared to 41.8% in 2009. Alcohol abuse among adolescents increased slightly from 1991 to 1997, with 31.3% reported having had five or more drinks within a couple of hours in the last month in 1991 compared to 33.4% in 1997. However, from 1997 to 2009, the percentage of adolescents who reported having five or more drinks steadily declined to 24.2%. On another indicator of alcohol abuse, having had at least one drink of alcohol on school property in the past 30 days, the percentage reporting that they had engaged in this behavior remained at approximately 5% from 1991 to 2009.

Despite the decreases in AAU that were found, the results of the YRBS indicate that there is substantial use and abuse of alcohol by adolescents. The finding that approximately one out of every four adolescents surveyed in 2009 had had five or more drinks within a couple of hours in the last month is alarming. Of perhaps more concern, almost 10% of the adolescents surveyed indicated that they had driven a car or other vehicle one or more times when they had been drinking alcohol in the past thirty days (Centers for Disease Control, 2009b).

Two older nationally representative surveys of adolescents in the United States found similar substantial levels of AAU. Grunbaum and colleagues (2002) found that almost 80% of high school students had a drink of alcohol by 12th grade, and that over one-half had had a drink in the past 30 days. Furthermore, 60% of high school students reported having been drunk at some point in their lifetime, and almost 30% reported having had five or more drinks on one occasion in the past 30 days. Finally, Johnston and colleagues (2006) found that 40% of high school students indicated they first had a drink of alcohol before entering high school.

Differences in use by age, gender, ethnicity, and geographic location

AAU appears to vary by age, gender, ethnicity, and geographic location. On all indicators of alcohol use, older adolescents use more than younger adolescents (Centers for Disease Control and Prevention, 2009b; Grunbaum et al., 2002; Johnston et al., 2003, 2006). Jessor and colleagues (1991) have suggested that older adolescents consume more alcohol because they perceive its use as a rite of passage into adulthood. Older adolescents may also be exposed to more alcohol use in social situations than younger adolescents and, as a result, may have more opportunities to drink.

Male adolescents have been found to use more alcohol than female adolescents (Centers for Disease Control and Prevention, 2009b; Grunbaum et al., 2002; Johnston et al., 2003; Maggs, Patrick, & Feinstein, 2008) and to have more incidents of drunk driving than females (Grunbaum et al., 2002). Male adolescents may use and abuse alcohol more than female adolescents because of differences in drinking norms for males and females. Males are also more likely to engage in risky behaviors than females (Centers for Disease Control and Prevention, 2009b; Clubb et al., 2001; Dryfoos, 1990; Pleck & O'Donnell, 2001). Furthermore, boys typically exhibit more externalizing problems than girls (American Psychiatric Association, 2000), and externalizing problems in childhood are associated with alcohol abuse as an adolescent (Glantz, Weinberg, Miner, & Collwer, 1999; Laukkanen, Shemeikka, Vünamäki, Polkki, & Lehtonen, 2001).

There are only a handful of studies that have examined the link between ethnicity and AAU, and these studies have not included information on mixed ethnicity adolescents. From the available evidence, it appears that White adolescents use more alcohol, and use more frequently, than Hispanic adolescents, and that Hispanic adolescents use more alcohol, and use more frequently, than Black adolescents (Centers for Disease Control and Prevention, 2009b; Stuart & Power, 2003). Although it is unclear why Hispanic adolescents report more use than Black adolescents, it may be that White adolescents drink more than Hispanic and Black adolescents because White adolescents on average have more financial resources to purchase alcohol (DeNavas-Walt, Proctor, & Mills, 2003).

Other evidence indicates that Native American adolescents consume alcohol at higher levels than adolescents from all other ethnic groups (Institute of Medicine, 1990;

Potthoff et al., 1998). Native American adolescents are exposed to high levels of alcohol use, which may account for the high rate of AAU in this ethnic group. O'Neill and Mitchell (1996) found that Native American adolescents live in the context of high rates of alcohol problems among adults and peer social environments that revolve around alcohol use.

Geographic location is also associated with AAU. For example, adolescents in Utah, North Carolina, and Massachusetts report current alcohol use of 17.9%, 38.2%, and 53%, respectively (Roy & Ksir, 1999). According to Roy and Ksir (1999), it may be that differences across states may exist because of differences in norms about drinking (e.g., percentage of fundamentalist or Mormon Church members and number of liquor outlets per capita) and stress levels as inferred from the crime rate and number of business failures and divorces.

In summary, any consumption of alcohol places an adolescent at risk for developing an AUD. Yet adolescents are experimenting with alcohol at an early age and a significant proportion are engaging in frequent and multiple use. However, this use does not appear to be uniform across age, gender, ethnicity, or geographic location.

Risk and Protective Factors for AAU

The risk and protective factors of AAU are delineated in Tables 1 and 2, respectively. Included next to each risk and protective factor is the number of studies in which each factor was found to be associated with AAU. The factors are organized in descending order according to the number of studies in which each was found to be associated with AAU. The studies in which the factors were found to be related to AAU are cited below each factor. Consistent with the risk and resilience perspective (Fraser,

1997), a risk factor is any influence that may increase the probability of consuming more alcohol, and a protective factor is a trait, condition, or characteristic that may reduce or modify risk for more consumption.

The risk and protective factors are organized within the multisystems framework provided by Fraser (1997). This framework consists of three major systems – the individual system, the social system, and the broad environment system – of influence in any given youth's life. The individual system includes an adolescent's biology, temperament, and genetics; the social system consists of family, school, and neighborhood conditions; and the broad environment system consists of factors related to societal norms and laws and opportunities for education and employment. Each system consists of the risk and protective factors that interact to increase or attenuate the risk for problematic behavior (e.g., school failure, delinquency, or depression). Although this framework was not developed specifically to explain AAU, it has been applied to general adolescent substance abuse (Jenson, 2004). Furthermore, it is consistent with developmental systems theory (Zucker, 1994), which was proposed specifically to account for alcohol use and abuse.

In the studies reviewed in Tables 1 and 2, AAU was typically operationalized by one or more of the following measures: Ever drink, number of drinks of alcohol in last 30 days and last year, ever been drunk, number of times drunk in the last 30 days and last year, and problems resulting from alcohol use. These measures assess increasing severity of alcohol use as adolescents move from any alcohol use to problems resulting from alcohol use. In some studies, composite measures, which consist of two or more of the measures, were used to examine AAU; in other studies the measures were each examined

separately. A consistent pattern of one measure or composite measure being used in the study of a particular risk or protective factor did not emerge. In addition, the AAU measures varied across the risk and protective factors.

The majority of researchers who conducted the studies in Tables 1 and 2 either found a correlation between AAU and a risk or protective factor within their sample or divided their sample based on the presence or absence of a risk or protective factor and compared the mean use for each group. As a result, the concepts of “more AAU” and “less AAU”, which are utilized in the following sections, typically refer to within sample variation of AAU.

Risk factors. Table 1, which includes the risk factors for AAU, reveals that much of the research on AAU has identified risk factors within the individual and social systems. In the individual system, externalizing and internalizing problems have received considerable attention as risk factors for more AAU. Regarding externalizing problems, conduct disorder has most often been found to precede, or be currently associated with, more AAU (see Zucker, 2008). Although a second externalizing disorder, ADHD, has also been found to be associated with use, results from the reviewed studies are less consistent (Disney, Elkins, McGue, and Lacono, 1999; Moss & Lynch, 2000; Smith, Molina, & Pelham, 2002; Molina & Pelham, 2003).

Regarding internalizing problems, anxiety and depression have most often been linked to more AAU and evidence is emerging for post-traumatic stress being related to AAU. As will be delineated later, internalizing problems often precede AAU (for a review, see Khantzian, 1997); however, the findings have not been as consistent for internalizing problems as for externalizing problems (see Zucker, 2008). It is important to

note that research has revealed that the associations of externalizing and internalizing problems with alcohol use may be moderated by gender, with externalizing problems being a more salient predictor for adolescent males and internalizing problems being a more salient predictor for adolescent females (Chassin et al., 2002; Kumpulainen, 2000).

Having a difficult childhood temperament is another individual system variable associated with more AAU. A difficult childhood temperament is characterized by high levels of negative emotionality and/or physical activity. Negative emotionality includes frequently experiencing frustration and irritation, and physical activity includes extreme restlessness.

Having positive-arousal alcohol expectancies is also associated with more AAU. These expectancies involve the adolescent's cumulative memory of the effects of alcohol, and whether this cumulative memory evokes positive arousal expectancies of use. The research on this variable provides convincing evidence for its relationship with AAU.

Table 1. Risk factors of adolescent alcohol use.

Individual system variables	Social system variables	Broad environment system variables
<p>Internalizing Problems – 30 studies (Baer & Bray, 1999; Bray, Getz & Baer, 2000; Buckner & Turner, 2009; Buckner et al., 2008; Bukstein, Glancy, & Kamner, 1992; Chassin et al., 2002; Christie et al., 1988; Clark & Jacob, 1992; Clark & Sayette, 1993; Colder, Campbell, Ruel, Richardson, & Flay, 2002; Colder & Chassin, 1999; Dauber et al., 2009; Deykin, Buka, & Zeena, 1992; Glancy & Kamner, 1992; Glantz, Weinberg, Miner, & Collier, 1999; Gomburg, 1982; Greenbaum et al., 1991; Kilpatrick et al., 2001; Kumpulainen, 2000; Maggs et al., 2008; Marmorstein et al., 2010; Mezzich et al., 1993; Newcomb, Maddahian, & Bentler, 1986; Rhode, Lewinsohn, & Seeley, 1996; Rydelius, 1983a, 1983b; Sher & Gotham, 1999; Steinhausen & Melzke, 2003; Stowell & Jeremy, 1991; Weinberg & Glantz, 1999)</p>	<p>Peer Alcohol Use – 23 studies (Adalbjarnardottir & Hafsteinsson, 2001; Baer & Bray, 1999; Barnes & Farrell, 1992; Barnes & Welte, 1986; Blount & Dembo, 1984; Bray, Adams, Getz, & McQueen, 2003; Bray & Getz, 2000; Brody, Flor, Hollett-Wright, & McCoy, 1998; Chassin, Prost, & Pitts, 2002; Colder & Chassin, 1999; Dishion & Owen, 2002; Dusenbury, Epstein, Botvin, & Diaz, 1994; Epstein, Botvin, Diaz, & Schinke, 1995; Feigelman, Li, & Stanton, 1995; Forney, Forney, & Ripley, 1991; Fowler, 2007; Graham, Marks, & Hansen, 1991; Iannotti & Bush, 1992; Marshal & Chassin, 2000; Mason & Windle, 2002; Newcomb, Maddahian, & Bentler, 1986; Walter, Vaughan, & Cohall, 1993; Wills & Cleary, 1996; Windle, Wills, & Cleary, 1998)</p>	<p>Alcohol Advertisements – 6 studies (Atkin & Block, 1981; Atkin, Hocking, & Block, 1984; Atkin, Neuendorf, & McDermott, 1983; Johnson, & Rohrbach, 1995; Unger, Schuster, Zogg, Dent, & Stacy, 2003; Wyllie, Zhang, & Casswell, 1998)</p>
<p>Externalizing Problems – 18 studies (Bierderman, Wilens, Mick, & Faraone, 1997; Chassin, et al., 2002; Colder & Chassin, 1999; Dauber et al., 2009; Englund et al., 2008; Epstein, Botvin, Diaz, Williams, & Griffin, 2000; Glantz, Weinberg, Miner, & Collier, 1999, 1999; Kessler et al., 1996; Kumpulainen, 2000; Laukkanen, Shemeikka, Vinamaki, Polkki, & Lehtonen, 2001; Maddahian & Bentler, 1986; Disney, et al., 1999; Manuzza et al., 1991; Moss & Lynch, 2000; Newcomb, Weinberg & Glantz, 1999; Molina & Pelham, 2003; Shankman et al., 2009)</p>	<p>Family Alcohol Use – 24 studies (Adalbjarnardottir & Hafsteinsson, 2001; Barnes & Welte, 1986; Blount & Dembo, 1984; Bray et al., 2000; Brody, Flor, Hollett-Wright, & McCoy, 1998; Brody, Ge, Katz, & Arias, 2000; Chassin, et al., 2002; Chassin et al., 1999; Chassin et al., 1991; Dawkins, 1986; Delucia, Belz & Chassin, 2001; Dusenbury, Epstein, Botvin, & Diaz, 1994; Epstein, Botvin, Diaz, & Schinke, 1995; Feigelman, Li, & Stanton, 1995; Forney, Forney, & Ripley, 1991; Herjanic, Herjanic, Penick, Tomelleri, & Armbruster 1977; Iannotti & Bush, 1992; Kandel & Andrews, 1987; Lund & Landesman-Dwyer, 1979; Merikangas, Weissman, Prusoff, Pauls, & Leckman, 1985; Newcomb, Maddahian, & Bentler, 1986; Schuckit & Chiles, 1978; Walter, Vaughan, & Cohall 1993; Van Zundert et al., 2006)</p>	
<p>Difficult Childhood Temperament – 10 studies (Blackson, 1994; Brody, Flor, Hollett-Wright, & McCoy, 1998; Kellam, Brown, Rubin, & Ensminger, 1983; McCord, 1988; Wills et al., 2001; Wills, DuHamel, & Vaccaro, 1995; Wills & Stoolmiller, 2002; Windle, 1991; Windle, Wills, & Cleary, 1998; Windle & Windle, 1993)</p>		

Table 1 (continued). Risk factors of adolescent alcohol use.

Individual system variables	Social system variables	Broad environment system variables
<p>Positive-Arousal Alcohol Expectancies – 10 studies (Brook, Brook, Gordon, Whiteman, & Cohen, 1990; Christiansen, Smith, Roehling, & Goldman, 1989; Dunn & Goldman, 1996, 1998; Goldberg, Halpern-Felsher, & Millstein, 2002; Kraus, Smith, & Ratner, 1994; Rather & Goldman, 1994; Rather, Goldman, Roehrich, & Brannick, 1992; Sher, Wood, Wood, Raskin, 1996; Zucker, Kincaid, Fitzgerald, & Bingham, 1995)</p>	<p>Violence Exposure – 24 studies (Arata et al., 2007; Baer & Bray, 1999; Blount & Dembo, 1984; Bray et al., 2000; Brockenbrough, 2002; Clark et al., 1997; Colder & Chassin, 1999; Dembo et al., 1978; Dembo et al., 1984; Dembo et al., 1985; Elze et al., 1999; Emmett et al., 1997; Fick & Thomas, 1995; Harrison et al., 1997; Jenkins & Bell, 1994; Kilpatrick et al., 2003; Luster & Small, 1997; Perkins & Jones, 2004; Scheier et al., 2001; Schwab-Stone et al., 1995; Sullivan et al., 2004; Vermeisen et al., 2003; Wilson, 2001)</p>	
<p>High Acculturation – 8 studies (Carvajal, Photiades, Evans, & Nash, 1997; Epstein, Botvin, & Day, 2000; Epstein, Stacy, Ames, & Sussman, 1996; Gil, Wagner, & Vega, 2000; Goldberg & Botvin, 1993; Gong, Takeuchi, Agbayani-Stewart & Tacata, 2003; Hahn, Lahiff, & Guterman, 2003; Lovato, Litrowink, Elder, & Nunez-Liriano, 1994)</p>	<p>Low Family Socioeconomic Status – 11 studies (Donovan & Jessor, 1978; Epstein, Botvin, Baker, & Diaz, 1998; Fitzgerald & Zucker, 1995; Kaplow, Curran, & Dodge, 2002; Knupfer, 1989; Loeber, Farrington, Magda, Stouthamer-Loeber, & VanKammen, 1998; Lowry, Kann, Collins, Kolbe, 1996; Neff, Prihoda, & Hoppe, 1991; Wills, McNamara, & Vaccaro, 1995; Wills, Vaccaro, & McNamara, 1994; Zucker & Harford, 1983)</p>	
<p>Sensation Seeking – 7 studies (Colder, Campbell, Ruel, Richardson, & Flay, 2002; Masse & Tremblay, 1997; Newcomb, Maddahian, & Bentler, 1986; Schwartz, Burkhardt, & Green, 1978; Wills, Vaccaro, & McNamara, 1994; Wills, Windle, & Cleary, 1998; Zuckerman, Bone, Neary, Mangelsdorff, & Brustman, 1972)</p>	<p>Neighborhood Problems – 6 studies (Abdelrahman, Rodriguez, Ryan, French, & Weinbaum, 1998; Dembo, 1978; Dembo, Blount, Kaplow, Curran, & Dodge, 2002; Scheier, Botvin, & Miller, 1999; Scheier, Miller, Ifill-Williams, & Botvin, 2001; Schmeidler, & Burgos, 1986)</p>	
<p>Low Academic Competence – 3 studies (Laukkanen, Shemeikka, Viinamake, Polkki, & Lethonen, 2001; Marsiglia & Waller, 2002; Newcomb, Maddahian, & Bentler, 1986)</p>		
<p>Cigarette Smoking – 2 studies (Chen et al., 2002; Laukkanen et al., 2001)</p>		
<p>Low Self-Esteem – 2 studies (Laukkanen et al., 2001; Newcomb et al., 1986)</p>	<p>Poor Parenting Practices – 7 studies (Adalbjarnardottir & Hafsteinsson, 2001; Barnes & Farrell, 1992; Barnes, Reifman, Farrell, & Dintcheff, 2000; Brody & Ge, 2001; Colder & Chassin, 1999; Newcomb, Maddahian, & Bentler, 1986; Van Zundert et al., 2006)</p>	

Table 1 (continued). Risk factors of adolescent alcohol use.

Individual system variables	Social system variables	Broad environment system variables
Poor Social Skills– 1 study (Laukkanen et al., 2001)	Poor Parent-Child Relationship – 2 studies (Bray, Adams, Getz, & McQueen, 2003; Chassin, 1999)	
Deviant Prone Attitude – 1 study (Wills & Cleary, 1996)	Negative Life Events – 2 studies (Wills & Cleary, 1996; Wills, Windle & Cleary, 1998)	
Low Religiosity – 1 study (Newcomb et al., 1986)		

Immigrant adolescents who have a high level of acculturation in American society appear to be at risk for high levels of alcohol use. Acculturation, which includes the process of changes in original cultural patterns that occur as a result of ongoing contact with a different culture(s), has received some attention, most likely because of studies indicating differences in drinking among adolescents from different ethnicities (e.g., Grumbaum et al., 2003; Stuart & Power, 2003). Although the literature in this area is still developing, evidence from the studies that do exist has consistently indicated that immigrant adolescents who are more acculturated into American society consume more alcohol. However, the participants in these studies have only included Hispanic Americans and Asian Americans. Thus, more research is needed to confirm the role of acculturation in these and other immigrant populations.

Sensation seeking has also been found to be positively associated with AAU. Zuckerman defined sensation seeking behavior as "the need for varied, novel, and complex sensations and experiences and willingness to take physical and social risks for the sake of such experiences" (1979, p. 10). Finally, other individual system risk variables with relatively less support include low academic competence, cigarette smoking, low self-esteem, poor social skills, having a deviance prone attitude, and low religiosity.

Peer alcohol use, family alcohol use, violence exposure, low family SES, neighborhood problems, and poor parenting practices are social system variables in Table 1 that have been found to be associated with AAU in numerous studies (e.g., Fowler et al., 2007; Van Zundert et al., 2006). These studies indicate that having peers, parents, or siblings who drink often is associated with more AAU. Being exposed to violence, either

witnessing it or being victimized, is associated with more AAU, where exposure has occurred in one or more of three settings: Home (e.g., Arata, Langhenichsen-Rohling, Bowers, & O'Brien, 2007; Baer & Bray, 1999); neighborhood (e.g., Ennett, Plewelling, Lindrooth, & Norton, 1997); and school (e.g., Ennett, 1997). Adolescents whose parents have more liberal alcohol norms and show little support or exert little control in their parenting are also likely to drink more alcohol. In addition, neighborhood problems, including perceived safety, high levels of illicit drug use, gang activity, and fighting are associated with more AAU.

Low family SES is the remaining social system variable that has been linked to more AAU in numerous studies. The studies listed in Table 1 under this variable have linked various indicators of low family SES, such as low parent education, eligibility for free school lunch, and low family income, to more AAU. However, the direction of the relationship between this variable and AAU is not consistent, as it is has also been found to be associated with less AAU (see Table 2).

Having a poor relationship with one's parents is a social system variable that has been linked to more AAU in two studies (Bray, Adams, Getz, & McQueen, 2003; Chassin, 1999). Experiencing negative life events is the remaining social system variable linked to more AAU. Two studies have found this link and are included in Table 1. These studies included various negative life events, such as having a family member pass away recently, parents who divorce, or a parent losing his or her job (Wills & Cleary, 1996; Wills, Windle & Cleary, 1998).

Exposure to alcohol advertisements is the only broad environment system variable linked to more AAU. In the six studies reviewed in Table 1, the operationalization of

exposure to alcohol advertisements varied. For example, Wyllie, Zhang, and Casswell (1998) operationalized it as adolescent self-report of hours of television watching, whereas Unger, Johnson, and Rohrbach (1995) operationalized it as positive affect toward alcohol advertisements. Unger, Schuster, Zogg, Dent, and Stacy (2003) conducted separate analyses on numerous indicators of alcohol advertisement exposure and found liking of alcohol ads, recall of brand names, and media receptivity to be associated with more AAU. A recent review of 13 longitudinal studies confirmed that media exposure is linked to AAU (Anderson, Bruijn, Angus, Gordon, & Hastings, 2009).

Protective Factors. Table 2, which includes the protective factors of AAU, indicates that considerably less research has focused on factors that reduce or moderate the risk for more AAU. However, much like the research on risk factors, the research on protective factors has predominantly focused on the individual and social systems. Within the individual system, 10 variables have been found to be associated with less drinking among adolescents. Of these variables, seven have been found to be associated in multiple studies. One of these, having a positive childhood temperament, includes the degree of attention control and positive emotionality of the adolescent. In the two studies presented in Table 2 under this variable, attention control, which is defined as the ability to focus attention on a task, avoid distraction, and follow through in completing the task, and positive emotionality, which is defined as experiencing positive moods as well as laughing and smiling frequently, were both associated with less AAU.

Two other individual system variables that are related to positive childhood temperament (yet differentiated from it because they are not necessarily only assessed in childhood) and associated with less AAU include level of self-control and inhibition. In the studies

reviewed in Table 2, self-control was measured as level of patience, soothability (i.e., ability to calm one's self down), ability to set goals and follow-through, and thinking ahead about the consequences of one's actions. Inhibition was measured as cautiousness (e.g., not going into a strange part of town alone and avoiding rough sports where you could get injured) and neuroticism (e.g., worrying a lot).

Social competency, academic competency, individuation, and low acculturation are other individual system factors in Table 2 that have been found in more than one study to be associated with less AAU. In the studies reviewed, social competency included the adolescent's ability to work and communicate with others, academic competency most often was measured by grade point average, individuation included the adolescent's ability to take responsibility for him or herself, and acculturation included the degree to which immigrant adolescents were immersed in American culture. As can be seen in Table 2, most of the research on these variables has occurred within recent years (e.g., see Zucker, 2008, for recent work on social competency). Obviously, much work is needed to establish further and understand the relationship between these variables and AAU.

Two other individual system variables – high self-esteem and psychosocial maturity – have each been linked to less AAU in only one study. In the study on adolescent self-esteem, this construct was measured as a composite of the adolescent's perception of his or her physical, cognitive, and emotional self; in the study on psychosocial maturity, this construct was measured as a composite of interpersonal understanding, hypothetical negotiation, real-life negotiation, and personal meaning.

Table 2. Protective factors of adolescent alcohol use.

Individual system variables	Social system variables	Broad environment system variables
<p>Social Competency – 4 studies (Botvin & Wills, 1985; Dusenbury, Botvin & James-Ortiz, 1989; Johnson & Pandina, 1991; Scheier, Botvin, Griffin & Diaz, 1999; also see Zucker, 2008)</p> <p>Self-Control – 4 studies (Scheier et al., 1999; Wills & Stoolmiller, 2002; Wills et al., 1998; Wills & Cleary, 1996)</p> <p>Inhibition – 4 studies (Kellam, Brown, Rubin, & Ensminger, 1983; Masse & Tremblay, 1997; McCord, 1988; Windle & Windle, 1993)</p> <p>Academic Competency – 5 studies (Lifrak, McKay, Rostain, & Alterman, 1997; Maggs et al., 2008; Mason & Windle, 2002; Wills et al., 1998; Wills & Cleary, 1996)</p> <p>Individuation – 3 studies (Baer & Bray, 1999; Bray, Adams, Getz, & McQueen, 2003; Bray, Getz, & Baer, 2000)</p> <p>Positive Childhood Temperament – 2 studies (Wills, Duhamel, & Vaccaro, 1995; Wills & Cleary, 1996)</p> <p>Low Acculturation – 2 studies (Elder et al., 2002; Marsiglia & Waller, 2002)</p> <p>High Self-Esteem – 1 study (Spath, Redmond, Hockaday, & Yoo, 1996)</p> <p>Psychosocial Maturity – 1 study (Adabjarnardottir, 2002)</p> <p>Religiosity – 1 study (Mason & Windle, 2002)</p>	<p>Low Family Socioeconomic Status – 12 studies (Calahan, 1974; Coombs, Fawzy, & Gerber, 1986; Dawkins, 1986; Ellickson, McGuigan, Adams, Bell, & Hays, 1996; Helzer, Burman, & McEvoy, 1991; Kandel, Chen, Warner, Kessler, & Grant, 1997; Knupper, 1989; Maggs et al., 2008; Martin & Pritchard, 1991; Pritchard & Martin, 1996; Smith, Abby, & Scott, 1993; Zucker & Harford, 1983)</p> <p>Positive Parenting – 4 studies (Adalbjarnardottir & Hafsteinsson, 2001; Mason & Windle, 2002; Spoth, Redmond, Hockaday, & Yoo, 1996; Wills & Cleary, 1996)</p> <p>Prosocial Peers – 1 study (Spoth et al., 1996)</p> <p>Supportive School Teachers – 1 study (Lifrak, McKay, Rostain, & Alterman, 1997)</p> <p>Family Social Support – 1 study (Mason & Windle, 2002)</p>	<p>Underage Drinking Laws – 2 studies (Barry et al., 2004; Jones, Pieper, & Robertson, 1992)</p>

The remaining individual system variable associated with less AAU is religion. Although this association has been found in only one study to date, religion certainly plays an important role in our society and has been associated with less adolescent problem behavior (e.g., Jessor et al., 1991). Therefore, further examination of the relationship between it and AAU is warranted.

Within the social system, low family SES has the most support for being associated with less AAU (e.g., Maggs et al., 2008). However, because low family SES has also been found to be associated with more AAU (see Table 1), it is evident that the nature of the relationship between low family SES and AAU is not well understood.

Four other social system variables – positive parenting and having prosocial peers, supportive school teachers, and family social support – have been found to be associated with less AAU. As seen in Table 2, of these four, positive parenting has received the most attention. Adolescents who perceived their parents as being more supportive and controlling drank less. Finally, within the broad environment system, underage drinking laws (Barry et al., 2004; Jones, Pieper, & Roberson, 1992) are associated with less AAU.

In summary, a number of risk and protective factors of AAU have been identified. However, substantially more risk and protective factors have been identified within the individual system than within the social or broad environment systems, and risk factors in general have received far more attention than protective factors. In addition, for some variables (e.g., religiosity, parenting, and acculturation), the classification of a variable as a risk or protective factor depends on whether the investigator chose to focus on the high

or low “end” of the measurement of the variable. Thus, the risk and protective factors are not always conceptually distinct.

Prevention and Intervention Programs for AAU

Risk and protective factors of AAU should be targeted in prevention and intervention programs that seek to stop the initiation and decrease the occurrence of AAU. Therefore, the extent to which the correlates of AAU in Tables 1 and 2 have been incorporated into these programs will be considered in this section.

The Substance Abuse and Mental Health Services Association (SAMHSA) maintains the National Registry of Evidence-based Programs and Practices (NREPP), which is an on-line registry of mental health and substance abuse prevention and intervention programs that have been independently reviewed. The Registry provides general information, as well as any research outcomes, for the programs. There are 51 AAU prevention and intervention programs listed in the NREPP. Table 3 provides a breakdown of the factors addressed by the programs. The factors are organized within Fraser’s (1997) risk and resilience framework, which consists of the individual, social environment, and broad environment systems. The percentage of programs addressing each factor is provided.

Within the individual system, there are six factors, each of which is addressed by at least one NREPP program. Of these, alcohol awareness and social competency are addressed by a majority of the programs. In the programs that address these factors, alcohol awareness is most often increased by providing adolescents with education about normative drinking behavior and the potentially harmful behavioral and medical effects of alcohol abuse. Increasing social competency most often involves helping adolescents

to develop better relationship and problem-solving skills. Alcohol refusal skills and academic competency are addressed by approximately a third of the 51 NREPP programs. In these programs, alcohol refusal skills most often includes teaching the adolescent strategies for denying urges to drink in situations where peers or others are drinking. The remaining two individual system factors are addressed by less than five percent or less of the programs (see Table 3).

Within the social system, there are 13 factors, each of which is addressed by at least one NREPP program. Of these, parenting skills and family relationships are addressed by approximately a third of the 51 NREPP programs. In these programs, parenting skills most often includes teaching parents to communicate, problem-solve, and set and reinforce limits with their adolescents. Improving family relationships most often includes reducing conflict between parents and between parents and siblings of the targeted adolescents. Improving peer relationships, having the adolescent participate in community service activities, providing alternative alcohol-free activities, and limiting the availability of alcohol in the community are each addressed in 10 to 20% of the 51 NREPP programs. The remaining five social system factors listed in Table 3, as well as the one broad environment system factor, were each addressed in less than 10% of the 51 NREPP programs.

Table 3. Risk and protective factors addressed in SAMHSA adolescent alcohol use programs

Factor	Percentage of SAMHSA programs (<i>n</i> = 51) addressing factor
Individual system factors	
-Alcohol awareness	64%
-Social competency	52%
-Alcohol refusal skills	31%
-Academic competency	27%
-Self-esteem	5%
-Twelve step counseling	1%
Social system factors	
-Parenting skills	35%
-Family relationships	29%
-Peer relationships	17%
-Youth community service activities	11%
-Alternative alcohol-free activities	11%
-Alcohol availability in community	11%
-Mentoring	7%
-Parent alcohol use	5%
-After-school activities availability	5%
-Family stress	3%
-(Limit) Local alcohol advertising	1%
-Neighborhood safety	1%
-Juvenile justice involvement	1%
Broad Environment Level Factor	
-Underage alcohol laws and enforcement	7%

In conclusion, most of the NREPP AAU programs have focused on treating factors within the individual and social systems. Within these two systems, alcohol awareness and social competency are each addressed in a majority of the 51 NREPP programs and alcohol refusal skills, academic competency, parenting skills, and family relationships are each addressed in approximately a third of the 51 programs. Recent reviews have provided support for the effectiveness of individual and family interventions (Deas, 2008; Smit, Verdurmen, Monshouwer, & Smit, 2008).

There are a number of risk and protective factors of AAU that are either not addressed in any of the prevention and intervention programs or only in a handful of the programs (see Tables 1 and 2). Of particular relevance to the study conducted, exposure to violence is addressed in only one NREPP program, which is the Striving Together to Achieve Rewards Tomorrow (CASASTART; Murray, 1999). However, the focus of this program is only on neighborhood safety, leaving out safety in the home and school environments. Nonetheless, the program has been successful in reducing violence in neighborhoods, as well as substance use among adolescents, including AAU. Given this, and that violence exposure is linked to more AAU in a number of studies (see Table 1), it is surprising that more NREPP programs do not address this risk factor, and even more surprising that it is only addressed in one setting.

Theories of AAU

The theories and models that have been proposed to explain AAU are organized within the risk and resilience framework (Fraser, 1997) and delineated in Table 4. A brief description of each theory is also provided in this table. In addition to the individual, social, and broad environments systems, I included theories that integrate two or more of these systems. Petraitis, Flay, and Miller (1995) delineated sixteen of the presented theories. The others are other theories or models that Petraitis and colleagues did not include.

The individual system theories primarily focus on biological and personality traits, cognitions, and behavioral characteristics in the development of AAU. The social system theories focus on the immediate environments of the adolescent and relationships with key individuals in these environments. The two broad environment system theories

included in Table 4 emphasize the role of opportunities in the larger social environment and bonds to conventional society. The integrative theories include variables from the individual, social, and/or broad environment systems.

The more recent theories in Table 4 are typically more encompassing. That is, they include more contributors to AAU and, in some cases, specify direct and indirect influences. An example is developmental systems theory (Fitzgerald, Zucker, & Yang, 1995), which is summarized below in the developmental systems theory section.

Some of the theories and models in Table 4 were not proposed specifically to account for AAU (e.g., Dodge & Pettit, 2003; Gallo & Matthews, 2003; Moffitt, 1993); nevertheless, they appear to apply equally well to AAU. For example, Dodge and Pettit (2003) and more recently Dodge et al. (2009), as well as Gallo and Matthews (2003), contend that their theories are able to account for a range of behavioral and health problems, including adolescent alcohol abuse and dependence. Furthermore, the theories delineated by Petraitis and colleagues (1995) are not specific to alcohol use but rather are proposed for adolescent substance use. Again, they appear to apply equally well to alcohol use.

In summary, increasingly complex theories, involving direct and indirect effects, have been proposed to explain AAU. These theories integrate numerous variables from different systems into a more comprehensive understanding of why adolescents use alcohol. In the next section, I will summarize the support for each theory and offer some conclusions about the level of support.

Table 4 (continued). Theories of adolescent alcohol use.

Individual system theories	Social system theories	Broad environment system theories	Integrative theories
<p>added. Two types of self-efficacy are important: use self-efficacy (beliefs about abilities to obtain and use alcohol) and refusal self-efficacy (beliefs about abilities to resist social pressure to use alcohol).</p> <p>Self-Derogation Theory (Kaplan, 1975) Low self-esteem resulting from negative evaluations by others and self-perceptions of social deficiency result in AAU.</p>	<p>Reserve Capacity Hypothesis (Gallo & Matthews, 2003) Low family SES leads to experiencing more stressors and having less reserve capacity to deal with the stressors, which leads to negative emotions (depression, anxiety and hostility). These emotions result in health-related problems which may include alcohol use.</p> <p>Multi-Stage Social Learning Model (Simons, Conger, & Whitbeck, 1988) Emphasizes social processes within the context of several individual traits, including emotional distress and inadequate coping skills, to explain AAU.</p> <p>Acculturation Model (LaFromboise, Coleman & Gerton, 1993; Segall, Dasen, Berry, & Poortinga, 1990) The process of taking on values, norms, and behavior patterns of another cultural group. Key contributing factors include intercultural contact and acceptance of ideas and beliefs that exist in the new culture.</p>	<p>Social Development Model (Catalano & Hawkins, 1996) A model for the development of general deviant behavior. Variables such as family SES, gender, individual traits, and external restraints lead to opportunities for and then involvement in problem behaviors which, in turn, leads to rewarding interactions with drug users and attachment to them, resulting in alcohol and other substance use.</p> <p>Integrative Social Control Theory (Elliot, Huizinga, & Ageton, 1985; Elliot, Huizinga, & Menard, 1989) Integrates strain theory, social control theory, and social learning theory. A discrepancy between aspirations and opportunities (strain) leads to a weak commitment to conventional society and role models (social control). Instead, the adolescent will commit to deviant groups and learn alcohol use behavior from the role models in these groups (social learning).</p>	<p>Early Starter Model (McMahon & Wells, 1998) Adolescent alcohol use is one behavior in a chain of increasingly severe externalizing symptoms. Earlier externalizing symptoms, which originate with temperamental difficulties and are exacerbated by adverse interactions with parents, teachers, and peers, lead to adolescent alcohol use.</p> <p>Developmental Systems Theory (Fitzgerald, Zucker, & Yang, 1995) Structure of events leading to alcohol use is anchored in time. The co-occurrence of risk factors in context and in sequence lead to an adolescent's use of alcohol.</p>
<p>Social Disorganization Theory (Sampson & Groves, 1989) The inability of a community structure to realize the common values of its residents and maintain effective social controls (e.g., control over AAU).</p>			

Support for theories of AAU

In this section, I will initially summarize the support demonstrated in Tables 1 and 2 for the theories presented in Table 4. In the individual system, the sensation seeking hypothesis has considerable support, as sensation seeking has been shown to be a risk factor for AAU in numerous studies (see Table 1). Furthermore, sensation seeking is associated with externalizing behavior (Ang & Woo, 2033; Schmeck & Poustka, 2001), and externalizing behavior has substantial support as a risk factor for AAU (see Table 1).

There is indirect support for the self-medication hypothesis, which is drawn from the relationships among violence exposure, internalizing behavior, and AAU. That is, adolescents self-medicate through alcohol use to reduce internal affective states such as depression and anxiety. As will be shown later in this proposal, these affective states may arise from violence exposure. Therefore, there is considerable indirect support for the self-medication hypothesis based on the studies examining internalizing symptoms (see Table 1) and violence exposure (see Table 1 and, as will be reviewed later, Table 5).

The role of positive attitudes about alcohol use in the theory of reasoned action and in the theory of planned behavior has received partial support through the research on positive-arousal alcohol expectancies (see Table 1). Specifically, if an adolescent expects alcohol use to have positive rather than negative effects, he or she is more likely to drink. The role of social norms in both of these theories and the role of self-efficacy in the theory of planned behavior have not yet been examined. Support for the remaining theory in the individual system – self-derogation theory – is relatively weak, as self-esteem has only been found to be related to AAU in three studies (see Tables 1 and 2).

In the social system, a pathway leading from economic hardship to parental distress and conflict to disrupted parenting to AAU is proposed in the family stress model. There is direct support for the disrupted parenting-AAU connection, as poor parenting has been found to be a risk factor for AAU (see Table 1). In addition, economic hardship is often associated with low SES and living in settings where exposure to violence occurs frequently. Both low SES and violence exposure have been associated with AAU (see Table 1). Furthermore, the overall family stress model has been directly tested and supported (Conger & Conger, 2002).

Support for the family interaction theory may be drawn from the research which has shown poor parenting practices and having a poor relationship with one's parents to be risk factors for more AAU (see Table 1). However, most of this research has focused on these variables during adolescence, and the family interaction theory emphasizes their role early in life. Thus, the support for this theory is limited.

Indirect support is evident for social learning theory, as family and peer alcohol use (see Table 1) may serve as models which are copied by an adolescent. In addition to modeling use, peers may also reinforce AAU.

The role of stress, especially school stress, in AAU is emphasized in the social ecology model. Support for the role of stress emerges from the relationship found between violence exposure that occurs in schools and AAU (see Table 1). Indirect support for the role of school stress in AAU may be inferred from the study in which having supportive school teachers was found to be associated with less AAU (see Table 2). Specifically, supportive school teachers may decrease stress in adolescents which will lead to less AAU. Indirect support for the role of stress in AAU may also be inferred

from the finding that experiencing negative life events is a risk factor for more AAU (see Table 1). In addition, the role of stress may be inferred from the association between family SES and AAU (see Table 1), as low family SES environments may be conceptualized as being more stressful.

Stress created by low family SES is a primary premise of the reserve capacity hypothesis. According to this hypothesis, low family SES creates stress which creates negative emotions that lead to AAU (see low family socioeconomic status in Table 1). Support for the relationship between negative emotions (e.g., depression, anxiety, and hostility) and AAU exists (see internalizing problems and externalizing problems in Table 1). Furthermore, in the review by Gallo and Matthews (2003), support for the earlier steps in the model exists as well.

Support for the multi-stage social learning model is difficult to determine, as it incorporates individual system variables (e.g., emotional distress and coping skills) and social system variables (e.g., interactions with parents) in the explanation of AAU. There is support for the roles of the variables in the individual system (e.g., see internalizing problems in Table 1 and social and academic competency in Table 2) and social system (e.g., see poor parenting practices in Table 1 and positive parenting in Table 2). However, the ways these variables operate jointly to influence AAU has not been examined.

The acculturation model has received considerable direct support in recent years, as high acculturation has been shown to be a risk factor for AAU (see Table 1) and low acculturation has been shown to protect against AAU (see Table 2).

Support for the remaining social system theory – social disorganization theory – and the two broad environment system theories – strain theory and social control theory –

is indirect, as it must be inferred from the relationships between violence exposure and AAU and between low family SES and AAU. Specifically, low SES families live in environments where there are discrepancies between aspirations and opportunities (i.e., strain theory) and include broken institutions that fail to control unconventional behavior like violence (i.e., social control theory). Furthermore, these environments lead to families being isolated, failing to work together, and using violence to solve family problems (i.e., social disorganization theory). In each case, problem behaviors, including drinking, are more likely to occur among adolescents.

Because the integrative theories are, for the most part, more recent than the other theories, and involve complex reciprocal processes from multiple systems with one exception, they have not been directly tested. However, various components of them have been tested and supported. For example, components of problem behavior theory have received support from the relationship between AAU and each of the following variables: Self-control (see Table 2), academic competency (see Table 2), externalizing problems (see Table 1), and peer alcohol use (see Table 1). Components of peer cluster theory have received support from the association between AAU and each of the following: Peer alcohol use (see Table 1), low family SES (see Table 1), positive-arousal alcohol expectancies (see Table 1), and parenting (see Tables 1 and 2). The domain model includes over 50 potential causes, and, as a consequence, receives support from almost all variables associated with AAU in Tables 1 and 2. However, this model is so encompassing that it is almost meaningless in terms of identifying the primary determinants of AAU. In the biopsychosocial model, the earlier starter model, and the social developmental model, the variables in the individual system (e.g., temperament)

are proposed to interact with the variables in the social system (e.g., parents, peers, and low family SES) to increase or attenuate the risk for adolescent problems, including AAU. Support for the roles of these variables in the biopsychosocial model is presented in Tables 1 and 2. Furthermore, as I noted above, there has been one exception to models not being directly tested and that has been a recent study on the biopsychosocial model. Dodge and colleagues (2009) found evidence for a cascade effect of temperament, culture, parenting and peers from the preschool through high school years, resulting in substance-use (including alcohol) onset. Others (e.g., Martel et al., 2010) have found support for a similar model of development of substance use. Support for the integrative social control theory can be inferred from the association between low family SES and AAU and peer and family use of alcohol and AAU (see Table 1). Support for the early starter model comes from the association of externalizing problems and AAU. (Note: support for developmental systems theory will be reviewed in a later section).

In summary, within the individual system, two theories have received substantial support (i.e., sensation seeking and acculturation model), others have received partial support (i.e., theory of reasoned action and theory of planned behavior), one has received several forms of indirect support (i.e., self-medication theory), and one has received little support (i.e., self-derogation theory). Within the social system, two theories have received direct support (i.e., early starter model, family stress model), two theories have received indirect support (i.e., social learning theory and social disorganization theory), and one proposition has received partial support (i.e., reserve capacity hypothesis). Limited support has been demonstrated for two of the theories in this system (i.e., multi-stage social learning theory and family interaction theory). Within the broad environment

system, social control theory and strain theory have received indirect support. Most of the integrative models have received only partial support, as various components have been related to AAU, but the complete models have not yet been tested.

Several general conclusions may be drawn from the review of the empirical support for the theories presented in Table 4. First, the simpler the model, the more likely that support will exist for it. For example, the sensation seeking model and acculturation model each propose and test one variable and find support. However, it is important to note that this is not always the case. For example, the social interaction theory proposes the importance of negative interactions with parents early in life. This theory has either failed to receive attention or has been tested, not supported, and the findings not published. Second, models that integrate variables from across systems have primarily found support for variables within each system, but have not systematically examined how the variables from across systems operate together. This is not surprising, as it is easier to conceptualize than to operationalize and analyze variables from multiple systems.

Finally, the integrative theories have recently been proposed and are particularly complex, as they typically consider variables from all systems and propose a framework for how they work together to affect AAU. Transactional processes are also proposed in which two variables reciprocally influence each other over time. However, testing such processes is difficult. In short, for the most part, the integrative models at this time have not been supported and should primarily be viewed as models to guide future research. As is noted below, one integrative model, developmental systems theory (e.g., Zucker, 1994), is of particular relevance and will be reviewed in detail.

Developmental systems theory (DST) is particularly relevant because it was proposed by Zucker and his colleagues (Fitzgerald & Zucker, 1995; Fitzgerald et al., 1995; Zucker, 1994, 2006; Zucker, Fitzgerald, & Moses, 1994) as a framework to account specifically for the development of alcohol abuse. DST focuses on identifying variables that guide individuals onto developmental pathways and that predict the potential for increased alcohol use at various points in time. Critical concepts within the model are the changing roles and transactional processes of systems across the life span (Fitzgerald et al., 1995).

In DST, risk factors for alcohol use and abuse are classified into five categories (i.e., sociocultural, familial, peer, psychological, and biological). Many of the risk factors in these categories have been identified. However, the developmental or causal processes that lead an individual down a pathway are less well understood (Fitzgerald et al., 1995). The model in Figure 1 proposes that each category of risk is a system that interacts with the other categories (systems) to set the stage for potential or actual alcohol abuse. The various systems have feedback loops that determine their structure and the degree of risk emerging from that system. Feedback loops also operate across systems. Therefore, each system has an impact on all other systems such that there is an ongoing transactional process (Zucker et al., 1994). The role of a system can change over the life course (see Figure 1 for stages of the life course) and influences other systems through interactions with them at any developmental stage. Furthermore, a system can influence other systems sequentially, creating the trajectory for alcohol abuse.

Figure 1. A probabilistic developmental model of the flow of risk across the biopsychosocial domain structure and over the life course (from Zucker, 1994). Relative risk at any age involves additive and subtractive elements in the grid that may, at a particular age stage, go over threshold to display as a clinical case. Pathways to alcohol problems and alcoholism indicate a developmental account of the evidence for contextual contributions to risk (adapted from Fitzgerald et al., 1995, p. 10).

The sequential or causal chains have typically been theorized to run from more macro level variables and processes (e.g., neighborhood violence) to increasingly micro level variables (i.e., variables close to or characteristic of the adolescent; e.g., internalizing symptoms) to drinking. Thus, variables closer in proximity to the adolescent are conceptualized as being embedded in larger social contexts (Zucker et al., 1994). The distal social contexts operate through the more proximal variables to influence adolescent alcohol use. The goal of DST is to provide a framework for identifying the connections between these systems of influence on alcohol abuse (Fitzgerald & Zucker, 1995).

Developmental systems theory proposes that when high risk social contexts are paired with risk factors of the individual, AAU is most likely to occur (Zucker et al., 1994). The social contexts within which adolescents primarily interact are the home, school, and neighborhood, and each of these is acknowledged as important in the development of alcohol problems in DST (Fitzgerald et al., 1995). Furthermore, a risk factor that is identified as important in these social contexts is conflict and violence (Zucker et al., 1994). The review in Table 1 (see Violence Exposure) provides support for a relationship between violence in multiple contexts and AAU.

In terms of risk factors of the individual, the review in Table 1 indicates that internalizing symptoms and externalizing problems of an adolescent have received substantial support as variables associated with AAU. Furthermore, DST identifies these two types of symptoms as key variables in trajectories leading to alcohol abuse (Zucker et al., 1994, 2000). Specifically, two major pathways for the development of AAU are proposed in DST (Zucker et al., 1994). One pathway, termed the negative affect trajectory, proposes that environmental stress leads to AAU through internalizing

problems. This pathway is proposed to operate primarily in females and to be associated with long term problems with alcohol. As will be noted, the role of affective state in AAU has been delineated in the self-medication hypothesis (Khantzian, 1997), where alcohol is used to relieve painful affect. The second pathway, termed the antisocial trajectory, proposes that an environmental stress leads to AAU through externalizing problems.

This pathway is proposed to operate primarily in males and is congruent with the early starter model for conduct problems (McMahon & Wells, 1998; McMahon, Wells, & Kotler, 2006). As Zucker and colleagues (1994, 2000) point out, these trajectories are critical for understanding how adolescents develop problems with alcohol and for developing effective interventions; however, they remain untested. The proposed study examined both trajectories and tested whether adolescent females and males have different pathways from violence exposure to AAU (i.e., males through externalizing problems and females through internalizing problems).

Adolescent gender is proposed to play an important role in DST. Internalizing symptoms are proposed to be the mediating variable between environmental stress and AAU for females, whereas externalizing symptoms are proposed to be the mediating variable for males (Zucker et al., 1994, 2000). The role of gender has *not* been tested in DST, as males have been primarily examined when externalizing problems are studied and females have been examined when internalizing problems are studied. Nevertheless, the adolescent gender hypotheses in DST are congruent with several other theoretical perspectives.

The proposal that internalizing problems will play a stronger role in the environmental stress – AAU link among females than males is congruent with the gender intensification hypothesis (Davies & Lindsay, 2004), which proposes that adolescent females, when compared to males, are more sensitive to environmental stress and this sensitivity is manifested in an increase in internalizing problems. There is support for this hypothesis (Davies & Lindsay, 2004; Ge, Conger, Elder & Simons, 1994). Furthermore, there is some evidence that internalizing problems are a more salient predictor of AAU for female adolescents than male adolescents (Chassin et al., 2002). The proposal that externalizing problems will play a stronger role in the environmental stress – AAU link among males than females is congruent with the early starter model (McMahon & Wells, 1998). This model, which postulates that early externalizing symptoms lead to increasingly severe symptoms, including AAU, has been supported with males but not females (Crick & Zahn-Waxler, 2003; Silverthorne & Frick, 1999).

In summary, DST proposes that elevated environmental stress, such as exposure to violence, is associated with internalizing problems in females which, in turn, are associated with sustained alcohol abuse. In contrast, elevated environmental stress is hypothesized to be associated with externalizing symptoms in males, which, in turn, are associated with sustained alcohol abuse. These hypotheses have not been directly tested; however, the proposals are congruent with other theoretical perspectives (self-medication hypothesis, gender intensification hypothesis; early starter model), and there is evidence to support each of the links. The following sections will present the evidence for the links in the model.

Before considering the evidence for the links in the proposed model, it is important to put the contribution of DST in perspective. It is a complex theory which identifies systems and pathways of influence on alcohol abuse. However, how the variables from different categories of risk reciprocally influence each other and interact has not been well studied. Such research is difficult to design, implement, and analyze. Nevertheless, DST does provide a framework for conceptually organizing risk factors into categories and proposing how they operate to influence risk for AAU. With a theory like DST, the support will initially emerge from the *accumulation* of studies examining components of the theory. The proposed study contributes by examining several of the components of DST.

Violence exposure, internalizing and externalizing problems, and AAU

Violence Exposure. The Centers for Disease Control and Prevention defines violence as “The threatened or actual physical force or power initiated by an individual that results in or has a high likelihood of resulting in physical or psychological injury or death” (Youth Violence and Suicide Prevention Team, 1999). American adolescents are exposed to high levels of violence across the multiple contexts in which they interact (e.g., Finkelhor, Ormrod, & Turner, 2007; Margolin & Gordes, 2000; Ozer, Park, Paul, Bundis, & Irwin, 2003; Smith & Farole, 2009). In these settings, adolescents may experience violence themselves (i.e., be victimized) or witness violence (e.g., parents fighting, peers being victimized) and both forms of exposure to violence are detrimental (e.g., Margolin & Gordes, 2000; Osofsky, 1995; Salzinger et al., 2002). In one survey, children and adolescents reported that the settings in which they were most likely to be victims of violence were, in descending order, home, school, and neighborhood. In

contrast, they were most likely to witness violence, in descending order, in school, neighborhood, and home. Of importance, high rates of violence were found in all three settings (Slovak, 2000).

High rates of violence exposure have been reported in multiple studies that have included samples from inner cities and rural settings, as well as samples that are nationally representative (for reviews, see Margolin & Gordes, 2000; Osofsky, 1995; Ozer et al., 2003). For example, examining data from the home setting, Straus (1992) estimated that 10 million American children witness physical aggression between parents annually. Furthermore, almost 1.5 million adolescents were victims of serious violent crimes in 2000 (Ozer et al., 2003). These crimes, and ones of lesser severity, often occur at school and in the neighborhood. As an example of the school setting, in a recent national survey almost 7% of adolescents reported not attending school in the previous 30 days because they felt unsafe at school (Ozer et al., 2003). Shafii and Shafii (2003), in reviewing data on school crime from the U.S. Department of Justice and Education, reported that almost 20% of adolescents are victimized in schools and 28% of schools report that street gangs exist in schools. School violence has led to the creation of a Federal Safe Schools/Healthy Students Initiative (Giancola & Bear, 2003) and a Conference on Persistently Safe Schools was held in Washington, D.C. in 2004. Finally, as an example of neighborhood violence, over 95% of adolescents report witnessing violence and almost 60% being victims of violence in some high risk (e.g., urban) neighborhoods (Margolin & Gordes, 2003).

Exposure to violence in one setting may be offset by another setting being a safe haven. Unfortunately, the literature suggests that violence exposure in the home and

community (neighborhood and school) often co-exist. For example, Kennedy, Bybee, Sullivan, and Greeson (2010), as well as Duncan, Strycker, Duncan, and Okut (2002) and Richters and Martinez (1993), found significant links between neighborhood violence and family violence; Mateu-Belabert and Lune (2003) found a similar link between neighborhood and school violence. The co-occurrence of violence across the social contexts in which adolescents interact is not surprising. Families with low socioeconomic status experience economic stress, which may lead to violent behaviors in the home. Furthermore, these families typically live in neighborhoods characterized by risks, including violence, and the neighborhood schools are often unsafe (e.g., Leventhal & Brooks-Gunn, 2000; Paige, Kitges, & Wolfe, 2003). In addition, several theories in Table 4 are congruent with the framework just delineated for the interrelatedness of violence across home and community, including the Family Stress Model (Conger & Conger, 2002), Social Ecology Model (Kumpfer & Turner, 1990-1991), Reserve Capacity Hypothesis (Gallo & Matthews, 2003), and Social Disorganization Theory (Sampson & Groves, 1989). Finally, social workers have advocated for the inclusion of family and school measures when studying neighborhood violence (Nash & Bowen, 1999), suggesting that their interrelatedness is important to examine.

In order to understand the relationship between violence exposure and adolescent adjustment, including AAU, it is necessary to consider the multiple social contexts in which the adolescent interacts. For example, Bronfenbrenner's Ecological Systems Model (1979) emphasizes the interrelated influences across systems (e.g., home, neighborhood, school) in understanding adolescent behavior. Consistent with Garbarino's Risk Accumulation Model (Garbarino, 2000), multiple systems need to be considered

when studying violence exposure. In this way the individual, additive, and interactive contributions of violence exposure to AAU can be understood.

Violence Exposure and AAU. A number of studies support the link between violence exposure and AAU (see Table 1). Some of these studies did not differentiate among social contexts (e.g., Kilpatrick et al., 2003; Schwab-Stone et al., 1995), whereas most focused on violence exposure in one setting. With rare exceptions (Elze, Stiffman, & Dore, 1999; Ennett et al., 1997; Mrug, Loosier, & Windle, 2008) studies have not differentiated between or examined two settings (school and neighborhood).

Exposure to violence in neighborhoods has received the most attention, whereas exposure to violence in schools and homes have received less attention. Other studies not included in Table 1 suggest that family violence or conflict is associated with a broader array of problem behaviors which includes AAU (e.g., Conger & Conger, 2002). Both witnessing violence (e.g., Kilpatrick et al., 2000; Schwab-Stone et al., 1995) and being victimized, either physically (e.g., Clark, Lesnick, & Hegedus, 1997; Harrison, Fulkerson, & Beebe, 1997; Perkins & Jones, 2004) or sexually (e.g., Kilpatrick et al., 2000; Kipke, Montgomery, & MacKenzie, 1993), have been associated with higher levels of AAU. Of these three types of violence, both Emery and Laumann-Billings (1998) and Margolin and Gordos (2000) concluded that sexually abused children may be at particular risk for AAU and other problem behaviors. Furthermore, the combination of witnessing violence, being physically abused, and/or sexually abused is associated with particularly high levels of AAU (e.g., Arata, Langhinrichsen-Rohling, Bowers, & O'Brien, 2007; Luster & Small, 1997; Rotheram-Borus, Mahler, Koopman, & Langabeer, 1996). Finally,

it should be noted that several of the studies included AAU as one of several indicators of substance use (Dembo, 1978; Kilpatrick et al., 2003).

In summary, violence exposure has been related to more AAU. However, the violence construct in the studies examining this relationship has typically been limited to one setting or failed to differentiate between settings. In order to understand the association between violence exposure and AAU, multiple settings (i.e., home and community) need to be studied concurrently. Furthermore, attention needs to focus on potential mediators; based on theory, DST (Zucker et al., 1994), the self-medication hypothesis (Khantzian, 1997), and on the studies reviewed in Table 1, internalizing problems appear to be one potential mediator. Demonstration of a link between violence exposure and internalizing problems is a first step in establishing that internalizing problems may be a mediator.

Violence Exposure and Internalizing Problems. Internalizing problems consist of depressive (i.e., sadness or dysphoria), anxious (i.e., excessive worry or fear), and post-traumatic stress (i.e., life stressors that lead to re-experiencing a trauma, avoidant symptoms, and increased arousal) symptoms. A substantial body of literature indicates that exposure to violence, both witnessing and experiencing it (Kennedy et al., 2010; Kliemer et al., 1998; Lynch & Cicchetti, 1998), is associated with increased levels of these symptoms. Table 5 shows the frequency of studies supporting the association between violence exposure in each setting and internalizing symptoms.

Table 5. Frequency of studies supporting the association between violence exposure in each setting and internalizing symptoms.

Internalizing symptoms	Frequency of studies in each setting				Total
	Home violence exposure	Neighborhood violence exposure	School violence exposure	General exposure not limited to a specific setting	
Depression	11	7	0	1	19
Anxiety	0	6	1	1	8
Post traumatic stress	1	8	0	1	10
Total	12	21	1	3	37

As is evident in Table 5, violence in the three settings, but particularly in the neighborhood and home, has been found to be associated with one or more of the three indicators of internalizing problems. When more than one indicator has been examined in the same study (e.g., anxious and depressive symptoms), violence is typically associated with both (e.g., Kliemer et al., 1998; Schwab-Stone et al., 1995, 1999). This is not surprising, as depression and anxiety are often comorbid among children (e.g., Kovacs, 1989) and an anxiety or depression diagnosis is related to PTSD (Milgram, 1998). As a consequence of the overlap, anxious, depressive, and post-traumatic stress symptoms are often combined into a measure of internalizing problems (e.g., Achenbach, 1991), which is used to denote negative affectivity.

School violence has received less attention than community and home violence. However, it is important to note that, with the tragic occurrences of school violence in recent years (e.g., in schools in Arkansas, Colorado, and Minnesota), attention is beginning to focus on the relationship between violence in this setting and internalizing

problems (e.g., Shafii & Shafii, 2003). Furthermore, the findings reported earlier by Ozer et al. (2003) concerning adolescents avoiding school because of safety concerns suggests that school violence is related to internalizing problems.

From a theoretical perspective, exposure to violence can lead to internalizing problems through conditioning and attributional processes. An adolescent's reaction to witnessing violence or being victimized is likely to involve a combination of arousal, fear, and helplessness (Margolin & Gordes, 2000). Through repeated exposures to violence, an adolescent may experience persistent arousal and fears that interfere with adaptive functioning (e.g., avoiding school). An adolescent may interpret these experiences as indicating the world is unsafe, which leads to internalizing problems (Lynch & Cicchetti, 1998). The internalizing problems resulting from violence exposure can, in turn, lead to alcohol being used as a way to reduce tension (Zucker et al., 1994) or, stated alternatively, to self-medicate (Khantzian, 1997). The link between internalizing problems and AAU is the next step in establishing that internalizing symptoms may be a mediator.

Internalizing Problems and AAU. As is delineated in Table 1, the association of internalizing problems and AAU has been examined in numerous studies. In all cases, higher levels of internalizing problems were associated with more AAU. An anxiety or depression diagnosis has been found to double the risk for subsequent alcohol-related problems (Christie et al., 1988); however, after reviewing the literature, Khantzian (1997) pointed out that a diagnosis of anxiety, depression, or PTSD is not necessary to lead to problems with alcohol, as subclinical levels (i.e., symptoms) are sufficient for such problems to emerge. Furthermore, numerous other studies have documented that

internalizing problems precede problems with alcohol use among adolescents (e.g., Buckner & Turner, 2008; also see Clark, Smith, Neighbors, Skerlec, & Randall, 1994; Comptom, Burns, Egger, & Robertson, 2002; Khantzian, 1997, for reviews).

The studies which have been conducted have included: (a) ones which focused only on depressive symptoms (e.g., Deykin, Buka, & Zeena, 1992), anxiety symptoms (e.g., Buckner & Turner, 2009; Rhode, Lewinsohn, & Seeley, 1996), or stressful events (which are associated with post-traumatic stress symptoms; e.g. Baer & Bray, 1999); (b) each of these three indicators examined independently in the same study (e.g., Colder & Chassin, 1999); and (c) a combination of two or more of these indicators of internalizing problems (e.g., Mags et al., 2008; Steinhausen & Metzke, 2003). As has already been noted, in all studies, regardless of how internalizing symptoms were defined, an association with AAU emerged. This has led to a focus on the general construct, labeled as negative affectivity or internalizing problems, rather than specific symptoms (e.g., depressive symptoms).

The self-medication hypothesis (Khantzian, 1997), which is similar to but more fully developed than the tension reduction proposal in DST (Zucker et al., 1994), has been noted previously as an explanation for internalizing problems being associated with AAU. Alcohol relieves or ameliorates affective states that are painful, including isolation, emptiness, worry, and fear. In this conceptual model, stressful events, such as witnessing or experiencing violence, receive special attention as individuals who have experienced such events are proposed to use alcohol to relieve the painful negative affective states associated with the events. Therefore, the self-medication hypothesis suggests that

internalizing problems play an important mediating role in the association between violence exposure and AAU. The proposed study will test this hypothesis.

The Role of Adolescent Gender and Internalizing Problems. The gender intensification hypothesis proposes that in adolescence, girls are more sensitive to stress than boys (Davies & Lindsay, 2004). There is an emerging literature to support this hypothesis (e.g., Davies & Lindsay, 2004; Ge et al., 1994; Lee, Burkam, Zimilies, & Ladewski, 1994). For example, Davies and Lindsay (2004) found that witnessing violence between parents was associated with a higher level of internalizing problems for adolescent girls than boys.

Davies and Lindsay (2004) propose that in early adolescence, boys are socialized to become more independent and self-directed, whereas girls become more communal (i.e., interpersonally connected and concerned with the welfare of others). The communal dispositions of girls may result in them becoming more reactive to stress, leading to higher levels of internalizing problems. As noted, research is consistent with this explanation.

Other research lends support to the gender intensification hypothesis. Relative to boys, girls manifest an increase in internalizing problems, mainly depressive symptoms, in adolescence (for reviews, see Crick & Zahn-Waxler, 2003; Nolen-Hoeksema, 1994). Furthermore, the link between internalizing problems and AAU has emerged as stronger for adolescent girls than boys in several studies (e.g., Chassin et al., 2002; Kumpulainen, 2000). Finally, both the self-medication hypothesis (Khantzian, 1997) and DST (Zucker et al., 1994) point to the link between internalizing problems and alcohol misuse being stronger for females than males. Thus, when the gender intensification hypothesis

(adolescent females are more sensitive to stress than adolescent males which results in internalizing symptoms) is considered in combination with the self-medication hypothesis and DST (internalizing symptoms are more strongly related to alcohol use in females than males), the links in the model to be tested (violence exposure – internalizing symptoms – AAU) should be stronger in females than males.

Violence Exposure and Externalizing Symptoms. As with internalizing problems, both theory, [DST (Zucker et al., 1994), the early starter model (McMahon & Wells, 1998; McMahon et al., 2006)], and the studies reviewed in Table 1 suggest that externalizing problems may be one mediator of the violence exposure – AAU relationship. Demonstration of a link between violence exposure and externalizing problems is a first step in establishing that externalizing symptoms may be a mediator.

Externalizing problems consist of behaviors like aggression toward others, defiance of authority figures, and property destruction. A substantial literature with both children and adolescents indicates that violence exposure is associated with externalizing problems (e.g., Thornberry et al., 2010; for reviews, see Fincham, 1998; Ingoldsby & Shaw, 2002, Margolin & Gordes, 2000; Osofsky, 1995). Table 6 shows the frequency of studies supporting the association between violence exposure at home, school, and in the neighborhood and externalizing problems. As shown, the vast majority of these studies have focused on the association of violence exposure in the home and neighborhood as opposed to violence exposure at school.

It should also be noted that both witnessing violence and being victimized have been associated with externalizing problems, and that social learning theory has been used to explain these associations (Margolin & Gordes, 2000). Children and adolescents

who observe or experience violence learn that problem situations are handled through aggressing toward others. They imitate these behaviors and develop an array of increasingly severe externalizing problems in interactions with others. Other theoretical explanations which have been offered include: weakening disinhibition of violent responses (Farrell & Bruce, 1997); promotion of desensitization to the consequences of being aggressive (Garbarino, Kostelny, & Dubrow, 1991); and disruption of the development of empathy for others (Gorman-Smith & Tolan, 1998).

Externalizing Problems and AAU. There is also a substantial literature indicating that adolescents who engage in externalizing behaviors are likely to initiate early alcohol use and progress to problems with alcohol. These studies are noted in Table 1. As an example, Chassin and colleagues (2002) found that externalizing problems were associated with an early onset of binge drinking.

The findings summarized in Table 1 are congruent with several theoretical perspectives. For example, problem behavior theory (Jessor et al., 1991) proposes that various problem behaviors, including delinquent acts and AAU, co-occur. Jessor and his colleagues have generated substantial support for problem behavior theory (see Jessor et al., 1991, for a review).

A theoretical perspective that is particularly relevant is the early starter model for conduct problems (McMahon & Wells, 1998; McMahon et al., 2006). This model proposes that externalizing problems are initiated through difficult temperaments early in life and are exacerbated through negative interactions first with parents and then with teachers and peers, leading to increasing externalizing problems. As young adolescents, these youth begin associating with other problematic adolescents and engaging in

delinquent behaviors. Alcohol use occurs and accelerates as these youth begin to associate with older problematic adolescents. Therefore, from the perspective of the early starter model, AAU is an outgrowth of externalizing problems. This model is congruent with the antisocial trajectory proposed by Zucker and colleagues (1994) in developmental systems theory, which was reviewed earlier.

Table 6. Frequency of studies supporting the association between violence exposure in each setting and externalizing problems.

	Frequency of studies in each setting				Total
	Home violence exposure	Neighborhood violence exposure	School violence exposure	General exposure not limited to a specific setting	
Externalizing problems	13	9	1	2	25

The Role of Adolescent Gender and Externalizing Problems. The development of externalizing problems delineated in the early starter model has received substantial support with males (see McMahon & Wells, 1998; McMahon et al., 2006 for reviews). However, there has been little research with females. Both Silverthorne and Frick (1999) and Crick and Zahn-Waxler (2003) have proposed that females do not follow the same trajectory; that is, females do not begin in early childhood with difficult temperaments which accelerate into increasingly severe externalizing problems. The proposal by Crick and Zahn-Waxler (2003) and by Silverthorne and Frick (1999) that males, but not females, follow the early starter model is compatible with the antisocial trajectory to alcohol problems in developmental systems theory. The evidence presented by Zucker and colleagues (1994) indicates that the antisocial trajectory has been examined in males and leads to sustained problems with alcohol. As Zucker and colleagues point out,

research has not been conducted with females, but they propose that females primarily follow the negative affect trajectory, not the antisocial pathway. The proposed study will examine the roles of externalizing problems and internalizing problems in male and female adolescents to determine if the two types of symptoms are differential mediators of the violence exposure – AAU link for males and females. The findings will potentially provide some evidence for different pathways for females and males from violence exposure to AAU.

Hypotheses

The first hypothesis was that increased violence exposure in the home and in the community each are associated with increased AAU in females and in males separately. Both developmental systems theory and the studies conducted in one setting provide some support for this hypothesis. The current study builds on the existing literature by being one of the first investigations to include and contrast violence exposure in two different settings: home and community (school and neighborhood). Two separate constructs, violence exposure at home and in the community, were created.

The second hypothesis was that internalizing problems mediate the relationship between home/community violence exposure and AAU for females. The existing literature supports links between violence exposure and internalizing problems (e.g., Kennedy et al., 2010; also see Table 5) and between internalizing problems and AAU (see Table 1). However, as Zucker and colleagues (1994) noted, the hypothesis that elevated environmental stress is associated with internalizing problems, and AAU occurs in order to reduce these symptoms, has not been tested. As this is one of the critical trajectories (i.e., the negative affect trajectory) for developing alcohol misuse by

adolescents in developmental systems theory, the hypothesis warranted examination.

Furthermore, DST, as well as the gender intensification hypothesis, posits that negative affect primarily serves as a mediator for females. Therefore, differential findings are expected for male and female adolescents.

The third hypothesis was that externalizing problems mediate the relationship between home/community violence exposure and AAU for males. The existing literature supports a relationship between violence exposure and externalizing problems (see Table 6) and between externalizing problems and AAU (see Table 1). However, the hypothesis that elevated stress is associated with externalizing problems and AAU occurs as a consequence of engaging in these types of behaviors has not been tested. As this is one of the critical trajectories (i.e., antisocial trajectory) for alcohol problems in DST, the hypothesis warranted testing. Furthermore, DST, as well as the early starter model, proposes that externalizing problems primarily serve as a mediator for males. Therefore, differential findings by gender of the adolescent are expected.

As a primary interest in conducting the proposed study is home violence exposure, three additional hypotheses focused on violence in this setting were tested. First, the additive effect of home violence to community violence was examined. It was hypothesized that, after accounting for community violence, home violence makes a unique contribution to AAU. Second, the interaction of home violence and community violence was examined. It was hypothesized that there is a significant interaction which indicates that high levels of both home and community violence are associated with the highest levels of AAU. Third, the individual contributions of the three variables constituting the home violence construct (physical abuse, sexual abuse, witness violence)

were examined individually. Based on Margolin and Gordos (2000) and Emery and Laumann-Billings (1998), it was hypothesized that, when considered in the context of each other, having experienced sexual abuse is the primary predictor of AAU.

The additional three hypotheses (i.e., hypotheses four, five, and six) contributed to the first three hypotheses by (1) examining the violence exposure constructs in a more detailed manner (i.e., unique contributions of home violence beyond community violence and the interaction of violence in these two settings) and (2) “breaking down” the home violence construct (individual contributions of witnessing, physical, and sexual violence). The hypotheses were congruent with the Ecological Systems Model (1979), the Risk Accumulation Model (Garbarino, 2000), and Developmental Systems Theory (Zucker et al., 1994) in that multiple systems and multiple contributors within systems need to be considered.

Chapter 3

Study Methods

Dataset

The secondary data utilized for the present study originated from the National Survey of Adolescents in the United States (Kilpatrick & Saunders, 1995), a project conducted with adolescents to examine the associations between violence exposure, mental health, delinquency, and substance abuse, including alcohol use. The study was conducted in 1995 and a multi-stage, stratified, area probability, random-digit-dialing sampling procedure was utilized to select a nationally representative sample. In addition, an oversample of urban adolescents was included to increase the number of youth exposed to violence. Collecting the oversample followed the same sampling procedures as for the initial sample except for the geographic stratification step. This step was replaced by identifying counties classified as urban by the census and specifying the target population as households within these counties.

The content areas surveyed with the adolescents and the national sample made the dataset an ideal one for testing the hypotheses. Furthermore, the study builds on existing findings from the dataset in the following ways: Examining violence exposure in two different settings (home and community); building a construct of violence exposure consisting of witnessing physical and sexual violence in each of these settings; examining mechanisms of the proposed violence exposure – AAU association; and examining the unique, interactive (with community violence), and individual component (witness, physical, sexual) contributions of home violence to AAU.

Participants

The total sample consisted of 4,023 adolescents between the ages of 12 and 17. There were two subsamples: A national probability sample of 3,161 adolescents and a probability oversample of 862 adolescents residing in urban areas. The sample was composed of 51.5% males, 48.5% females, 15.1% African Americans, 3.5% Native Americans, 1.2% Asian Americans, 8% Hispanic, and 72.2% Caucasian, non-Hispanic adolescents. Sixteen to 17% of the sample was in each of the following six age groups: 12, 13, 14, 15, 16, and 17 years of age. The participants included in the current analyses are described in the Results section.

Measures

A structured interview was utilized to collect all information in telephone interviews with a parent and, subsequently, the adolescent. The adolescent provided data for each of the primary variables in the models to be tested.

From the measures noted below, I initially built five constructs: (1) A community violence construct consisting of youth perception of violence as a problem in their neighborhood and school, as well as youth report of witnessing or being a victim of violence in these settings; (2) a home violence construct consisting of youth report of witnessing violence in the home, as well as being a victim of physical abuse or sexual abuse in the home; (3) an internalizing problems construct, consisting of youth report of depressive, anxious, and post-traumatic stress symptoms; (4) an externalizing construct, consisting of youth report of behaviors such as aggression and theft; and (5) an AAU construct consisting of youth report of amount of alcohol consumed, how recent the use was, and experiencing alcohol related problems.

Demographic Information. Parents provided information on education and family income. For education, they were asked to indicate the highest level of education they had completed, including (1) no formal schooling, (2) first through seventh grade, (3) eighth grade, (4) some high school, (5) high school, (6) some college, (7) four year college graduate, (8) some graduate school, or (9) a graduate degree. Household income was measured by asking the parent to indicate whether their income before taxes is (1) less than \$20,000, (2) \$20,000 to \$50,000, or (3) more than \$50,000.

Adolescents provided information on their age, gender, and ethnicity. They were asked to provide their age in years and whether they are male or female. Ethnicity was measured by asking the adolescents to indicate whether they identify themselves as Hispanic, Asian or Pacific Islander, American Indian or Alaska Native, African American (Black), or White/Caucasian.

Violence Exposure. The adolescent provided information on exposure to violence at home and in the community (neighborhood and school combined) and type of violence in each setting. For each type of violence in each setting (witnessed, physical, sexual), the number of different types of violence witnessed and victimization experiences served as the indicators for each participant's level of violence exposure.

Regarding witnessing violence, the adolescent indicated whether she or he had witnessed each of the following: An individual being (1) shot; (2) cut or stabbed; (3) sexually assaulted; (4) mugged or robbed; (5) threatened with a weapon; or (6) beaten in the past year. For each occurrence, the adolescent indicated if it occurred at home or in the community (i.e., school or neighborhood). A score of 0 to 6 was assigned depending

on the number of these different types of violence witnessed at home. A similar procedure was followed for community violence.

Regarding physical victimization, the adolescent indicated whether she or he had ever been: (1) attacked with a weapon; (2) attacked without a weapon; (3) threatened with a gun or knife; (4) beaten up with an object; or (5) beaten up with fists. For each occurrence, the adolescent indicated if it occurred at home or in the community (school or neighborhood). A score of 0 to 5 was assigned depending on the number of these different types of physical victimization experienced at home. The same procedure was followed for community physical victimization.

Regarding sexual victimization, the adolescent indicated whether any of the following occurred: (1) a male put his sexual body parts into you; (2) a person has put his or her fingers or objects inside your sexual parts; (3) a person put his or her mouth on your sexual parts; (4) a person touched your sexual parts; or (5) a person made you touch his or her sexual parts. The adolescent also was asked who did this and where it occurred. Answers to the latter question were used to determine if sexual victimization occurred in the home or community. A score of 0 to 5 was assigned depending on the number of these different types of sexual victimization experienced at home. The same procedure was followed for community sexual victimization.

Internalizing Problems. The adolescent provided information on her or his depressive symptoms, anxiety symptoms, and post-traumatic stress (PTSD) symptoms. Six items assessed depressive symptoms: (1) ever felt so low that you thought about suicide; (2) ever attempted suicide; (3) has trouble concentrating; (4) stopped caring about activities; (5) weight loss; and (6) cannot feel things anymore. Six items assessed

anxiety symptoms: (1) unexpected noises startle you; (2) find yourself suddenly feeling anxious; (3) little things bother you a lot; (4) feel you have to be on guard much of the time; (5) try not to think of some things; and (6) difficulty falling asleep. Seven items assessed PTSD symptoms: (1) you go out of your way to avoid places; (2) you have a reaction because you are reminded of a past situation; (3) you have had a flashback; (4) you have felt like you cannot remember parts of a bad experience; (5) continue to have unpleasant memories; (6) you try to avoid feelings about something; and (7) repeated bad dreams or nightmares.

All items assessed symptoms over the past year, were answered in a yes (score of 1)/no (score of 0) format, and are similar to disorders in the DSM-IV (American Psychiatric Association, 1994). Items for each scale were summed and the three scales served as indicators of internalizing problems.

Externalizing Problems. Six items were used to assess externalizing problems: (1) you stole something worth more than \$100; (2) you have broken into and entered someone else's home or building; (3) you have been involved in gang fights; (4) you used force or strong-armed someone in a robbery; (5) you had sex with someone against their will; and (6) you attacked someone with the intent of hurting them.

All items assessed the number of instances in which the adolescent committed the behavior over the past year and are similar to items for Conduct Disorder in the DSM IV (APA, 1994). Each of the items served as a manifest variable for the externalizing problems latent construct.

Alcohol use. Three indicators of alcohol problems were assessed. One item assessed how often the adolescent drank in the past year. Possible answers included: (1) 3

or more times a day; (2) 2 times a day; (3) once a day; (4) 3 or 4 times a week; (5) once or twice a week; (6) 2-3 times a month; (7) about once a month; (8) less than once per month; and (9) never in the past year. This item was reverse scored so that higher numbers represent more alcohol use. One item assessed the number of days the adolescent had 5 or more drinks in the past year. The number of days reported as having 5 or more drinks served as the indicator. The third indicator consisted of alcohol-related problems and was assessed by ten items, each asking if the problem occurred as a result of alcohol use. All items were answered as occurring (score of 1)/not occurring (score of 0) as a result of alcohol use: (1) your heart beats fast or you sweat a lot; (2) your hands shake; (3) you have trouble sleeping; (4) you have an upset stomach or throw up; (5) you felt anxious; (6) you saw, heard, smelled, or felt things which were not there; (7) you were so tense you could not sit still; (8) you drank right after waking up; (9) you drank to keep from having a hangover; and (10) you drank to make withdrawal symptoms go away. The sum of the 10 items responded to positively served as the indicator for alcohol-related problems. Use in last year, number of times the adolescent had 5 or more drinks, and alcohol-related problems served as the three indicators of AAU.

Data collection procedures

Telephone surveys were conducted in English or Spanish by Schulman, Ronca, and Bucuvalas, Inc., a New York-based survey research firm. A Computer-Assisted Telephone Interviewing (CATI) system was used for all interviews.

The national probability sample was constructed by a multistage, stratified, area probability random-digit dialing sampling procedure. First, the United States was stratified geographically by census region, and each region was sampled proportionally to

the distribution of the population in that region. Next, telephone banks in each region were systematically selected. Third, random-digit-dialing was used to sample households. Business numbers were replaced and non-answering numbers were called five times before being replaced. Finally, an adult in the household was screened to determine if an adolescent resided in the house. If more than one adolescent 12-17 years of age resided in the household, the adolescent who had the most recent birthday was selected as the participant. The oversampled urban participants were selected in the same way except the first step was eliminated and replaced by identifying households in urban settings.

After determining that the household contained one or more eligible adolescents, an interviewer asked to speak to a parent or guardian. One parent or guardian in each household was interviewed briefly to establish rapport and secure permission to interview the targeted adolescent. Parents and guardians were provided the opportunity to call a toll-free number to confirm the authenticity of the study. Whenever possible, adolescents were interviewed immediately following the parent or guardian interviews. Otherwise, appointments for interviews were scheduled. As an incentive for participation, adolescents received a check for five dollars as compensation for their time.

Two steps were taken to increase the likelihood that adolescents answered questions in an open and honest manner, with privacy. First, the interviewer asked whether the adolescent was in a location where she or he could be assured of privacy and could answer freely. If the adolescent indicated that he or she was not, the interviewer offered to call back at another time when privacy was more likely. Second, the interview was designed primarily with closed-ended questions, enabling adolescents to respond to questions with a simple “yes” or “no” or other one-word or phrase answers. Thus, if

someone in the home was listening to a respondent's answers, he or she would be unlikely to hear anything that would reveal the nature of the question.

Parents in 90.1% of eligible households completed interviews and parents in 78.9% of eligible households gave permission for their adolescents to be interviewed. Adolescent interviews were completed in 75% of eligible households, 83.2% of households with completed parent interviews, and 95% of households with parental permission. Adolescents who were excluded from the study included those residing in institutional settings, in households without a parent or guardian, (e.g., emancipated minors, married adolescents living on their own) or in a house without telephones, those who did not speak English or Spanish, and those whose parents did not give permission for them to be interviewed.

Data analysis plan

Initially, a missing value analysis was conducted to determine the extent and nature of any missing data. Descriptive statistics were then used to describe the characteristics of the sample and to summarize the values for each variable. Following this, inter-correlations were computed among the independent and dependent variables. After the initial analyses, a measurement model was utilized to test the fit of the factor structures and to determine the factor loadings for each indicator. An alpha coefficient for each construct was then calculated and, based on this and the fit of the factor structures, post-hoc model modifications were made.

Following the modifications, the first three hypotheses were tested in version 7.0 of the Analysis of Moment Structures Program (Arbuckle, 2006) with a series of structural equation models. Although each model was tested separately for females and

males, the purpose of the analyses was not to directly compare the quality of the fit of the models across gender. Rather, the purpose was to determine whether or not violence exposure is related to AAU in each gender and whether this relationship is mediated by internalizing problems in females and externalizing problems in males.

Hypotheses four, five, and six were tested using hierarchical regression with AAU serving as the dependent variable. In the first regression step, demographic control variables, including child gender, age, and ethnicity, as well as parent education and family income, were entered; the community violence exposure variables were added in the second step; the home violence exposure variables were added in the third step; and the interaction of the summed home and community violence exposure variables was added in the fourth step.

Some understanding of the unique contribution of home violence exposure in the context of community violence can be gained from the first structural equation model (see Figure 2). However, by examining the question through hierarchical regression, demographic variables were initially controlled so that the change in R-square, accounted for by home violence exposure and the interaction term, could be determined. No differential outcomes by gender were expected for hypotheses four, five, and six. Therefore, these hypotheses were tested with the full sample, which includes over four thousand cases. Because even small associations can be statistically significant with large samples such as this, a significance level of .01 instead .05 was chosen as the criterion for determining whether or not the observed changes in R-square were due to sampling error (related to hypotheses four and six). This significance level criterion was also utilized to

determine whether sexual abuse was the only significant predictor of AAU among the home violence exposure variables (related to hypothesis five).

Chapter 4

Results

Missing Value Analysis

SPSS was used to conduct a missing value analysis. Of the 4,023 cases, 705 (17.5%) were missing data for at least one indicator or demographic variable. A Little Missing Completely at Random test indicated that the missing data were not missing completely at random ($\chi^2 = 1440.264$, $df = 689$, $p < .01$). As a result, a full missing value analysis was conducted.

Separate variance t tests for those variables with one percent or more missing was conducted to explore whether they were missing data at random. Some t values were significant at the .05 level, indicating that missing cases in some of the variables are associated with other variables in the dataset and, thus, are not missing at random. For example, the mean number of depression, anxiety, and PTSD symptoms was significantly greater for the missing cases than for the cases with data in almost all of the other variables. Therefore, adolescents with more internalizing problems may have been more likely to have missing data than those adolescents with fewer internalizing problems. However, it is important to note that with the exception of the income variable, which was missing in 253 cases (6.3%), the percentage of missing values for each variable was small, ranging from none missing for gender to 2.5% missing for alcohol-related problems. In addition, only 5.5% (39/705) of the cases with at least one missing value was missing a value for more than two of the variables, indicating more of a missing at random than not missing at random scenario.

Because approximately 18% of the cases were missing data for at least one variable and there is some indication that this may not be completely at random, cases with missing values could not be excluded from the analysis. As a result, Maximum Likelihood Estimation (MLE) was conducted to impute data for missing values for all variables except ethnicity and gender, as these are nominal variables and MLE does not impute data for missing values for nominal variables. As a consequence, the cases ($n = 73$) with missing values for ethnicity were excluded from the hierarchical regression analyses that were used to test the fourth, fifth, and sixth hypotheses (gender did not have any missing values). The first three hypotheses did not require ethnicity to test; therefore, the full sample of 4,023 cases was utilized for these hypotheses.

Sample characteristics

The mean age of the sample was 14.5 years and included an approximately equal number of males and females. As can be seen in Table 7, about three-quarters identified themselves as White/Caucasian, almost 15% identified themselves as African American (Black), and 10% identified themselves as Hispanic. Less than 3.5% identified themselves as either American Indian or Alaska Native; Asian (Oriental); or Pacific Islander. A majority of participants came from households in which at least one parent has completed some college and with a yearly income of 20,000 dollars or more. Table 7 provides complete details on the characteristics of the sample.

Table 7. Sample characteristics.

Characteristic	<i>N</i>	Percentage
Gender		
Male	2,018	50.2%
Female	2,005	49.8%
Ethnicity*		
Hispanic	390	9.9%
Asian or Pacific Islander	107	2.7%
American Indian or Alaska Native	135	3.4%
African American (Black)	572	14.5%
White/Caucasian	2,746	69.5%
Parent education		
No formal schooling	2	0.0%
1 st through 7 th grade	44	1.1%
8 th grade	56	1.4%
Some high school	299	7.4%
High school graduate	1,285	31.9%
Some college	1,104	27.5%
4 year college graduate	656	16.3%
Some graduate school	140	3.5%
Graduate degree	437	10.9%
Household income (before taxes)		
Less than \$20,000	651	16.2%
\$20,000 to \$50,000	1,854	46.1%
More than \$50,000	1,518	37.7%
Age	Mean 14.5 years	<i>SD</i> 1.63 years

*Missing values for 73 cases

Measurement model

A confirmatory factor analysis was performed in AMOS to assess the validity of the home violence exposure, community violence exposure, internalizing problems, externalizing problems, and adolescent alcohol use constructs shown in Figure 2.

Figure 2. Measurement model (indicator notes are provided on the following page)

Indicator notes for Figure 2

1 = Witness violence in school or neighborhood	10 = Stolen more than \$100
2 = Victim of violence in school or neighborhood	11 = Stolen motor vehicle
3 = Victim of sexual abuse in school or neighborhood	12 = Broken and entered
4 = Witness violence in home	13 = Gang fights
5 = Victim of violence in home	14 = Robbed
6 = Victim of sexual abuse in home	15 = Forced sex
7 = Depression symptoms	16 = Attacked someone
8 = Generalized anxiety symptoms	17 = Alcohol-related problems
9 = Post-traumatic stress disorder symptoms	18 = Amount of use in past year
	19 = Number of days with five or more drinks in the past year

Maximum Likelihood Estimation was employed to estimate the model. The independence model, which tests the hypothesis that all variables are uncorrelated, was easily rejected, $X^2(171, n = 4,023) = 15556.995, p = .000$. Some support was found for the hypothesized model: $X^2(142, n = 4,023) = 1996.127, p = .000$, root mean square error of approximation = .057, normed fit index = .872, comparative fit index = .879. In addition, a chi-square difference test indicated a significant improvement in fit between the independence model and hypothesized model.

Post hoc model modifications were performed in an attempt to develop a better and possibly more parsimonious model. First, because the externalizing problems factor loading for “had or tried to have sexual relations with someone against their will” was not significant (coefficient = .02) and is a relatively serious behavior relative to the other externalizing problems indicators, it was dropped. Second, on the basis of modification indices provided by AMOS, correlation paths were added between the following error terms within the externalizing problems construct shown in Figure 2: (1) e₁₂ and e₁₆;

(2) e_12 and e_13; (3) e_10 and e_12; and (4) e_10 and e_13. The model was then re-estimated, $X^2(121, n = 4,023) = 956.527, p = .000$. In addition to a significant drop in the chi-square value from the original model to this model, the root mean square error of approximation decreased to .041, the normed fit index increased to .946, and the comparative fit index increased to .946. Finally, both the akaike information criterion and the consistent akaike information criterion indicated a better fitting, more parsimonious model after modifications were made, and all indicator coefficients in the final model were significant at the $p < .001$ level.

An internal alpha coefficient was obtained for each of the five constructs in SPSS. The results are provided in Table 8. In order to achieve better reliability for the AAU construct, the variable “number of days had five or more drinks in the past year” was dropped; the Alpha increased to .6920. However, this leaves only two indicators for this construct, which is not acceptable because it creates an unidentified model (i.e., there are fewer data points than the number of estimate parameters). Despite this, the loadings of the indicators were good. So, in order to retain the latent nature of the variable, a principal components factor analysis was conducted and a single factor was retained as an observed AAU variable that replaced the original three factor AAU construct. In addition, because better reliability could not be achieved for the violence exposure constructs, the indicators were separated for the primary analyses.

Table 8. Alpha coefficients for each construct.

Construct	Alpha coefficient
Home Violence Exposure	.3462
Community Violence Exposure	.3361
Internalizing Problems	.8374
Externalizing Problems	.6345
Adolescent Alcohol Use	.2063

The final measurement model shown in Figure 3 was estimated, $X^2(71, n = 4,023) = 535.384, p = .000$. In addition to a significant drop in the chi-square value from the last model, the root mean square error of approximation decreased from .041 to .040, the normed fit index increased from .938 to .959, and the comparative fit index increased from .946 to .964. Finally, both the akaike information criterion and the consistent akaike information criterion indicated a better fitting, more parsimonious model after all modifications were made, and all indicator coefficients in the final model were significant at the $p < .001$ level. Taken together, these results indicate that the final measurement model, following post hoc modifications, is a good-fitting model and that, more specifically, all of the indicators for internalizing and externalizing problems account for a significant amount of variance in their respective construct. It is therefore appropriate to move forward with testing the structural models for hypotheses one, two, and three.

Figure 3. Final measurement model

Indicator notes for Figure 3

1 = Depression symptoms
 2 = Generalized anxiety symptoms
 3 = Post-traumatic stress disorder symptoms

4 = Stolen more than \$100
 5 = Stolen motor vehicle
 6 = Broken and entered
 7 = Gang fights
 8 = Robbed
 9 = Attacked someone

Table 9 presents the ranges, means, and standard deviations for each variable that was examined. As shown for the violence exposure variables, the mean for the summed number of different types of violence experienced in the home was more than twice as much for females than males. However, the mean for the summed number of different types of violence experienced in the community was greater for males than females. Of the different types of violence exposure, the mean number of different types of violence witnessed in the community was greatest for both genders. Conversely, the mean number of different types of violence witnessed at home was the smallest in females and second smallest in males. The mean of different types of physical victimization experienced at home was greater for females, whereas the mean number of different types of physical victimization in the community was greater for males. Lastly for the violence exposure variables, male adolescents had lower means for sexual abuse both at home and in the community than did female adolescents.

As is also shown in Table 9, the mean number of internalizing problems was greater in females than males, and the mean number of externalizing problems was greater in males than females. For AAU, both genders had experienced the same mean number of alcohol related problems, but male adolescents had a slightly greater mean rate of use in the past year than did female adolescents.

Table 9. Female and male adolescent ranges, means, and standard deviations for the home and community violence exposure, internalizing and externalizing problems, and adolescent alcohol use variables.

Variable	Females			Males		
	Range	Mean	SD	Range	Mean	SD
Home violence exposure						
Number of different types of violence witnessed	0 to 4	.04	.22	0 to 3	.02	.15
Number of different types of physical victimization	0 to 3	.09	.37	0 to 3	.05	.27
Number of different types of sexual abuse	0 to 2	.05	.27	0 to 3	.01	.17
Sum of home violence exposure indicators	0 to 7	.19	.60	0 to 4	.08	.35
Community violence exposure						
Number of different types of violence witnessed	0 to 5	.90	.95	0 to 5	1.1	1.0
Number of different types of physical victimization	0 to 3	.09	.34	0 to 3	.20	.50
Number of different types of sexual victimization	0 to 2	.07	.28	0 to 3	.02	.17
Sum of community violence exposure indicators	0 to 7	1.1	1.8	0 to 8	1.3	1.3
Internalizing problems						
Number of different types of depression symptoms	0 to 6	.96	1.40	0 to 6	.63	1.06
Number of different types of anxiety symptoms	0 to 6	1.03	1.39	0 to 6	.73	1.15
Number of different types of post-traumatic stress symptoms	0 to 9	1.05	1.63	0 to 8	.79	1.39
Sum of internalizing problems indicators	0 to 20	3.05	3.87	0 to 20	2.15	3.10
Externalizing problems						
Number of times in the past year:						
Stolen more than \$100.00	0 to 30	.05	.98	0 to 20	.13	.90
Stolen a motor vehicle	0 to 10	.02	.30	0 to 10	.04	.43
Broken and entered into a building or residence	0 to 30	.03	.69	0 to 35	.16	1.19
Been in gang fights	0 to 95	.17	2.40	0 to 50	.32	2.39
Robbed someone	0 to 5	.02	.26	0 to 12	.07	.56
Attacked someone	0 to 72	.12	2.00	0 to 20	.16	1.10
Sum of externalizing problems indicators	0 to 200	.41	5.09	0 to 62	.88	4.30
Adolescent alcohol use						
Number of different types of alcohol related problems experienced	0 to 8	.46	1.11	0 to 8	.46	1.10
Amount of use in the past year ¹	0 to 8	.87	1.46	0 to 8	.98	1.60
Sum of adolescent alcohol use indicators	0 to 13	1.33	2.29	0 to 14	1.43	2.38

¹ Measured at the ordinal level with values ranging from zero to eight: 0 = never in the past year; 1 = less than once per month; 3 = about once a month; 4 = two to three times a month; 5 = once or twice a week; 6 = three to four times a week; 7 = once a day; 8 = two times a day; 9 = three or more times a day

Tables 10 and 11 show the intercorrelations of the violence exposure variables, internalizing and externalizing problems, and AAU. Each type of violence exposure at home and in the community was associated with internalizing problems in females at the $p < .01$ level, with bivariate R^2 ranging from .023 for witnessing violence at home to .123 for witnessing violence in the community. Witnessing violence at home was the only type of violence exposure that was not related to internalizing problems in males. The other five types of violence exposure were related to internalizing problems in males at the $p < .01$ level, with bivariate R^2 ranging from .020 for sexual victimization in the community to .102 for witnessing violence in the community.

Witnessing violence and sexual victimization at home were not related to externalizing problems in either gender. In females, physical victimization at home and in the community and witnessing violence in the community were associated externalizing problems at the $p < .01$ level, with bivariate R^2 ranging from .010 for witnessing violence in the community to .017 for physical victimization in the community. In males, physical victimization at home and each type of community violence exposure were related to externalizing problems at the $p < .01$ level, with bivariate R^2 ranging from .008 for sexual victimization in the community to .048 for physical victimization in the community.

Witnessing violence at home was not associated with AAU in either gender. In female adolescents, the remaining five types of violence exposure were related to AAU at the $p < .01$ level with bivariate R^2 ranging from .014 for sexual victimization in the community to .063 for witnessing violence in the community. In male adolescents, witnessing violence in the community, physical victimization both at home and in the community, and sexual victimization in the community were associated with AAU at the

$p < .01$ level, with bivariate R^2 square ranging from .010 for physical victimization at home to .058 for witnessing violence in the community. Sexual victimization at home was related to AAU in males at the $p < .05$ level, with a bivariate R^2 of .003.

Internalizing and externalizing problems were associated with AAU at the $p < .01$ level in both genders. For female adolescents, the bivariate R^2 was .110 for internalizing problems and .023 for externalizing problems. For male adolescents, the bivariate R^2 was .052 for internalizing problems and .075 for externalizing problems.

Table 10. Correlations among the independent and dependent variables for *female* adolescents ($n = 2,005$).

	1	2	3	4	5	6	7	8	9
1. withome	-								
2. physho	.20**	-							
3. sexhome	.12**	.26**	-						
4. witcomm	-.03	.16**	.13**	-					
5. physco	.04	.05*	.10**	.29**	-				
6. sexco	.05*	.11**	.01	.16**	.07**	-			
7. intprob	.15**	.33**	.20**	.35**	.24**	.26**	-		
8. extprob	.02	.11**	.03	.10**	.13**	.02	.07**	-	
9. aau	.03	.19**	.15**	.25**	.19**	.12**	.33**	.15**	-

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

Table 11. Correlations among the independent and dependent variables for *male* adolescents ($n = 2,018$).

	1	2	3	4	5	6	7	8	9
1. withome	-								
2. physho	.06**	-							
3. sexhome	-.00	.08**	-						
4. witcomm	-.02	.14**	.01	-					
5. physco	-.02	.00	.05*	.35**	-				
6. sexco	-.01	.04	.06**	.11**	.14**	-			
7. intprob	.03	.17**	.17**	.32**	.31**	.14**	-		
8. extprob	.04	.13**	.04	.20**	.22**	.09**	.33**	-	
9. aau	-.01	.10**	.05*	.24**	.21**	.11**	.23**	.27**	-

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

Hypotheses one, two, and three

Hypothesis one. The first hypothesis was that increased violence exposure in the home and community will be associated with increased AAU for both females and males separately. The model for the first hypothesis is shown in Figure 4. The rectangles represent the measured variables, and as is shown, the violence exposure variables were allowed to freely correlate and each was predicted to explain a significant amount of the variance in AAU. The model was estimated for females and males separately and the results for each gender are provided in Table 12. The violence exposure variables explained approximately 11% of the variance in female AAU and approximately nine percent of the variance in male AAU. Witnessing violence in the home was not a significant predictor for either females or males and being a victim of sexual abuse in the home was not a significant predictor of AAU in males. The remaining violence exposure variables for each gender significantly predicted AAU at the $p < .01$ level, indicating that

Figure 4. Structural model for the first hypothesis.

Table 12. Path coefficients and significance levels for females and males in the model in which violence exposure predicts AAU (standard errors in parentheses).

Parameter Estimate	Females ($R^2 = .11$)			Males ($R^2 = .09$)		
	Unstandardized	Standardized	p	Unstandardized	Standardized	p
Witness violence in the home → AAU	-.04 (.10)	-.01	.66	-.02 (.15)	.00	.89
Victim of physical abuse in the home → AAU	.35 (.06)	.13	<.01	.26 (.08)	.07	<.01
Victim of sexual abuse in the home → AAU	.30 (.08)	.08	<.01	.22 (.16)	.03	.17
Witness violence in the community → AAU	.18 (.02)	.18	<.01	.18 (.02)	.18	<.01
Victim of physical violence in the community → AAU	.34 (.06)	.13	<.01	.28 (.05)	.14	<.01
Victim of sexual abuse in the community → AAU	.22 (.08)	.06	<.01	.40 (.13)	.07	<.01

increases in these types of violence exposure are associated with increases in AAU for females and males.

Hypothesis two. The second hypothesis was that internalizing problems mediates the relationship between violence exposure and AAU for females only. The models that were utilized to test this hypothesis are shown in Figures 5 and 6. Figure 5 shows the full internalizing problems model and Figure 6 shows the nested, or mediation, model. In each model, the violence exposure variables were allowed to freely correlate and two error terms are shown. The error term e_{int} represents the error in predicting internalizing problems and the error term e_{aau} represents the error in predicting AAU. The error terms for the internalizing problems indicators (i.e., e_1 , e_2 , and e_3) represent the error in predicting each indicator.

In the full internalizing problems model in Figure 5, the observed violence exposure variables predict the internalizing problems construct and the violence exposure variables and the internalizing problems construct predict AAU. The path coefficients and their respective significance levels for this model are included in Table 13 for each gender. For female adolescents, the full model explained 16% of the variability in AAU. In addition, each of the violence exposure variables significantly predicted internalizing problems at the $p < .01$ level and internalizing problems significantly predicted AAU at the $p < .01$ level. All but two of the violence exposure variables, including witnessing violence at home and being a victim of sexual abuse in the community, significantly predicted AAU at the $p < .01$ level for female adolescents.

For male adolescents, the full model explained 11% of the variability in AAU. All of the violence exposure variables except witnessing violence in the home were

significant predictors of internalizing problems at the $p < .01$ level and internalizing problems significantly predicted AAU at the $p < .01$ level. Witnessing and being a victim of physical violence in the community were both significant predictors of AAU at the $p < .01$ level. Being a victim of sexual abuse in the community predicted AAU at the $p = .01$ level and being a victim of physical abuse in the home predicted AAU at the $p < .05$ level. Witnessing violence at home and being a victim of sexual abuse in the home were not significant predictors of AAU for males.

In the nested, or mediation, model in Figure 6 the prediction paths from the violence exposure variables to AAU are removed. However, the violence exposure variables still predict the internalizing problems construct and the internalizing problems construct still predicts AAU. The path coefficients and their respective significance levels for this model are included in Table 14 for each gender. The nested model explained 14% of the variability in female AAU and seven percent of the variability in male AAU. With the exception of witnessing violence in the home for males, each of the violence exposure variables in both genders significantly predicted internalizing problems at the $p < .01$ level and internalizing problems in both genders significantly predicted AAU at the $p < .01$ level.

To test the second hypothesis, the fit of the full model was compared to the fit of the nested model for females and males separately to determine whether the nested model fit at least as well as the full model. Chi-square difference tests were first conducted to determine if a statistical difference between the full and nested models exist. The chi-square difference tests for both the female adolescent models (χ^2 diff = 63.95, $df = 6$, $p < .001$) and the male adolescent models (χ^2 diff = 86.45, $df = 6$, $p < .001$) were significant,

indicating that the full model in both genders is statistically superior to their respective nested models. In large samples such as this, however, the chi-square difference test is likely to be significant even if the difference is trivial. (Tabachnik & Fidell, 2007). Therefore, fit indices, which are less influenced by sample size, were examined to determine if the nested model fit the data at least as well as the full model in each gender.

Table 13 shows the results of each fit index provided by AMOS for the full and nested internalizing problems models for both females and males. Included in the table is the name of each fit index, its cutoff score for acceptable fit (if one has been established), and the actual score that resulted from running the model. As is shown, the results are similar for both females and males. Although the full model for each gender had slightly better results on all fit indices that do not account for the parsimony (i.e., the PGFI), or simplicity of the model, both the nested and full models fit the data very well, meeting or exceeding cutoff scores for each fit index that has one. These findings provide support for the second hypothesis that internalizing problems mediates the relationship between violence exposure and AAU in females. Unexpectedly, the findings also indicate that this relationship is mediated by internalizing problems in male adolescents.

Figure 5. Full internalizing problems model.

Indicator notes for Figure 5

1 = Depression symptoms

2 = Generalized anxiety symptoms

3 = Post-traumatic stress disorder symptoms

Table 13. Path coefficients and significance levels for the full internalizing problems model by gender.

Parameter Estimate	Females ($R^2 = .16$)			Males ($R^2 = .11$)		
	Unstandardized	Standardized	p	Unstandardized	Standardized	p
Witness violence in the home → internalizing	.51 (.12)	.09	<.01	.25 (.16)	.03	.12
Victim of physical abuse in the home → internalizing	.89 (.08)	.25	<.01	.55 (.09)	.13	<.01
Victim of sexual abuse in the home → internalizing	.42 (.10)	.09	<.01	1.31 (.18)	.16	<.01
Witness violence in the community → internalizing	.35 (.03)	.26	<.01	.26 (.03)	.24	<.01
Victim of physical violence in the community → internalizing	.55 (.08)	.15	<.01	.52 (.05)	.24	<.01
Victim of sexual abuse in the community → internalizing	.87 (.10)	.19	<.01	.50 (.15)	.08	<.01
Internalizing → AAU	.20 (.02)	.27	<.01	.14 (.03)	.15	<.01
Witness violence in the home → AAU	-.15 (.10)	-.03	.12	-.06 (.15)	-.01	.70
Victim of physical abuse in the home → AAU	.17 (.06)	.06	<.01	.18 (.08)	.05	.03
Victim of sexual abuse in the home → AAU	.22 (.08)	.09	<.01	.04 (.16)	.01	.80
Witness violence in the community → AAU	.11 (.02)	.11	<.01	.14 (.02)	.14	<.01
Victim of physical violence in the community → AAU	.23 (.06)	.08	<.01	.21 (.05)	.10	<.01
Victim of sexual abuse in the community → AAU	.05 (.08)	.01	.54	.33 (.13)	.05	.01

Figure 6. Nested internalizing problems model.

Indicator notes for Figure 6

- 1 = Depression symptoms
- 2 = Generalized anxiety symptoms
- 3 = Post-traumatic stress disorder symptoms

Table 14. Path coefficients and significance levels for the nested internalizing problems model by gender (standard errors in parentheses).

Parameter Estimate	Females ($R^2 = .16$)			Males ($R^2 = .11$)		
	Unstandardized	Standardized	p	Unstandardized	Standardized	p
Witness violence in the home → internalizing	.50 (.12)	.09	<.01	.25 (.16)	.03	.13
Victim of physical abuse in the home → internalizing	.89 (.08)	.25	<.01	.55 (.09)	.14	<.01
Victim of sexual abuse in the home → internalizing	.44 (.10)	.09	<.01	1.30 (.18)	.16	<.01
Witness violence in the community → internalizing	.36 (.03)	.26	<.01	.27 (.03)	.25	<.01
Victim of physical violence in the community → internalizing	.56 (.08)	.15	<.01	.53 (.05)	.24	<.01
Victim of sexual abuse in the community → internalizing	.87 (.10)	.19	<.01	.52 (.15)	.08	<.01
Internalizing → AAU	.29 (.02)	.38	<.01	.25 (.02)	.27	<.01

Table 15. Fit index comparison table for the full and nested internalizing problems models by gender.

Index	Cutoff	All females – full model with internalizing problems (chi- square = 61.766, df = 14, p=.000)	All females – mediation model with internalizing problems (chi-square = 125.720, df = 20, p=.000)	All males – full model with internalizing problems (chi- square = 27.019, df = 14, p=.019)	All males – mediation model with internalizing problems (chi-square = 113.467, df = 20, p=.000)
Normed Fit Index	> .95	.985	.970	.992	.965
Incremental Fit Index	> .95	.988	.974	.996	.971
Comparative Fit Index	> .95	.988	.974	.996	.971
Root Mean Square Error of Approximation	< or = to .06	.041	.051	.021	.048
Goodness of Fit Index	None, higher the better	.994	.988	.997	.989
Adjusted Goodness of Fit Index	None, higher the better	.976	.966	.990	.970
Parsimony Goodness of Fit Index	None, higher the better	.253	.359	.254	.360
Akaike Information Criterion	None, lower the better	143.77	195.72	109.02	183.47
Consistent Akaike Information Criterion	None, lower the better	414.51	426.84	380.02	414.81
Root Mean Square Residual	None, lower the better	.015	.021	.006	.023

Hypothesis three. The third hypothesis was that externalizing problems mediates the relationship between violence exposure and AAU for males only. The models that were utilized to test this hypothesis are shown in Figures 7 and 8. Figure 7 shows the full externalizing problems model and Figure 8 shows the nested, or mediation, model. In each model, the violence exposure variables were allowed to freely correlate and two error terms are shown. The error term e_{ext} represents the error in predicting externalizing problems and the error term e_{aaU} represents the error in predicting AAU. The error terms for the externalizing problems indicators (i.e., e_1 through e_6) represent the error in predicting each indicator.

In the full externalizing problems model in Figure 7, the observed violence exposure variables predict the externalizing problems construct and the violence exposure variables and the externalizing problems construct predict AAU. The path coefficients and their respective significance levels for this model are included in Table 16 for each gender. For female adolescents, the full model explained 12% of the variability in AAU. Witnessing violence and being a victim of physical violence in the community were the only two violence exposure variables that significantly predicted externalizing problems at the $p < .01$ level. Being physically abused at home significantly predicted externalizing problems at the $p < .05$ level. Externalizing problems significantly predicted AAU at the $p < .01$ level and, with the exception of witnessing violence in the home, each of the violence exposure variables significantly predicted AAU at the $p < .01$ level.

For male adolescents, the full model explained 14% of the variability in AAU. Being physically abused at home and witnessing violence and being a victim of physical violence in the community significantly predicted externalizing problems at the $p < .01$

level and externalizing problems significantly predicted AAU at the $p < .01$ level.

Whereas none of the home violence exposure variables significantly predicted AAU in the full model for males, each of the community violence exposure variables were significant predictors at the $p < .01$ level.

In the nested, or mediation, model in Figure 8 the prediction paths from the violence exposure variables to AAU are removed. However, the violence exposure variables still predict the externalizing problems construct and the externalizing problems construct still predicts AAU. The path coefficients and their respective significance levels for this model are included in Table 17 for each gender. The nested model explained 1% of the variability in female AAU. Witnessing violence and being a victim of physical violence in the community were the only significant predictors of externalizing problems at the $p < .01$ level; being physically abused at home significantly predicted externalizing problems at the $p < .05$ level. Externalizing problems significantly predicted AAU at the $p < .01$ level. For male adolescents, the nested model explained 12% of the variability in AAU. Being a victim of physical violence in the home and community and witnessing violence in the community significantly predicted externalizing problems at the $p < .01$ level and externalizing problems significantly predicted AAU at the $p < .01$ level.

To test the third hypothesis, the fit of the full model was compared to the fit of the nested model for females and males separately to determine whether the nested model fit at least as well as the full model. Chi-square difference tests were first conducted to determine if a statistical difference between the full and nested models exist. The chi-square difference tests for both the female adolescent models (χ^2 diff = 223.47, df = 6, $p < .001$) and the male adolescent models (χ^2 diff = 99.30, df = 6, $p < .001$) were

significant, indicating that the full model in both genders is statistically superior to their respective nested models. As mentioned previously, however, in large samples such as this the chi-square difference test is likely to be significant even if the difference is trivial (Tabachnik & Fidell, 2007). Therefore, fit indices, which are less influenced by sample size, were examined to determine if the nested model fit the data at least as well as the full model in each gender.

Table 18 shows the results of each fit index provided by AMOS for the full and nested externalizing problems models for both females and males. Included in the table is the name of each fit index, its cutoff score for acceptable fit (if one has been established), and the actual score that resulted from running the model. As shown, the fit indices indicate the full model for females fit the data well. The mediation model, however, did not meet the cutoffs for all indices that have a cutoff score, indicating that the externalizing problems mediation model is a poor fit for females. Both the full and mediation models for males did not meet the cutoffs for all indices that have a cutoff score, indicating that both models are a poor fit for males. These results indicate that externalizing problems do not mediate the relationship between violence exposure and AAU for either males or females.

Figure 7. Full externalizing problems model.

Table 16. Path coefficients and significance levels for the full externalizing problems model by gender

Parameter Estimate	Females ($R^2 = .16$)			Males ($R^2 = .11$)		
	Unstandardized	Standardized	p	Unstandardized	Standardized	p
Witness violence in the home → externalizing	-.03 (.07)	-.01	.63	.18 (.10)	.04	.07
Victim of physical abuse in the home → externalizing	.09 (.04)	.04	.04	.27 (.06)	.12	<.01
Victim of sexual abuse in the home → externalizing	-.09 (.06)	-.03	.14	.15 (.11)	.03	.17
Witness violence in the community → externalizing	.05 (.02)	.06	<.01	.08 (.02)	.13	<.01
Victim of physical violence in the community → externalizing	.21 (.05)	.09	<.01	.23 (.03)	.19	<.01
Victim of sexual abuse in the community → externalizing	.01 (.05)	.00	.83	.11 (.09)	.03	.20
Externalizing → AAU	.09 (.02)	.07	<.01	.40 (.05)	.24	<.01
Witness violence in the home → AAU	-.04 (.10)	-.01	.68	-.09 (.14)	-.01	.52
Victim of physical abuse in the home → AAU	.34 (.06)	.13	<.01	.15 (.08)	.04	.07
Victim of sexual abuse in the home → AAU	.31 (.08)	.09	<.01	.16 (.16)	.02	.30
Witness violence in the community → AAU	.18 (.02)	.17	<.01	.15 (.02)	.15	<.01
Victim of physical violence in the community → AAU	.32 (.06)	.11	<.01	.19 (.05)	.09	<.01
Victim of sexual abuse in the community → AAU	.22 (.07)	.06	<.01	.35 (.13)	.06	<.01

Figure 8. Nested externalizing problems model

Table 17. Path coefficients and significance levels for the nested externalizing problems model by gender (standard errors in parentheses).

Parameter Estimate	Females ($R^2 = .16$)			Males ($R^2 = .11$)		
	Unstandardized	Standardized	p	Unstandardized	Standardized	p
Witness violence in the home → externalizing	-.03 (.07)	-.01	.67	.16 (.10)	.04	.10
Victim of physical abuse in the home → externalizing	.10 (.05)	.05	.02	.27 (.05)	.12	<.01
Victim of sexual abuse in the home → externalizing	-.10 (.06)	-.03	.11	.15 (.11)	.03	.15
Witness violence in the community → externalizing	.05 (.02)	.05	<.01	.09 (.02)	.15	<.01
Victim of physical violence in the community → externalizing	.21 (.05)	.09	<.01	.24 (.03)	.20	<.01
Victim of sexual abuse in the community → externalizing	.01 (.06)	.00	.92	.13 (.09)	.04	.12
Externalizing → AAU	.13 (.02)	.11	<.01	.59 (.05)	.34	<.01

Table 18. Fit index comparison table for the full and nested externalizing problems models by gender.

Index	Cutoff	All females – full model with internalizing problems (chi- square = 61.766, df = 14, p=.000)	All females – mediation model with internalizing problems (chi-square = 125.720, df = 20, p=.000)	All males – full model with internalizing problems (chi- square = 27.019, df = 14, p=.019)	All males – mediation model with internalizing problems (chi-square = 113.467, df = 20, p=.000)
Normed Fit Index	> .95	.971	.938	.860	.824
Incremental Fit Index	> .95	.976	.944	.872	.838
Comparative Fit Index	> .95	.976	.944	.871	.836
Root Mean Square Error of Approximation	< or = to .06	.045	.064	.066	.069
Goodness of Fit Index	None, higher the better	.985	.968	.971	.964
Adjusted Goodness of Fit Index	None, higher the better	.967	.936	.934	.928
Parsimony Goodness of Fit Index	None, higher the better	.433	.489	.427	.487
Akaike Information Criterion	None, lower the better	301.384	512.855	492.726	580.021
Consistent Akaike Information Criterion	None, lower the better	638.157	810.008	829.829	877.465
Root Mean Square Residual	None, lower the better	.016	.030	.042	.047

Follow-up analyses for hypothesis two

Because the results for the second hypothesis indicated that internalizing problems mediates the relationship between violence exposure and AAU in both genders, a set of follow-up analyses with the full sample of both females and males were conducted to further explore which, if any, of the violence exposure variables are

mediated by internalizing problems. These follow-up analyses do not include the observed variable witnessing violence in the home, as it was not a significant predictor of AAU in the internalizing problems models for either gender.

Table 15 shows the intercorrelations of the variables that were utilized to conduct the follow-up analyses, as well as to test hypotheses four, five, and six in the full sample. Each violence exposure variable was associated with internalizing problems, with bivariate R^2 ranging from .012 for witnessing violence in the home to .099 for witnessing violence in the community. Four of the violence exposure variables, including physical abuse in the home, witnessing violence in the community, being a victim of violence in the community, and being sexually victimized in the community, were associated with externalizing problems. Bivariate R^2 for these four variables ranged from .001 for being sexually victimized in the community to .032 for being a victim of physical violence in the community. Being sexually abused in the home and witnessing violence in the home were not associated with externalizing problems. Witnessing violence in the home was also the only violence exposure variable that was not associated with AAU. The bivariate R^2 for the remaining five violence exposure variables that were associated with AAU ranged from .011 for being sexually abused in the community and in the home to .062 for witnessing violence in the community.

Table 19. Correlations among the independent and dependent variables for the full sample of female and male adolescents ($n = 4,023$).

	1	2	3	4	5	6	7	8	9
1. withome	-								
2. physho	.157**	-							
3. sexhome	.090**	.211**	-						
4. witcomm	-.032*	.137**	.067**	-					
5. physco	.001	.015	.057**	.329**	-				
6. sexco	.035*	.096**	.031*	.120**	.078**	-			
7. intprob	.111*	.275**	.197**	.314**	.245**	.226**	-		
8. extprob	.023	.113**	.023	.150**	.179**	.034*	.165**	-	
9. aau	.012	.146**	.106**	.248**	.199**	.106**	.278**	.209**	-

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

The first follow-up model is included in Figure 9. As is shown, the violence exposure variables were allowed to freely correlate and each was predicted to explain a significant amount of the variance in AAU. The model was estimated for the full sample of males and females and the results are provided in Table 16. The violence exposure variables explained 9.8% of the variance in AAU and were each positively and significantly predicted AAU at the $p < .01$ level.

Figure 9. First follow-up model.

Table 20. First follow-up model path coefficients and significance levels for the full sample of female and male adolescents (standard errors in parentheses).

Parameter Estimate	$R^2 = .10$		
	Unstandardized	Standardized	p
Victim of physical violence in the home → AAU	.31 (.05)	.10	<.01
Victim of sexual abuse in the home → AAU	.29 (.07)	.06	<.01
Witness violence in the community → AAU	.18 (.02)	.18	<.01
Victim of physical violence in the community → AAU	.30 (.04)	.13	<.01
Victim of sexual abuse in the community → AAU	.27 (.07)	.06	<.01

The second follow-up model is shown in Figure 10. In this model, each violence exposure variable predicts both AAU and internalizing problems and internalizing problems predicts AAU. The model was estimated for the full sample of males and females and the results are provided in Figure 10 and Table 17. The violence exposure variables and internalizing problems construct explained 13% of the variance in AAU. In addition, there was significant change in R^2 from the first exploratory model (R^2 Fchange = 107.87, df = 1, $p < .001$). Each of the violence exposure variables positively and significantly predicted internalizing problems and internalizing problems positively and significantly predicted AAU at the $p < .01$ level. Three of the violence exposure variables positively and significantly predicted AAU, including witnessing violence in both settings and being a victim of violence in both settings. The paths from sexual abuse in the home and in the community, however, were no longer significant at the $p < .01$ level, indicating that in the context of these five violence exposure variables, internalizing problems serves as a mediator between sexual abuse in the home and in the community and AAU.

Figure 10. Second *follow-up* model.

Indicator notes for Figure 10

1 = Depression symptoms

2 = Generalized anxiety symptoms

3 = Post-traumatic stress disorder symptoms

Table 21. Second *follow-up* model path coefficients and significance levels for the full sample of female and male adolescents (standard errors in parentheses).

Parameter Estimate	R ² = .13		p
	Unstandardized	Standardized	
Victim of physical violence in the home → internalizing	.82 (.06)	.22	<.01
Victim of sexual abuse in the home → internalizing	.76 (.09)	.14	<.01
Witness violence in the community → internalizing	.27 (.02)	.23	<.01
Victim of physical violence in the community → internalizing	.46 (.05)	.17	<.01
Victim of sexual abuse in the community → internalizing	.92 (.08)	.18	<.01
Internalizing → AAU	.17 (.02)	.20	<.01
Victim of physical violence in the home → AAU	.18 (.05)	.06	<.01
Victim of sexual abuse in the home → AAU	.17 (.07)	.04	.02
Witness violence in the community → AAU	.14 (.02)	.13	<.01
Victim of physical violence in the community → AAU	.22 (.04)	.10	<.01
Victim of sexual abuse in the community → AAU	.12 (.07)	.03	.08

Hypotheses four, five, and six

Hypotheses four, five, and six were:

4. Home violence exposure contributes unique variance beyond community violence exposure.
5. Of the three types of home violence exposure, sexual abuse is the only significant predictor of AAU.
6. High levels of *both* community and home violence exposure are associated with the highest levels of AAU (interaction of community violence by home violence added to the model).

The results for the fourth and fifth hypotheses are included in Table 18. For ease of viewing, the results for the sixth hypothesis are not included in the table. In sum, the fourth hypothesis was accepted, some support was found for the fifth hypothesis, and the sixth hypothesis was not accepted.

As shown in Table 18, the demographic control variables of adolescent gender, age, and ethnicity, as well as parent education and family income, were entered in the

first step of the hierarchical regression analysis. Prior to doing so, the categorical ethnicity variable was dummy coded into five new variables, each indicating whether or not the adolescent belonged to a specified ethnic group. In the analyses that follow, white/Caucasian adolescents served as the baseline; the regression coefficients for each ethnic minority group should, therefore, be interpreted as a comparison between that group of adolescents and the white/Caucasian group.

The demographic variables accounted for approximately 10% of the variability in AAU. Increases in adolescent age and being a Hispanic versus a white/Caucasian significantly predicted increased AAU at the $p < .01$ level with age accounting for almost all of the variability ($sr^2 = .097$). Parent education was also a significant predictor, but at the $p < .05$ level.

For the fourth and fifth hypotheses, the community violence exposure variables were added in the second step of the regression analysis and the home violence exposure variables were added in the third step. In addition to a significant increase in R^2 when the community violence exposure variables were added, there was a significant increase in R^2 when the home violence exposure variables were added. This provides support for the fourth hypothesis that home violence exposure explains unique variance in AAU beyond community violence exposure. For hypothesis five, sexual victimization in the home was a significant predictor of AAU (see Table 18). However, physical victimization in the home was also a significant predictor, lending only partial support for this hypothesis. Of note, with the exception of the number of different types of violence witnessed at home, each of the community and home violence exposure variables was a positive and significant predictor of AAU at the $p < .01$ level.

Table 22. Multiple regression models¹ for adolescent alcohol use ($n = 3,950$).

R^2	R^2 change	Outcome	Predictor	Step 1		Step 2		Step 3	
				β	sr^2	β	sr^2	β	sr^2
.10**	-	AAU	Gender	-.01	-	.01	-	.00	-
			Age	.31**	.097	.28**	.075	.27**	.070
			Parent education	-.04*	.001	-.02	-	-.02	-
			Income	-.01	-	.00	-	.01	-
			Ethnicity (baseline = white/Caucasian)						
			African American	-.01	-	-.05**	.002	-.05**	.002
			American Indian or Native Alaskan	.02	-	.01	-	.01	-
			Asian or Pacific Islander	-.00	-	-.01	-	-.00	-
			Hispanic	.05**	.002	.04*	.001	.04*	.001
			Sexual victimization in community			.06**	.004	.06**	.003
.16**	.06**	AAU	Physical victimization in community			.12**	.013	.12**	.013
			Witness violence in community			.17**	.024	.15**	.020
			Sexual victimization at home					.05**	.002
.17**	.01**	AAU	Physical victimization at home					.09**	.007
			Witness violence at home					.00	-

¹The fourth step, which included the home and community violence exposure interaction term (related to hypothesis five), is not shown because the amount of variance explained in AAU did not significantly improve after it was added to the model.

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

For the sixth hypothesis, a community violence exposure variable was created by summing the number of different types of sexual and physical victimization experienced and the number of different types of violence witnessed in the community. A home violence exposure variable was also created by summing the number of different types of sexual and physical victimization experienced and the number of different types of violence witnessed at home. The summed community violence exposure and home violence exposure variables were centered by subtracting the mean for each construct

from its overall score prior to creating the interaction term. The change in R^2 after adding the interaction term was not significant, indicating that high levels of both community and home violence exposure do not explain a significant amount of the variance in AAU after the variance already explained by home and community violence exposure separately.

In order to examine the effects of outliers on the results for hypotheses four, five, and six, the analyses were first repeated only with cases that had a standardized residual within three standard deviations from the mean standardized residual score and then with cases that had a standardized residual within two standard deviations. For cases with a standardized residual within two standard deviations from the mean standardized residual, sexual victimization in the home was not a significant predictor of AAU (related to hypothesis five, for which there was only partial support found). With this exception, the results were the same for the trimmed samples as for the full sample.

Chapter 5

Discussion

The purpose of this study was to examine the relationship between home and community violence exposure and AAU in a nationally representative sample of adolescents, with a focus on the roles of externalizing and internalizing problems as mediators for male and female adolescents. This section reviews the findings and places them in the context of the literature. Each hypothesis will be considered, followed by the implications and a summary statement about the importance of the study. Implications will also be considered throughout the Discussion. First, however, data analytic issues that arose, as well as limitations and strengths, will be summarized so that the findings can be considered in the context of these issues.

Data analytic issues

Internal alpha coefficients for the main constructs of interest were calculated and several of these were unacceptably low. First, I had proposed that three items would be used to measure AAU; however, because adequate reliability could not be established, one item had to be dropped. Unfortunately, a two-factor construct creates an unidentified model in SEM (i.e., there are fewer data points than the number of estimated parameters), a Principal Component Factor Analysis was conducted on the remaining two AAU indicators; one item emerged that was used as an observed AAU variable. Second, individual items had to be used for home violence and community violence, as neither of these constructs had adequate alpha coefficients. These issues are considered further in the following limitations subsection.

Strengths and limitations

Strengths. The primary strengths of this study were the sample and uniqueness of the relationships examined. The sample was large and nationally representative, which increases confidence in generalizing the findings to the full population of adolescents in the nation. Because the sample was large, the models also could be tested separately for female and male adolescents. This allowed for an examination of the different pathways from adverse environmental circumstances (violence exposure) to negative outcomes (internalizing and externalizing problems and AAU) proposed for females and males in Developmental Systems Theory (Zucker, 1994) and the gender intensification hypothesis (Davies & Lindsay, 2004). In addition, this is the only nationally representative sample in which all of the variables of interest, including adolescent violence exposure, internalizing and externalizing problems, and alcohol use, were measured. The study is also unique in that it is one of the first examinations of the differential effects of violence exposure in multiple settings (i.e., home and community) on AAU, as well as one of the first to examine the role of internalizing and externalizing problems as mediators of the link between violence exposure and AAU.

Limitations. The primary limitations of the study were the cross-sectional nature of the data and the inability to establish some of the proposed latent constructs. The structural models proposed that violence exposure leads to internalizing and externalizing problems which then lead to increases in AAU. However, because the data were cross sectional, the temporal order of violence exposure, internalizing and externalizing problems, and AAU could not be established. As such, the results for the hypotheses that internalizing problems mediates the violence exposure – AAU relationship in female

adolescents and that externalizing problems mediates this relationship for male adolescents must ultimately be interpreted as co-occurring phenomena rather than following a specified temporal order.

Another issue was missing data. Approximately 18% of the cases were missing data for at least one variable and the full missing value analysis indicated that this may not be at random. Instead of dropping these cases, Maximum Likelihood Estimation was utilized to impute data for the parent education, family income, violence exposure, internalizing and externalizing problems, and AAU variables. The first three hypotheses only required the latter four of these variables; therefore, the full sample of 4,023 adolescents was utilized to test them. However, hypotheses four, five, and six also required the demographic variables, and missing values for ethnicity could not be estimated as it is a categorical, not continuous, variable. Therefore, the 73 cases with a missing value for ethnicity were dropped from the analyses for these hypotheses. Because this is less than two percent of the sample, it is, however, unlikely that the results for the hypotheses would have been different if these cases were not dropped.

Another issue is that because the data already existed, only those variables that were addressed by the original researchers could be studied. Of particular concern was that only extreme indicators of externalizing problems (e.g., stolen a motor vehicle and been in gang fights) were assessed. The finding for hypothesis three that externalizing problems does not mediate the relationship between violence exposure and AAU must be considered in light of these extreme indicators. It may be that if the hypothesis had been tested using a more conventional measure of externalizing problems that includes mild problems (e.g. ASEBA; Achenbach & Rescorla, 2001), such as breaking rules at home or

at school or bullying peers, the results would have indicated that externalizing problems do, indeed, mediate the relationship between violence exposure and AAU in males as was hypothesized.

Another limitation is that the proposed latent constructs of home violence exposure, community violence exposure, and AAU could not be established. The violence exposure indicators had to be studied separately, making it more difficult to interpret the findings for the first three hypotheses. For example, the first hypothesis asserted that violence exposure at home and in the community is associated with increased AAU in females and males separately. Although support was found for this hypothesis, the findings were not consistent across the different types of violence exposure examined. Specifically, one of the violence exposure variables for females (i.e., witnessing violence) and two of the violence exposure variables for males (i.e., witnessing violence and sexual abuse in the home) were not significant predictors of AAU. While the remaining violence exposure variables were significantly associated with AAU, this only provides partial support for the first hypothesis.

For AAU, the one indicator that had to be dropped, the number of days the adolescent had five or more drinks within a couple of hours in the past year, is a symptom of alcohol abuse (American Psychiatric Association, 2000). Unfortunately, this left only one other indicator of abuse, the number of alcohol related problems the adolescent had experienced. While this an important dimension of abuse, many of the adolescents may not have been drinking for a sufficient number of years for the alcohol related problems to manifest. As a result, the level of alcohol use, particularly abuse, may have been underestimated in this study.

The measurement of ethnicity is another limitation, as the adolescents were not allowed to select more than one ethnicity category. Instead, they were instructed to choose the one ethnicity category in which they feel they most belonged. Consequently, multi-ethnic adolescents were not represented. This may be one reason why 73 of the participants were missing data for this variable and, as a result, were excluded from the analyses for hypotheses four, five, and six.

Hypotheses

Table 23 summarizes the six hypotheses of the study and delineates whether each one was or was not supported. As shown, the first, second, and fourth hypotheses were supported, but the third, fifth and sixth hypotheses were not.

The first hypothesis was that increased violence exposure at home and in the community is associated with increased AAU in females and males. Both developmental systems theory (DST) (Zucker, 1994, 2006) and a number of studies (see Table 1) support the link between violence exposure and AAU. However, most of the studies did not differentiate among the different types of violence exposure (witnessing, physical, sexual) or social contexts (home and community) or were only focused on one type of exposure or context. Therefore, the current study not only contributes DST but to the Risk and Protective Perspective. The first hypothesis was formulated to examine whether witnessing and experiencing physical and sexual violence across two clearly differentiated contexts are associated with AAU.

Table 23. Hypotheses and support for each hypothesis.

Hypothesis number	Hypothesis	Supported	
		Yes	No
1	Increased violence exposure in the home and in the community is associated with increased AAU in females and males separately	✓	
2	Internalizing problems mediate the relationship between home/community violence exposure and AAU for females	✓	
3	Externalizing problems mediate the relationship between home/community violence exposure and AAU for males		✓
4	Home violence exposure explains unique variance in AAU beyond the variance explained by community violence exposure (tested in the full sample of males and females)	✓	
5	Of the three types of home violence exposure, sexual abuse is the only significant predictor of AAU		✓
6	High levels of both community and home violence exposure are associated with the highest levels of AAU (interaction of community violence by home violence added to the model)		✓

Similar patterns of findings emerged across females and males. First, the percentage of variance accounted for in AAU in the models was similar: 11% for females and nine percent for males. Second, with the exception of being a victim of sexual abuse in the home (significantly related to AAU only for females), consistent findings emerged across females and males for each type and setting of violence exposure. Specifically, witnessing violence in the home was not a significant predictor of AAU for either gender whereas higher levels of all other types of violence in both settings were significantly predictive of more AAU in both genders.

According to developmental systems theory, the social contexts in which adolescents primarily interact are the home, school, and neighborhood, and risk factors in any of these contexts may contribute to the development of alcohol problems (Fitzgerald et al., 1995). Witnessing violence is a risk factor that has been found to be associated with increased AAU (e.g., Kilpatrick et al., 2000; Schwab-Stone et al., 1995). The findings of the present study suggest, however, that the context in which the violence is witnessed determines whether or not it is a risk factor. Specifically, while witnessing violence in the school or neighborhood significantly predicted level of alcohol use in female and male adolescents, witnessing violence in the home did not. One potential explanation for this finding is that there may have been more protective factors (see Table 2) in the home than in the community to offset the violence witnessed in the home. Another reason may be that the mean number of different types of violence witnessed in the home was substantially smaller than the mean number of different types of violence witnessed in the community (see Table 9). This may have prevented significant associations from appearing for the amount of home violence witnessed.

Sexual abuse in the home was associated with AAU in females but not males, and sexual abuse in the community was associated with AAU in both females and males. These findings suggest that both gender and context are important to consider when examining the association of sexual abuse and AAU. The findings are partially consistent with the gender intensification hypothesis, which postulates that in adolescence, females are more sensitive to stress than males (Davies & Lindsay, 2004). However, when AAU is the outcome, the differential sensitivity to the stress of sexual abuse is only evident when the abuse occurs in the home. One possible explanation for the findings is that whereas the males had more protective factors in the home than females, in the community protective factors were more equal across the two genders. Another possible explanation is that the mean number of different types of sexual experienced in the home was lower for males than females (see Table 9). This may have prevented significant associations from appearing at home for males.

Of importance, most of the associations between types of violence exposure in the home and community resulted in the same findings for females and males. This suggests that, with the exceptions already noted, different types of violence in different settings are related to higher levels of AAU for both females and males. The current findings add to the existing literature as AAU has not been studied by itself (but rather as part of a larger construct of substance use), females and males have not been studied separately, types of violence have not been differentiated, and/or settings have not been studied separately. As examples, Kilpatrick and colleagues (2000) examined AAU as one of several indicators of a substance abuse construct and Schwab-Stone and colleagues (1995) combined sexual abuse in the home with other types of violence exposure in the home

and community to create a single violence exposure construct. By studying AAU with a large sample of each gender, as well as examining different types of violence occurring in the home and community, the current study is one of the first to provide substantial support for the consistency of associations between violence exposure and AAU across females and males. As such, this finding suggests that intervention programs do not need to be modified based on adolescent gender (see implications section for further discussion).

The second hypothesis was that internalizing problems will mediate the relationship between violence exposure and AAU for females. The findings of this study provide support for this hypothesis. Although the full model had slightly better fit than the mediation model, both models fit the data well, exceeding cutoffs for each index that has one. In addition, the mediation model had a better PGFI score than the full model, indicating that, when taking the parsimony, or simplicity, of the models into consideration, the mediation model is preferable. According to Arbuckle (2009), the general consensus in the scientific community is that a parsimonious model is always preferable to a complex model as long the fit of the parsimonious model is good. In this case, the more parsimonious, but still good fitting, model indicates that internalizing problems are a mechanism for female adolescents through which violence exposure operates to impact AAU.

The findings also indicate that internalizing problems mediate the relationship between violence exposure and AAU for males. This finding was not expected, as it was hypothesized that externalizing, not internalizing, problems would mediate this relationship for males (hypothesis three). As was the case for females, however, both

models fit the data well and the more parsimonious model had a larger PGFI. This indicates that internalizing problems may serve the same role as a mediator between violence exposure and AAU for males as it does for females.

My findings are consistent with the tension reduction proposal in Developmental Systems Theory (Zucker, 1994) and the self-medication hypothesis (Khantzian, 1997). Drawing from both of these frameworks, violence exposure leads to internalizing problems and AAU reduces these negative internal states. In contrast, my findings did not provide support for the gender intensification hypothesis (Davies & Lindsay, 2004) as internalizing problems served as a mediator of the violence exposure-AAU relation for both boys and girls

The series of exploratory analyses that were conducted indicates that internalizing problems may, in particular, mediate the relationship between sexual victimization and AAU for both males and females. Before including internalizing problems in the model for the full sample, witnessing violence in the community and being physically and sexually victimized in the community and at home were significant predictors of AAU. However, after internalizing problems were included, sexual victimization in the community and at home were no longer significant predictors of AAU. This indicates that when the three types of violence in two settings are considered, sexual victimization both at home and in the community are the only types violence exposure that are mediated by internalizing problems.

The finding that internalizing problems mediate the relationships between sexual victimization and AAU, but not the relationship between witnessing violence and AAU or between physical victimization and AAU, is consistent with findings from other

studies. However, these prior studies did not examine mediation but each of the links for mediation: (1) violence exposure and AAU; (2) violence exposure and internalizing problems; and (3) internalizing problems and AAU. First, although both witnessing violence (e.g., Kilpatrick et al., 2000; Schwab-Stone et al., 1995) and being victimized, either physically (e.g., Clark, Lesnick, & Hegedus, 1997; Harrison, Fulkerson, & Beebe, 1997; Perkins & Jones, 2004) or sexually (e.g., Kilpatrick et al., 2000; Kipke, Montgomery, & MacKenzie, 1993), have been associated with higher levels of AAU, researchers have concluded that sexually abused children may be at particular risk for AAU and other problem behaviors (Emery & Laumann-Billings, 1998; Margolin & Gordos, 2000). This may be because sexual violence is a more personal, violating experience than either of the other two types of violence. Second, regarding the connection between violence exposure and internalizing problems, there is a growing body of research that indicates that sexual victimization is more strongly related to internalizing problems than is physical victimization (e.g., see Brown, et al., 1999; Coleman & Stewart, 2010; Gover, 2004; McNally, 1999). Third, regarding the link between internalizing problems and AAU, the literature provides strong support for this association (see Table 1). In summary, the current findings build on prior research by formally testing the role of internalizing problems as a mediator of different types of violence exposure and AAU rather than only examining associations across the variables. The findings suggest that violence exposure and internalizing problems should not be ignored in the assessment and treatment of AAU.

The third hypothesis was externalizing problems will mediate the relationship between violence exposure and AAU in males. No support was found for this hypothesis.

No fit index cutoff scores were met or exceeded for the full and nested mediation models, indicating that they both fit the data poorly. For female adolescents, the full model had a good fit, but the mediation model did not.

The proposal that externalizing problems would play a stronger role in the violence exposure – AAU link among males than females is congruent with the early starter model (McMahon & Wells, 1998) and developmental systems theory (Zucker, 1994). The early starter model, which postulates that early externalizing symptoms lead to increasingly severe symptoms, including AAU, has been supported with males but not females (Crick & Zahn-Waxler, 2003; Silverthorne & Frick, 1999). Developmental Systems Theory (Zucker, 1994) was developed to specifically account for AAU. The theory posits that while internalizing problems mediate the relationship between environmental stress (e.g., violence exposure) and AAU for females, externalizing problems mediate the relationship between environmental stress and AAU for males. Until the present study, this theory has not been tested. The findings of this study suggest that while violence exposure is related to externalizing problems and AAU in males, these types of problems do not serve as the mechanism through which violence exposure impacts AAU.

One reason why externalizing problems may not have served as a mediator is that the six items assessing this construct (e.g., attacked someone, broken and entered, gang fight involvement) are extreme indicators. It may be the case that indicators assessing less severe forms of externalizing problems (e.g., oppositional and/or hyperactive behaviors) would be more highly related to violence exposure and AAU. For example, The Child Behavior Checklist for Ages 6 -18 and the Youth Self-Report Form (Achenbach &

Rescorla, 2001) are well validated and reliable measures of adolescent externalizing behaviors. And, the externalizing behaviors assessed are generally less severe than the ones that were assessed in this study. Example externalizing behaviors from the checklist include: argues a lot, destroys his/her own things, disobedient at school, disobedient at home, threatens people, commits impulsive acts without thinking, doesn't get along with other kids, and doesn't seem to feel guilty after misbehaving. Use of the Youth Self-Report Form may have yielded different results than found in the current study.

Another reason may be that other variables need to be considered. For example, Zucker (2008) has noted that the core underlying factor of externalizing problems that relates to adolescent alcohol use is self-control. This construct was not assessed in the current study. However, he also points out that the pathway from self-control to alcohol use is not always direct, suggesting that other intervening variables may be important. Any implications of the findings for the role of externalizing problems in the assessment and treatment of AAU is limited by the extreme form of this type of problem and the failure to assess constructs like self-control.

Conclusions from hypotheses one through three findings. The first three hypotheses examined whether different types of violence exposure across the home and community settings are related to increases in AAU, and whether this relationship is mediated by internalizing problems in females and externalizing problems in males. The results provided support for both a relationship between different types of violence exposure and AAU for males and females and internalizing problems serving as the mechanism through which violence exposure affects female and unexpectedly male AAU. Additional exploratory analyses indicated that the particular relationships being

mediated by internalizing problems for both males and females are between sexual victimization in the community and home and AAU.

The findings for the first three hypotheses suggest that the proposed differences in the roles of internalizing and externalizing problems by gender may not exist. Similar to my findings, Mrug and colleagues (2008) recently failed to find that home, school, or community violence exposure was differentially related to internalizing and externalizing problems based on gender of child. Zucker (2008) has also recently noted that “the preponderance of evidence points toward a conclusion that sex differences are relatively small, if present at all” (p. 107) for the development of adolescent alcohol problems. In addition, in Table 1 there are twice as many studies supporting a relationship between internalizing problems and AAU than between externalizing problems and AAU. My results and these pieces of information suggest that violence exposure outcomes are similar for females and males, gender differences may rarely occur for alcohol use outcomes, and that internalizing problems may be related to AAU in both females and males.

The fourth hypothesis was that home violence exposure contributes unique variance to AAU beyond community violence exposure. Support was found for this hypothesis, and my findings are consistent with recent research examining the relationship between family and community violence and youth outcomes. One study, for example, found that change in violence exposure at home predicted change in children’s depressive symptoms beyond that predicted by community and school violence exposure (Kennedy et al., 2010). Another study found that violence exposure at home predicted unique variance in internalizing and externalizing problems beyond violence exposure in

school and in the community (Mrug et al., 2008). The researchers for the latter study postulated that violence exposure in the home may be a more salient predictor of harmful outcomes than exposure in the community because (a) children may not be able to avoid conflict at home; (b) the violence involves the people with whom children have the closest relationships (e.g., parents and siblings); and (c) because retaliation may not be an option, they may be more likely to blame themselves for the violence. The findings point to the importance of assessing and treating violence exposure in the home setting when AAU is a presenting issue.

The fifth hypothesis was that high levels of both community and home violence exposure will be associated with the highest level of AAU. This hypothesis was not supported. Findings are similar to the recent results of Mrug and colleagues (2008) who found that the number of contexts in which violence occurred did not relate to internalizing or externalizing problems. My findings suggest that violence in each setting contributes to AAU independently rather than in a multiplicative fashion. This finding still points to the importance of assessing multiple settings when assessing, treating, or studying AAU.

The sixth hypothesis was that, when considered in the context of each other, sexual abuse is the only type of home violence that significantly contributes to the explanation of AAU. The number of different types of sexual victimization that occurred was related to AAU but so was the number of different types of physical victimization at home. This suggests that multiple forms of home violence, including sexual abuse, are linked to AAU. However, as was discussed previously, research is accumulating that indicates sexual abuse may be a stronger predictor of AAU and other problem behaviors

than physical abuse (Brown et al., 1999; Coleman & Stewart, 2010; Emery & Laumann-Billings, 1998; Gover, 2004; Margolin & Gordos, 2000; McNally, 1999).

Although the current findings do not support this research, the findings of the exploratory analyses suggest that sexual abuse is unique in that it is the only type of violence exposure associated with AAU that is mediated by internalizing problems. As such, sexual abuse deserves particular attention in future research and in the assessment and treatment of AAU.

Conclusions from hypotheses four through six findings. There are two primary conclusions that can be drawn from the findings for the last three hypotheses. First, home violence exposure is uniquely related to AAU, even when controlling for levels of community violence exposure. Second, of the types of home violence exposure, sexual abuse and physical victimization are more important predictors than witnessing violence.

Implications

The results of this study have implications in four areas: Theory, practice, policy, and future research. Regarding theoretical implications, the hypotheses for the study were developed based on five theoretical frameworks. The findings have implications for each of these theories.

Developmental Systems Theory. The major framework for the proposed study is based on DST. A primary aspect of this theory is that different trajectories for alcohol misuse arise in adolescence. In order to understand and intervene with AAU, it is necessary to identify these trajectories and, based on demonstrating their existence, map interventions onto them. This has not occurred in the literature. One trajectory is negative affect alcoholism which, according to Zucker and colleagues (1994), proposes that

elevated environmental stress is associated with internalizing problems and AAU occurs to reduce these problems. This critical hypothesis in DST had not been tested (Zucker et al., 1994), but was tested and supported in this study. Furthermore, DST proposes this is more likely to occur in females than males, but this hypothesis had not been tested. This hypothesis was not supported in this study.

A second trajectory is antisocial alcoholism. This trajectory is based on the hypothesis that alcohol misuse is part of an antisocial trajectory. Living in environments with stress (e.g., violence) leads to antisocial behaviors which, in turn, lead to alcohol misuse. Furthermore, this trajectory is proposed to operate primarily in males and there is evidence for the trajectory in males (see Zucker et al., 1994). However, whether there is more evidence for the trajectory in males than females had not been tested. No support was found for the antisocial trajectory (externalizing problems leading to AAU) for either males or females.

In summary, the current study added to DST by examining each of the two major pathways that are proposed to lead to “severe, alcohol-related symptomology” (Zucker et al., 1994, p. 699) and, of importance, examined if gender of adolescent is a critical variable in determining which trajectory is followed. As Zucker and colleagues (1994) noted, alcohol research focused on males until recent years but problem alcohol use among females is increasing. DST proposes different pathways for females and males; however, evidence was found for only one pathway and this same pathway existed for females and males. This suggests that multiple pathways and different pathways by gender may not be needed in DST.

The secondary hypotheses contributed to DST by identifying the role of different types of violence exposure in different settings to AAU. Building on Bronfenbrenner's Ecological Theory Model (1979), two different systems (home and community) and the type of violence within one of these systems (home) were studied. The findings indicated that multiple types of violence in both systems made independent contributions to AAU. This adds to DST and supports the Ecological Theory Model.

Risk and Protective Perspective. AAU was conceptualized from a multisystems risk and protective framework in the literature review for the proposed study (Fraser, 1997). This perspective identifies "potential risk and protective factors at the individual, family, school, neighborhood, and broad environmental levels" (Nash & Bowen, 1999). The current study examined internalizing and externalizing problems from the individual level and violence exposure from the family, school, and community levels. Therefore, risks from multiple levels were studied. As was noted earlier, theoretical models that integrate variables from multiple levels or systems have rarely examined how variables from across systems operate together. The current study examined how variables from multiple systems operate together and suggested that variables in these systems make independent, but not interactive, contributions.

The current study also contributed to the risk and resilience perspective by examining a risk factor (violence) across two contexts (home and community) and, more importantly, by examining whether risks are additive and how they relate to AAU. As Nash and Bowen (1999) note, this is a key issue in the risk and resilience perspective. The current study found that violence exposure in community and home settings were additive as violence exposure in the home contributed uniquely (beyond community

violence exposure). Furthermore, one type of violence, sexual abuse, operated through internalizing problems for the combined sample. The findings contribute to the risk and resilience perspective by identifying how risk variables operate violence together and how they operate through other variables (problem behaviors) to influence AAU.

Self-Medication Hypothesis. The self-medication hypothesis is a primary hypothesis proposed for why internalizing problems relates to AAU. Although there is substantial evidence for a link between internalizing problems and AAU, the proposed study contributed to this literature and, in particular, added to the small literature (Chassin et al., 2002; Kumpulainen, 2000) suggesting some support for this hypothesis (the mediating role of internalizing problems) and failing to find gender differences.

Gender Intensification Hypothesis. The gender intensification hypothesis proposes that in adolescence females are more sensitive to stress than males and this stress leads to internalizing problems for females. The current study added to the few studies on the gender intensification hypothesis (e.g., Davies & Lindsay, 2004) and extended the existing studies in the following way. First, with the exception of recent work (Mrug et al., 2008), research to this point has only examined if violence exposure in one setting (e.g., home) is associated with increased internalizing problems; therefore, the proposed study provided a more rigorous test of the association between violence exposure and internalizing problems by finding support in two settings (home and community). However, the current study failed to find support for the gender intensification hypothesis as the increased level of internalizing problems that result from such exposure was associated with AAU of both females and males.

Early Starter Model. The early starter model proposes that externalizing problems begin in early childhood and progress to increasingly severe symptoms in adolescence (McMahon & Wells, 1998). Alcohol misuse is one potential severe behavior in the trajectory. Violence exposure can lead to youth moving along an antisocial trajectory by modeling how to handle interpersonal situations (e.g., bullying others). There is support for the early starter model for males (McMahon & Wells, 1998), but little research with females (McMahon & Wells, 1998,; Silverthorne & Frick, 1999). The current study failed to support the early starter model by not finding a link between externalizing problems and AAU for either males or females.

Practice Implications. There are numerous implications for social work practice from the proposed study. The findings suggest the assessment and treatment of youth referred for problems with alcohol should be multi-element (Nash, Fraser, Galinsky, & Kupper, 2003; Zucker et al., 1994). Not only should alcohol use be assessed and treated, but the adolescent's exposure to violence in multiple settings and her or his response to the violence, in particular internalizing problems, should be considered. In order to effectively intervene, it will not be sufficient to focus only on alcohol use. As Zucker and colleagues (1994) have noted, multiple inoculation strategies should be employed by the practitioner and the current study identified both contextual (i.e., home and community) and individual variables (i.e., type of violence experienced and internalizing problems) which can be included in the intervention. As is evident from Table 3 on variables included in AAU prevention and intervention programs, violence exposure, internalizing problems, and externalizing problems have not been part of these programs. The current study suggests two of these variables (i.e., violence exposure and internalizing problems)

should be included in prevention and intervention programs implemented by social workers.

The findings from this study suggest that assessment and intervention practices do not need to be modified based on adolescent gender. Each type of violence in each setting has similar associations with AAU and the role of internalizing symptoms was similar for females and males.

By including an assessment of violence exposure, the findings will guide practice by informing social workers about whether to target the context and/or the individual (Nash & Bowen, 2002). Some mental health fields (e.g., psychiatry) focus on the individual; however, with the inclusion of contexts, social work practitioners can develop interventions for an adolescent with alcohol problems which are more comprehensive and effective. The findings will inform social work practitioners that violence across the home and community settings both contribute to AAU and are additive. Practitioners need to assess and potentially intervene in each of the settings.

In addition, this study informs the social work practitioner about the relative contributions of three types of violence in the home (i.e., witness, physical, sexual) to AAU. The findings suggest that physical and sexual violence are related to AAU and these types of violence need to be assessed and potentially included in their interventions when working with adolescents with AAU problems.

As violence exposure in multiple settings was related to AAU, the practitioner needs to work with the adolescent to develop skills to protect him or herself from exposure. As part of an intervention, the role of violence exposure in alcohol problems can be explained to the adolescent. The importance of avoiding violence at school (e.g.,

staying away from “back hallways” alone), in neighborhoods (e.g., staying away from areas where street gangs “hang out”), and at home (e.g., not intervening in conflict between parents) can be emphasized. Teaching problem solving skills to help an adolescent avoid exposure to violence can be part of this therapeutic process.

As violence exposure in multiple settings was related to AAU as proposed, the social work practitioner can also work in each of the settings to reduce violence and to encourage multi-setting efforts, including the following with parents: Monitor the adolescent’s activities outside the home to reduce violence exposure (e.g., set a time for the adolescent to be home and know where she or he is); encourage parent involvement in school to help reduce school violence; and, as Nash and Bowen (1999) have noted, promote structured activities and mentors for adolescent. In the school, the social work practitioner can implement programs to prevent bullying. These programs can include teacher training, student problem solving skills, and consistent consequences for students who bully others. In the neighborhood, the social worker can promote community organization whereby neighbors know each other and work together to monitor adolescent activities in the neighborhood.

Beyond reducing violence exposure in multiple settings, this study also has implications for the social worker’s interventions with the adolescent’s internalizing problems. As these symptoms mediate the association between one type of violence (sexual abuse) exposure and adolescent alcohol misuse, then intervening directly with these symptoms will be a critical aspect of an intervention. Furthermore, as Petraitis and colleagues (1995) note, affective states are modifiable, as programs for internalizing problems (e.g., Coping Cat; Kendall et al., 1990) exist. If an adolescent has problems

with alcohol misuse, the findings suggest that interventions may need to be implemented with internalizing problems of females and males. The multi-element intervention should involve reducing not only violence exposure but the affective response (e.g., fear, anxiety) to the violence as a way to decrease reliance on alcohol. As has been noted, existing programs for prevention and intervention with AAU have not included components targeting internalizing problems (see Table 5). The findings from the current study provide evidence for social work practice that such components should be included in programs implemented by the practitioner.

Social workers can also address AAU at the community level. For example, they can target social service agencies that work with adolescents who are at risk for alcohol use and abuse. This will involve not only identifying agencies that address AAU directly, but also those that address risk factors of AAU, such as home and community violence exposure and internalizing problems. Once this is accomplished, the social worker can assist these agencies in connecting and developing relationships that foster the identification of adolescents in the community who are at risk for alcohol use and abuse and to create continuity of assessment and treatment across the agencies for these adolescents.

The current study also has implications for the prevention of illicit substance use. The Gateway Hypothesis (Kandel, 2002) proposes that alcohol misuse can lead to marijuana and hard drug use. By identifying violence exposure and internalizing problems as risk factors for alcohol misuse, illicit substance use can potentially be prevented by intervening with these early risk factors.

In summary, the findings of this study have multiple implications for social work practice. By identifying the pathways that lead to alcohol misuse, more effective interventions, which target specific individual factors (internalizing problems) in specific settings for specific kinds of violence, can be implemented.

Research Implications. Fincham (1999) proposed that research progresses through stages: (1) the association of risk factors to outcomes; (2) the identification of mechanisms (mediators) that account for the associations; and (3) the development of interventions that modify the mechanisms and risk factors. In the field of AAU, the first stage has received substantial attention (see Tables 1 and 2) and received some further attention through the secondary hypotheses addressed in this study. The second stage is in its infancy in AAU and, perhaps unfortunately, stage 3 has occurred (see Table 3) in the absence of literature at stage 2. The current study addressed this deficiency in the literature by examining mediators (internalizing and externalizing symptoms) of the association between violence exposure and AAU. Therefore, the primary hypotheses of this study represented a Stage 2 investigation. The study also promotes intervention research for adolescent alcohol misuse by identifying that treatment components for internalizing problems for both girls and boys should be included in AAU programs for adolescents living in settings where violence often occurs. Such a multi-element program can then be compared to one which targets only adolescent alcohol misuse.

In future research on AAU, the current findings indicate that neither violence nor internalizing problems can be ignored. However, it is important to point out that because of the measurement of only extreme forms of externalizing problems, these problems deserve further attention. The early starter model (McMahon & Wells, 1990) and early

work on DST (Zucker, Fitzgerald, & Moses, 1994) strongly supported the role of externalizing problems in AAU among males. This literature should not be overlooked when considering the current findings and their implications. A more sensitive measurement of externalizing problems may yield different findings.

The current research focused on AAU as the behavior of interest. However, as has already been noted, this behavior has implications for other substance use (Kandel, 2002) and for long-term educational, personal, and occupational competence. Thus, future research can extend the current study by examining not only violence, internalizing and externalizing problems, and AAU but measures of substance use and competence.

Future research should also consider that there may be unexplained interdependency between violence exposure, internalizing and externalizing problems, and AAU. Specifically, adolescents are nested within schools, and schools are nested within communities. As a consequence, the specific school that an adolescent attends may influence his or her rates of violence exposure, internalizing and externalizing problems, and alcohol use, as well as the relationships between these variables. In addition, because schools exist within larger communities, rates of violence exposure, internalizing and externalizing problems, and AAU within a given community may, to some degree, be dependent on the level of these variables in the school or group of schools in that community. In order to statistically account for such interdependency, future research on AAU should be conducted using Hierarchical Linear Modeling. Unlike standard multiple regression, this regression technique takes into account the nested, or hierarchical, nature of the data.

Future research on AAU should also examine the trajectories of AAU and its risk factors in heterogeneous groups of adolescents represented in longitudinal data. Analyses that utilize person-centered approaches, such as latent transition and class growth analyses and growth mixture modeling, are recommended for this type of examination (Muthen & Muthen, 2000). In these types of analyses, the focus is on understanding the trajectories of different groups of adolescents, such as females and males. Although the current study indicated that females and males follow a similar pathway to AAU, the data, as discussed previously, were cross-sectional. Thus, repeating the study using these person-centered approaches with longitudinal data is warranted to determine the exact nature of these pathways over time and whether a specified temporal order is followed. Beyond females and males, other heterogeneous groups should be examined over time. For example, the current study found that internalizing problems was the mechanism through which sexual abuse is associated with AAU. Using person-centered analyses with a longitudinal dataset, the trajectories of internalizing problems and alcohol use could be examined for those adolescents who have been sexually abused and those who have been not.

Policy Implications. This study also has two important long range policy implications. First, as AAU is associated with violence exposure in homes and communities, as well as with internalizing problems, then interventions for alcohol use should include components to address these risk factors. If these interventions can demonstrate effectiveness, then this justifies devoting resources at the local, state, and national levels to implement these programs to prevent or reduce AAU. Social workers can work at each of these three levels to promote funding of these interventions.

A second arena of policy implications is the prevention of AAU by decreasing the level of adolescent violence exposure in the communities in which adolescents reside. This may involve a shift in law enforcement efforts from enforcing underage drinking laws to enhanced violence prevention enforcement. This can include efforts to reduce gang activity, promote curfews for adolescents, and encourage community cohesion and social control. Community activities for adolescents have been delineated by Nash and Brown (1999) and include: structured after-school activities; supervised recreation centers; and providing mentors for youth. Reduction of violence in neighborhoods, schools, and homes can occur through formal and informal policy channels and should promote reductions in AAU.

Conclusions

The current study contributes to the existing literature by demonstrating relationships between particular types of violence and AAU. Furthermore, internalizing problems were found to mediate the association between violence exposure and AAU for both females and males. Home violence, particularly sexual abuse and physical victimization, was found to be of particular importance for AAU. Multiple implications of the findings for theory, practice, research, and policy were delineated, further demonstrating the contributions of the study to the literature.

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