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by

Jina Jun

2013

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**LONG-TERM ASSOCIATIONS BETWEEN CHILDHOOD
SEXUAL/PHYSICAL VIOLENCE EXPERIENCE, ALCOHOL USE,
DEPRESSIVE SYMPTOMS, AND RISKY SEXUAL BEHAVIORS
AMONG YOUNG ADULT WOMEN**

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by

Jina Jun, B.A., M.A.

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Dedication

To My Family, the Foundation of My Strength

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Current literature lacks longitudinal understandings of the association between childhood sexual/physical violence, alcohol use, depressive symptoms, and indiscriminant sexual behaviors among young women, as well as the racial/ethnic differences in these associations. Therefore, using the 1994-2008 National Longitudinal Study of Adolescent Health, this study examined a) heterogeneous growth trajectories of problem alcohol use during the transition from adolescents to young adulthood and the impact of childhood sexual/physical violence on drinking trajectories, b) the long-term impact of childhood sexual/physical violence on alcohol use and depressive symptoms, and c) the structural associations between childhood sexual/physical violence and indiscriminant sexual behaviors by examining alcohol use and depressive symptoms as mediators between White and African-American women.

First, with 1,702 women, LCGM was used to identify trajectories of problem alcohol use using the first three waves. Four trajectories of problem alcohol use emerged:

stable abstainers; decliners (moderate-low); incliners (low-moderate); and rapid incliners (low-high). From the bivariate level analyses, in reference to stable abstainers, White women who experienced childhood sexual/physical violence were more likely to be rapid incliners (low-high).

Second, with 1,756 women, autoregressive cross-lagged path models were performed to test longitudinal associations between childhood sexual/physical violence, problem alcohol use, and depressive symptoms of White and African-American women. Both groups demonstrated significant association between childhood sexual/physical violence and subsequent development of depressive symptoms, while only White women demonstrated significant association with subsequent problem alcohol use.

Third, with 1,388 women, SEM and multigroup SEM were used to test pathways between childhood sexual/physical violence and indiscriminant sexual behaviors for White and African-American women. SEM indicates that problem alcohol use and depressive symptoms mediated the proposed relationship. Multigroup SEM indicates that, for White women, both problem alcohol use and depressive symptoms mediated the association between childhood sexual/physical violence and indiscriminant sexual behaviors, while only depressive symptoms mediated the proposed association for African-American women.

These findings highlight the importance of designing and providing effective prevention and treatment programs for women who experienced childhood sexual/physical violence to interrupt subsequent problem alcohol use, depressive symptoms, and indiscriminant sexual behaviors.

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Chapter 1. Introduction

Statement of Problem

The 2010 National Survey on Drug Use and Health (NSDUH) (Substance Abuse and Mental Health Services Administration, 2011) provided some recent statistics related to the prevalence of alcohol use for adult women. In 2010, an estimated 46.5 percent females aged 12 or older had consumed at least one drink in the past 30 days. Among women of child-bearing age, 15 to 44, nearly 70 percent reported current alcohol use and 28 percent were binge drinkers, defined as consuming four or more drinks on one occasion on at least one day in the past 30 days. In addition, approximately 7 percent of women were heavy drinkers, defined as consuming four or more drinks on the same occasion on each of five or more days in the past 30 days. Moreover, the NSDUH estimates that approximately 6 percent of women have substance abuse or dependence.

Additionally, the 1997-2008 National Health Interview Survey (National Institute on Alcohol Abuse and Alcoholism, 2009) compared percent distribution of current drinking status and drinking levels. Compared to data from 1997, the number of women who had more than three drinks per week in the past year, which is defined as a moderate drinker, has increased from 6.6 to 8.3 percent and the number of women who drink more than one drink per day, which is defined as a heavy drinker, has increased from 3.3 to 5 percent, while the number of female abstainer and light drinkers remained the same. In terms of binge drinking episodes, approximately 10 percent of female drinkers reported 1-11 days of binge drinking per month and 5 percent of them reported 12 or more days of binge drinking episodes per month.

Women's excessive drinking (e.g., binge and heavy drinking) damage their health, safety, and general well-being (Diamant, Wold, Spritzer, & Gelberg, 2000; National Institute on Alcohol Abuse and Alcoholism, 2008). First, previous research has reported that large numbers of female drinkers experience psychiatric comorbidity such as depression, anxiety and post-traumatic stress disorder (PTSD) (Marmorstein, 2010; Nolen-Hoeksema, 2004; Petrakis, Gonzalez, Rosenheck, & Krystal, 2002). Many studies point out that psychiatric comorbidity such as anxiety and depression are more common in women than men (Grant, Stinson, et al., 2004; Kendler, Prescott, Myers, & Neale, 2003).

Besides mental health problems, findings from multiple studies suggest that women who engage in binge or heavy drinking are more likely to engage in risky sexual behaviors (e.g., indiscriminant sexual behaviors) (J. L. Brown & Venable, 2007; Cook & Clark, 2005; Cooper, 2002; Stappenbeck et al., 2013). For example, women's excessive drinking tends to increase the likelihood of having multiple sexual partners (J. L. Brown & Venable, 2007; Cooper, 2002). Also, women who drink heavily are at higher mortality risk (Graff-Iversen et al., 2012; Greenfield, Rehm, & Rogers, 2002). In addition, prior studies report alcohol related health problems such as alcoholic liver disease, brain disease, cancer, heart disease, and sexually transmitted diseases (Cook & Clark, 2005; National Institute on Alcohol Abuse and Alcoholism, 2004; Singletary & Gapstur, 2001). Moreover, recent studies have begun to focus on the drinking behaviors of child-bearing aged women (Laborde & Mair, 2012; Parackal, Parackal, & Harraway, 2012; S. Thompson & Jun, 2010). The number of women who drink during their pregnancy has

increased (Centers for Disease Control and Prevention, 2002). Women's alcohol consumption during pregnancy can harm their babies, which has been diagnosed as Fetal Alcohol Spectrum Disorders (Barr & Streissguth, 2001; Pagliaro & Pagliaro, 2000).

Numerous studies have previously analyzed risk factors to understand women's drinking (Nolen-Hoeksema, 2004; Paljärvi, Suominen, Car, & Koskenvuo, 2013; S. Thompson & Jun, 2010). Experiences of sexual or physical violence in childhood have been shown to be a significant predictor for women's drinking (D. B. Clark, Thatcher, & Martin, 2010; Sartor et al., 2012; Timko, Sutkowi, Pavao, & Kimerling, 2008). The U.S. Department of Health and Human services reports that in 2010, approximately 17.6 percent of children experienced physical abuse and 9.2 percent of children suffered sexual abuse (U.S. Department of Health and Human Services, Administration for Children and Families, Administration on Children, Youth and Families, & Children's Bureau, 2011). In addition, national surveys of adults suggest that between 6-23 percent of women experienced physical or sexual abuse and/or assault during their childhood (Cogle, Timpano, Sachs-Ericsson, Keough, & Riccardi, 2010; Lown, Nayak, Korcha, & Greenfield, 2011). Previous research indicates that women who experienced sexual and/or physical violence in childhood are more likely to engage in binge drinking and to report more alcohol related problems (e.g., problems at work, problems with friends or with family members) (D. B. Clark et al., 2010; M. P. Thompson, Kingree, & Desai, 2004). Besides women's drinking, childhood sexual or physical violence experiences has been related to poorer mental health (e.g., depression and anxiety) (Cogle et al., 2010;

Timko et al., 2008) and indiscriminant sexual behaviors (e.g., multiple sexual partners) (Lemieux & Byers, 2008; Senn, Carey, Venable, Coury-Doniger, & Urban, 2007).

The number of women who engage in binge and/or heavy drinking has increased over time. Additionally, the negative consequences of women's drinking are well known in the social work field. Although numerous studies have examined the association between childhood sexual or physical violence experiences and alcohol use (Jasinski, Williams, & Siegel, 2000; Lown et al., 2011; Shin, Edwards, & Heeren, 2009), only a limited numbers of studies have examined the long-term associations between experiences of childhood sexual or physical violence and women's drinking. In addition, little is known about the co-occurring association between alcohol use and mental health problems among women who experienced childhood sexual or physical violence. Most previous studies that examined the association between childhood sexual or physical violence experiences, alcohol use, and mental health problems were cross-sectional (Caetano, Field, & Nelson, 2003; Jasinski et al., 2000; Shin et al., 2009). Cross-sectional studies describe, explore, or examine a phenomena at one time and analyze it at a particular point (A. Rubin & Babbie, 2008), so it is difficult to explain the causal relationship between adverse experiences in childhood, alcohol use, and mental health problems.

In addition, with respect to women's drinking, most studies that address trajectories of alcohol use assumed homogeneous growth patterns of women's drinking (Ammon, Bond, Matzger, & Weisner, 2008; Chen & Jacobson, 2012; M. P. Thompson et al., 2004). However, drinking trajectories can vary by individual. For example, some

female heavy drinkers may decrease their drinking over time, while other female continuously engage in heavy drinking. A few previous studies examined these heterogeneous drinking patterns over time (Dauber, Paulson, & Leiferman, 2011; Delucchi, Matzger, & Weisner, 2004; Sher, Jackson, & Steinley, 2011). However, these studies did not target women, even though they found gender differences (Ammon et al., 2008; M. P. Thompson et al., 2004). In addition, these studies did not examine the association between childhood sexual or physical violence experience and heterogeneous drinking patterns.

Moreover, less is known about the mechanisms by which childhood experiences of sexual or physical violence increase the likelihood of engaging in indiscriminant sexual behaviors (e.g., multiple sexual partners). Understanding the cumulative effects of alcohol use and mental health problems (e.g., levels of depressive symptoms) on indiscriminant sexual behaviors is also limited, which impedes the development of appropriate prevention and treatment programs.

Furthermore, most studies utilized race/ethnicity as a controlling factor rather than examining racial/ethnic disparities. In addition, limited numbers of studies tested racial/ethnic differences in long-term and structural associations between childhood sexual or physical violence experiences, alcohol use, mental health problems, and indiscriminant sexual behaviors (Caetano et al., 2003; Dauber et al., 2011; Widom, Czaja, Wilson, Allwood, & Chauhan, 2013). Additionally, previous research has reported mixed findings on these associations between White and African American women (Adimora, Schoenbach, Taylor, Khan, & Schwartz, 2011; Caetano et al., 2003; Widom et al., 2013).

Therefore, using the longitudinal data from the 1994-2008 National Longitudinal Study of Adolescent Health (Add Health), this study examined (a) heterogeneous growth trajectories of alcohol use behaviors (problem alcohol use) during the transition from adolescents to young adulthood and impacts of experiences of childhood sexual or physical violence on heterogeneous drinking trajectories, (b) the long-term impact of experiences of childhood sexual or physical violence on alcohol use and depressive symptoms and co-occurring alcohol use and depressive symptoms during the transition from adolescents to young adulthood, and (c) the structural associations between experiences of childhood sexual or physical violence and indiscriminant sexual behaviors by examining the cumulative roles of alcohol use and levels of depressive symptoms between White and African American women.

Study Purpose

The purpose of this study was to address the long-term and structural associations between experiences of childhood sexual or physical violence on alcohol use, depressive symptoms, and indiscriminant sexual behaviors among White and African American women.

Aim 1: To identify trajectories of alcohol use behaviors from adolescence to young adulthood and examine the impacts of experiences of childhood sexual or physical violence on alcohol use trajectories

Hypothesis 1.1: Women who experienced childhood sexual or physical violence will be more likely to show a pattern of rapid increase of drinking during the transition from adolescence to young adulthood compared with women who did not experience childhood sexual or physical violence.

Hypothesis 1.2: White women will be more likely to exhibit risky drinking patterns than African American women.

Hypothesis 1.3: White women with experiences of childhood sexual or physical violence will be more likely to exhibit risky drinking patterns than White women without such experiences.

Hypothesis 1.4: African American women with experiences of childhood sexual or physical violence will be more likely to exhibit risky drinking patterns than African American women without such experiences.

Aim 2: To examine racial/ethnic differences in long-term effects of experiences of childhood sexual or physical violence on developing subsequent alcohol use and mental health problems during the transition from adolescence to young adulthood.

For White women,

Hypothesis 2.1.1: Women with childhood sexual or physical violence experience will be more likely to show greater levels of alcohol use in adolescence.

Hypothesis 2.1.2: Increased levels of alcohol use in adolescence as a result of childhood sexual or physical violence experiences will predict greater levels of alcohol use in young adulthood.

Hypothesis 2.1.3: Women with childhood sexual or physical violence experience will be more likely to show greater levels of mental health problems in adolescence.

Hypothesis 2.1.4: Increased levels of mental health problems in adolescence as a result of childhood sexual or physical violence experiences will predict greater levels of mental health problems in young adulthood

Hypothesis 2.1.5: Greater levels of alcohol use will be significantly associated with greater levels of mental health problems in adolescence.

Hypothesis 2.1.6: Greater levels of alcohol use will be significantly associated with greater levels of mental health problems in young adulthood.

For African American Women,

Hypothesis 2.2.1: Women with childhood sexual or physical violence experience will be more likely to show greater levels of alcohol use in adolescence.

Hypothesis 2.2.2: Increased levels of alcohol use in adolescence as a result of childhood sexual or physical violence experiences will predict greater levels of alcohol use in young adulthood.

Hypothesis 2.2.3: Women with childhood sexual or physical violence experience will be more likely to show greater levels of mental health problems in adolescence.

Hypothesis 2.2.4: Increased levels of mental health problems in adolescence as a result of childhood sexual or physical violence experiences will predict greater levels of mental health problems in young adulthood

Hypothesis 2.2.5: Greater levels of alcohol use will be significantly associated with greater levels of mental health problems in adolescence.

Hypothesis 2.2.6: Greater levels of alcohol use will be significantly associated with greater levels of mental health problems in young adulthood.

Aim 3: To examine structural mechanisms between experiences of childhood sexual or physical violence and indiscriminant sexual behaviors by examining the cumulative roles of alcohol use and mental health problems.

Hypothesis 3.1: Women who experienced childhood sexual or physical violence will be more likely to engage in indiscriminant sexual behaviors in adulthood.

Hypothesis 3.2: Women who experienced childhood sexual or physical violence will be more likely to show greater levels of alcohol use and mental health problems.

Hypothesis 3.3: Greater levels of alcohol use will be significantly associated with greater levels of mental health problems in young adulthood.

Hypothesis 3.4: Alcohol use and depressive symptoms in adulthood will mediate the relationship between childhood sexual or physical violence experience and indiscriminant sexual behaviors.

Hypothesis 3.5: The proposed associations between childhood sexual or physical violence, alcohol use, depressive symptoms, and indiscriminant sexual behaviors will vary by White and African American women.

Theoretical Frameworks

This study examined longitudinal associations between childhood experiences of sexual or physical violence, alcohol use, mental health problems, and indiscriminant sexual behaviors. The theoretical framework of this study explored in two ways. First, this study described two theories that explain the association between experiences of childhood sexual or physical violence, alcohol use, and mental health problems. Second, this section explored three models that explain racial/ethnic differences in negative consequences of adverse childhood experiences.

With respect to theories that explain the association between experiences of childhood sexual or physical violence, alcohol use, and negative mental health, this study was developed from two theories: (a) the tension reduction hypothesis and (b) social learning theory. The tension reduction hypothesis explains alcohol use as a coping behavior for negative feelings (e.g., depression) caused by adverse childhood experiences. Compared to the tension reduction hypothesis, social learning theory proposes a comprehensive model to understand individuals' alcohol use including psychosocial mechanisms. According to social learning theory, excessive alcohol use behaviors are learned maladaptive behaviors acquired from direct and indirect experiences.

With respect to theories that explain racial/ethnic differences in the proposed associations, this study explored three models: (a) racial invariance model, (b) double jeopardy model, and (c) resilience model. Both double jeopardy and resilience models argue that there are racial/ethnic differences in negative consequences of experiences of childhood sexual or physical violence on alcohol use, mental health problems, and

indiscriminant sexual behaviors, while the racial invariance model argues no racial/ethnic differences exist in them.

Tension Reduction Hypothesis

The tension reduction hypothesis considers excessive drinking (e.g., binge drinking or heavy drinking) as coping behaviors. Simply put, from the perspective of the tension reduction theory, people drink to reduce their tension when they are exposed to stressful events. Therefore, the tension reduction hypothesis assumes that exposure to tension leads to increased drinking.

The tension reduction hypothesis has been developed by Conger and his colleagues (1956). However, Jellinek (1945) previously pointed out the relationship between tension and problem alcohol use and noted that tension is generated by the increasing complexities of society, and alcohol was known to be a source of relief from tension. Conger (1956) developed the tension-reduction hypothesis, which states that alcohol reduces fear associated with conflict, which in turn reinforces its consumption. The tension reduction hypothesis became a precursor to later cognitive explanations of learning and motivation (Greeley & Oei, 1999; Young, Oei, & Knight, 1990).

In the tension reduction hypothesis, tension refers to social stressors (e.g., unemployment), physical stressors (e.g., headache), and cognitive disruption (e.g., anxiety and depression). Previous studies have applied this tension reduction hypothesis to explain the association between adverse childhood experiences, alcohol use, and depression (Grayson & Nolen-Hoeksema, 2005; Miranda, Meyerson, Long, Marx, & Simpson, 2002). More specifically, previous studies have consistently found that people

who experience childhood sexual or physical violence are more likely to show increased tension such as depression, anxiety, and/or PTSD. The tension reduction hypothesis explains that people may engage in binge or heavy drinking to cope with these individuals' negative feelings (Grayson & Nolen-Hoeksema, 2005; Miranda et al., 2002). The strong point of the tension reduction hypothesis may be its simplicity. The tension reduction hypothesis clearly demonstrates the relationship between adverse experiences and excessive alcohol use. Despite its simplicity, the tension reduction hypothesis has been criticized because it is overly broad and it does not include individual characteristics in understanding alcohol use (Cooper, Russell, Skinner, Frone, & Mudar, 1992).

Social Learning Theory

The social learning theory has been applied to understand women's alcohol use (Leonard & Mudar, 2000; Peirce, Frone, Russell, & Cooper, 1994; Ullman, Filipas, Townsend, & Starzynski, 2005). This theory considers alcohol use as a learned behavior from direct and indirect experiences, and further develops the tension reduction hypothesis.

The social learning theory has been developed by Bandura (1984), and applied to explain alcohol use since the late 1980s by Abrams and Niaura (1987). Compared to the tension reduction theory that did not fully examine psychosocial mechanisms, the social learning theory focuses on the role of the vicarious learning process and social environments in the development of alcohol use and alcohol problems (Maisto, Carey, & Bradizza, 1999). From the perspective of the social learning theory, alcohol use and

alcohol problems are learned maladaptive behaviors from direct experience and observing others' drinking (Bissonnette, 2006; Maisto et al., 1999).

Concepts. Bandura (1984) assumed human behavior as a triadic, dynamic, and reciprocal interaction of personal factors, behaviors, and the environment. He also assumed that human behavior is regulated through cognitive processes (Bandura, 1984). In addition, human behavior in the social learning theory is acquired through direct experience and observation of others (Maisto et al., 1999). Through observation, people gather information about how a specific behavior is produced and the consequences of this behavior. The social learning theory has four major concepts: (a) differential reinforcement; (b) vicarious learning; (c) cognitive processes; and (d) reciprocal determinism.

First, differential reinforcement refers to “the application of consequences for a behavior dependent on stimulus condition (=setting)” (Maisto et al., 1999, p. 108). For example, if a person drinks moderately at a party, he will likely have positive outcomes. However, if a person drinks moderately while he or she was working at an office, he is more likely to have negative outcomes. Therefore, differential reinforcement indicates the influence of the social environment. Second, a vicarious learning process includes observations of other people’s behaviors and direct experiences of a particular behavior. For example, a person learns about drinking from their own drinking experiences and by observing family members’ or peers’ drinking. Third, cognitive processes indicate encoding, organizing and retrieving information that regulate behaviors (Maisto et al., 1999). The expectancies of behavioral outcomes are based on cognitive processes.

Alcohol outcomes expectancies are described in the outcome expectancy theory section later. Besides expectancies, self-efficacy is also based on cognitive processes. Self-efficacy indicates the degree that a person can enact behavior at a level required to get desired outcomes (Caetano et al., 2003; Maisto et al., 1999). For example, if a person experiences tension from a previous adverse experience, he tries to control the tension by utilizing their previous direct and indirect experiences that have been encoded and organized. In addition, a person may try to relieve tension by interacting with other people. Through these cognitive process and interactions, a person can attain self-efficacy. Lastly, reciprocal determinism means that behavior may be controlled by the environment, but that behavior may also alter the environment (Bandura, 1984). To give an example of reciprocal determinism, a heavy drinker may claim he drinks excessively because he got fired as the result of his heavy drinking. In conclusion, in the social learning theory, people, their behaviors, and environments are interrelated.

Outcome expectancy theory. The outcome expectancy theory, a sub-model of the social learning theory (Jones, Corbin, & Fromme, 2001), has been utilized interchangeably with the motivational model (Cooper, Agocha, & Sheldon, 2000; W. R. Miller, 2006). This motivational model differs from the motivation theory developed by Prochaska and DiClemente (1992). The motivational model focuses on motives for drinking (i.e., drink to cope and drink to enhance) and the motivation theory pays attention to motives for change (i.e., preparedness and readiness to change alcohol misuse, abuse, and dependence).

The outcome expectancy theory considers individual behaviors as results of individuals' direct and indirect experience with alcohol (Bissonnette, 2006; Jones et al., 2001). For example, as mentioned earlier, observing and modeling family members and peers' drinking and one's own direct experience with alcohol play important roles in forming alcohol expectancies.

There are many types of expectancies for drinking such as drinking to enhance sociability, to increase power, to escape problems, to get drunk for enjoyment, or for ritualistic reasons (Abbey, Smith, & Scott, 1993; Cooper et al., 1992; Kassel, Jackson, & Unrod, 2000). Most research has focused on two broad categories of alcohol expectancies. One is negative expectancy, commonly labeled "drinking to cope." It means the tendency to drink to escape, avoid, or regulate negative feelings (Abbey et al., 1993). This drink to cope expectancy is based on the tension reduction hypothesis and mostly utilized in studies that examined the association between childhood experiences of sexual or physical violence and alcohol use (Grayson & Nolen-Hoeksema, 2005; Miranda et al., 2002). From the tension reduction hypothesis, the alcohol expectancy theory includes the cognitive process of learning. The other one is positive expectancy, typically called drinking to enhance. It means the tendency to drink to be convivial, celebrate social occasions, and have a good time with others (Abbey et al., 1993). These alcohol expectancies are hypothesized to be formed via socially learned expectations, acquired through observation of other's behaviors following consumption and one's own direct experiences (Bissonnette, 2006).

As Figure 1.1 shows, the alcohol expectancy theory posits a direct influence of expectancies on women's alcohol use or mediates the relationship between risk factors and women's excessive alcohol use (Cooper et al., 2000; Corbin, Bernat, Calhoun, McNair, & Seals, 2001; Goldsmith, Tran, Smith, & Howe, 2009; Han & Short, 2009; Leonard & Mudar, 2000). For example, Grayson and Nolen-Hoeksema (2005) studied alcohol expectancies' mediating effects on alcohol problems among women who experienced sexual abuse in their childhood. They found that both drinking to cope and drinking to enhance mediated the relationship between childhood experiences of sexual abuse and alcohol problems.

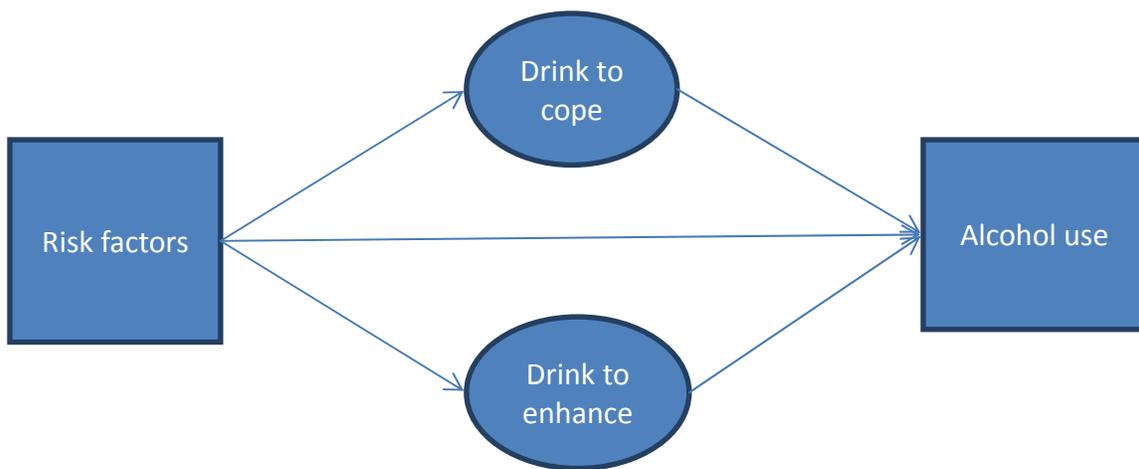


Figure 1.1. Conceptual Framework of alcohol expectancy theory

This outcome expectancy theory has been also applied to explain the association between alcohol use and risky sexual behaviors (Dermen & Cooper, 2000; Fromme,

D'Amico, & Katz, 1999; George, Stoner, Norris, Lopez, & Lehman, 2000; Stappenbeck et al., 2013). Previous studies that utilized sex-related expectancy models assumed that pre-existing beliefs about alcohol's influence on sexual behavior resulted in an individual's sexual behaviors after drinking (Cooper, 2002; Lang, 1985). For example, individuals who have beliefs about positive association between alcohol use and risky sexual behaviors are more likely to engage in risky sexual behaviors when they drink than those who do not have these beliefs (George et al., 2000; Leigh, 1990). In contrast, individuals with beliefs about negative association between alcohol use and risky sexual behaviors less likely to engage in risky sexual behaviors when they drink. Thus, unlike the expectancy theory to explain alcohol use behaviors, sex-related alcohol expectancies play a role as a moderator on the association between alcohol use and risky sexual behaviors (Dermen & Cooper, 2000; Dermen, Cooper, & Agocha, 1998; Stappenbeck et al., 2013).

Coping styles. The social learning theory considers that individual's coping styles (e.g., emotion-focused coping and problem-focused coping) are critical in making decisions to drink as well as whether drinking will be normal or maladaptive (McKee, Hinson, Wall, & Spriel, 1998; Timko, Finney, & Moos, 2005; Williams & Clark, 1998). The social learning theory assumes that individual's coping styles influence alcohol use by influencing alcohol expectancies (Cooper, Russell, & George, 1988). In particular, prior studies point out that emotion-focused coping is strongly related to the drinking to cope expectancy, which in turn is related to the alcohol use (Williams & Clark, 1998).

Figure 1.2 shows comprehensive model of social learning theory that includes outcome expectancy theories and individuals' coping styles. The comprehensive model of social learning theory for explaining individual's alcohol use has been developed by Cooper et al. (1988). Large numbers of studies have utilized this framework for explaining alcohol use (Caetano et al., 2003; Grayson & Nolen-Hoeksema, 2005; McKee et al., 1998; Williams & Clark, 1998).

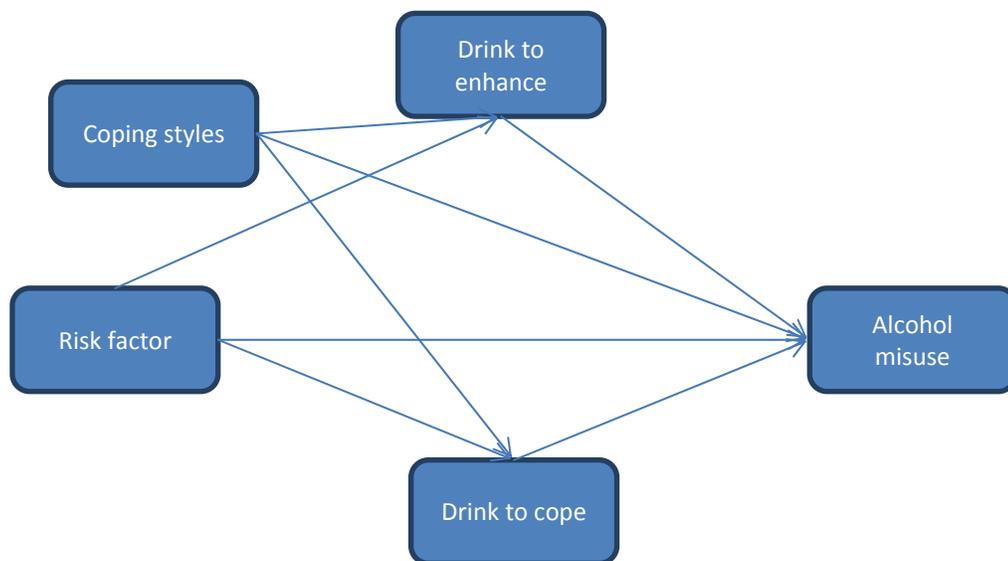


Figure 1.2. The social learning theory: coping, expectancies, and alcohol use
Source: Cooper, M. L., Russell, M., & George, W. H. (1988). Coping, expectancies, and alcohol abuse: A test of social learning formulations. *Journal of Abnormal Psychology*, 97(2), 218-230.

Conceptual Framework of Racial/Ethnic Considerations

Various theories have been used to explain the negative consequences of adverse childhood experiences of people from different race and ethnic backgrounds. One is the racial invariance model (Sampson & Bean, 2006; Sampson, Morenoff, & Raudenbush,

2005; Sampson & Wilson, 1995), in which people with adverse childhood experience are expected to show similar negative consequences regardless of their racial/ethnic backgrounds. This model originally developed to explain racial/ethnic disparities in violence (Sampson et al., 2005) and was utilized mostly in research of crime and violence (Le & Stockdale, 2008; Peterson & Krivo, 2005). With respect to racial invariance in negative consequences of adverse childhood experiences, this model argues that the impact of social influences on negative consequences due to childhood adverse experiences should be similar across race/ethnicity when people are exposed to similar social circumstances (Sampson & Bean, 2006; Widom et al., 2013). This model explains that observed racial/ethnic differences in negative outcomes of childhood adverse experiences are due to different social circumstances (Widom et al., 2013). Previous studies support the racial invariance model in terms of its explanation of the relationship between childhood sexual or physical violence, mental health problems, and problem alcohol use among women (Caetano et al., 2003; Glover et al., 2010; Mennen, 1995).

Second, the double jeopardy model suggests the negative effects of adverse childhood experiences will be significantly greater for African Americans (McLeod & Owens, 2004; Pearlin, Schieman, Fazio, & Meersman, 2005; Roberts, Gilman, Breslau, Breslau, & Koenen, 2011). This is because they are compounded by experiences of racism and exposure to other forms of victimization and violence (Robert, 1999; Wyatt, 1990). Robert (1999) suggested that African Americans may be more likely to show negative health outcomes in response to neighborhood disadvantage because psychological, social, and institutional resources may be severely limited by geographic

context. This model has been utilized to understand differences in outcomes related to health and psychological well-being (Adimora et al., 2011; Harris, Gordon-Larsen, Chantala, & Udry, 2006; Mulia, Ye, Zemore, & Greenfield, 2008). Specifically, African American drinkers in disadvantaged areas may experience more alcohol related problems than Whites, even at the same level of consumption, because of discrimination and/or stigmatization (K. M. Green, Zebrak, Robertson, Fothergill, & Ensminger, 2012; Karriker-Jaffe et al., 2012; Maag & Irvin, 2005; Mulia et al., 2008). Roberts et al. (2011) reported that African American women had significantly higher risk of child maltreatment than White women and reported greater probability of developing PTSD. In addition, with respect to indiscriminant sexual behaviors, Adimora et al. (2011) found that African American women are more likely to engage in these behaviors than White women.

Third, the resilience model argues that the negative consequences of adverse childhood experiences will be significantly smaller for African Americans than Whites (Banyard, Williams, Siegel, & West, 2002; French, Finkbiner, & Duhamel, 2002; Kaukinen & DeMaris, 2005; Widom et al., 2013). This model argues that African Americans develop resilience through living in environments with more stressors (e.g., low SES, higher crime rates) and experiencing cultural factors (e.g., supportive kinship networks, religion) that buffer against the effects of adverse childhood experience (Sanders-Phillips, Moisan, Wadlington, Morgan, & English, 1995; Watt, 2008; Widom et al., 2013). For example, Sanders-Phillips et al. (1995) suggested that lower levels of depression of African American girls with sexual abuse experience reflect greater levels

of social supports. Prior studies have supported this model in terms of the impacts of childhood sexual or physical violence experiences on problem alcohol use (Nelson et al., 2002; Widom et al., 2013) and levels of depressive symptoms (Kaukinen & DeMaris, 2005; Sanders-Phillips et al., 1995; Schilling, Aseltine, & Gore, 2007; Turner & Gil, 2002).

To understand the relationship between childhood experiences of sexual or physical violence and alcohol use, this study mainly tested the tension reduction hypothesis that explains alcohol use as a means to self-medicate or cope with one's negative feelings (Greeley & Oei, 1999; B. A. Miller & Downs, 1993; B. A. Miller, Downs, & Testa, 1993). Since the data that this study utilized does not provide information on outcome expectancies and coping styles that explain the associations between childhood adverse experiences and alcohol use, this study did not fully examine social learning theory.

With respect to racial/ethnic differences, previous studies reported mixed findings in terms of the associations between childhood adverse experiences and alcohol use. Some studies supported the racial invariance model (Caetano et al., 2003; Glover et al., 2010), while other studies reported racial/ethnic differences between Whites and African Americans (McLeod & Owens, 2004; Pearlin et al., 2005; Nelson et al., 2002; Widom et al., 2013). Therefore, this study tested whether there are racial/ethnic differences in the associations between childhood experiences of sexual or physical violence, alcohol use, mental health, and indiscriminant sexual behaviors.

Empirical Research Review

Major Concepts of Alcohol Use of Women

Before the empirical research review, the major concepts of alcohol use that this study principally focused on are reviewed. Alcohol use is typically measured by frequency and quantity of alcohol use. Based on frequency and quantity of alcohol use, studies have defined drinking status (drinker vs. abstainer), binge drinking (four or more drinks at one occasion for women), and heavy drinking (over seven drinks a week for women) (Burgard, Cochran, & Mays, 2005; Kitano, Lubben, & Chi, 1988). At-risk drinking is used interchangeably with heavy drinking and/or excessive drinking.

In terms of levels of alcohol use, there have been debates about the definition of alcohol use levels regarding whether the definition should be different for women and men. This is the result of gender differences in the physical absorption of alcohol (Sanchez-Craig, Wilkinson, & Davila, 1995; Wechsler, Dowdall, Davenport, & Rimm, 1995). The National Institute of Alcohol Abuse and Alcoholism (NIAAA, 2004) has recommended that a blood alcohol level of .08 or higher should be classified as a “binge,” which is considered a dangerous level for the drinker and others. This blood alcohol level corresponds approximately to five or more drinks for men, and four or more drinks for women, on one occasion. Blood alcohol levels seem to be a good predictor of defining levels of alcohol use, yet they are time consuming and difficult to estimate in social science studies. Therefore, many studies utilize the number of drinks as a measure of alcohol use. NIAAA (2004) defines a standard drink as one 12-ounce bottle of beer or wine cooler, one 5-ounce glass of wine, or 1.5 ounces of 80-proof distilled spirits.

The NIAAA (2004) also defines moderate drinking and at-risk drinking for women and men. For women, moderate drinking is defined as no more than one drink per day and at-risk drinking is defined as more than seven drinks per week. In contrast, moderate drinking for men is defined as no more than two drinks per day and at-risk drinking is defined as more than 14 drinks per week.

Previous studies utilized the concept of problem alcohol use to measure drinking behaviors of women (Donovan, Jessor, & Jessor, 1983; Swahn & Donovan, 2004, 2005; M. P. Thompson, Sims, Kingree, & Windle, 2008). Problem alcohol use was operationalized by three domains of alcohol use: (a) binge drinking episodes; (b) episodes of getting drunk; and (c) alcohol related problems. Research utilized both episodes of binge drinking and getting drunk to explain the concept of heavy drinking (Chen & Jacobson, 2012; Wickrama & Wickrama, 2010). Alcohol related problems (e.g., problems with school, problems with friends, problems with someone, experiencing a hangover, getting sick to the stomach or vomiting, putting oneself into a sexual situation, or getting into physical fights) were also utilized to show its influence on important social, occupational, or recreational activities (Dauber, Hogue, Paulson, & Leiferman, 2009; Dauber et al., 2011). This study mainly utilized the concept of problem alcohol use to show negative drinking behaviors including heavy drinking and alcohol related problems.

Childhood Experiences of Sexual or Physical Violence and Negative Health

Consequences

The U.S. Department of Health and Human services reports that approximately 17.6 percent of children experienced physical abuse and 9.2 percent of children suffered

sexual abuse in 2010 (U.S. Department of Health and Human Services et al., 2011). In addition, national surveys of adults suggest that between 6-23 percents of women experienced physical or sexual abuse and/or assault during their childhood (Cougler et al., 2010; J. G. Green et al., 2010; Lown et al., 2011).

Sexual violence has been operationalized as women's experience of forced sexual acts including physically forced kissing or touching (Grayson & Nolen-Hoeksema, 2005; Ullman et al., 2005), coerced sexual intercourse (A. H. Clark & Foy, 2000), and/or physically forced vaginal, oral, and anal penetration (Kendler et al., 2000; Widom, Ireland, & Glynn, 1995) when they were younger than 18 years of age. In addition, physical violence is defined as an experience of life threat or injury by the perpetrator such as being pushed, grabbed, or shoved, having something thrown at them, being kicked, bitten or punched, or getting hit with something (MacMillan et al., 2001; M. P. Thompson et al., 2004).

Childhood sexual or physical violence experiences have been demonstrated to be significant predictors of alcohol use behaviors (Bensley, Van Eenwyk, & Simmons, 2000). First, women who experienced sexual violence in their childhood by family members or someone outside the family were more likely to engage in heavy drinking and to report greater numbers of alcohol related problems than women without such experiences (D. B. Clark et al., 2010; Jasinski et al., 2000; Kallstrom-Fuqua, Weston, & Marshall, 2004; Wilsnack, Vogeltanz, Klassen, & Harris, 1997). For example, among adverse childhood experiences, childhood sexual abuse has been shown to be a significant risk factor for women's alcohol use (Grayson & Nolen-Hoeksema, 2005).

Similarly, previous studies reported that women with childhood sexual abuse history were more likely to use alcohol, to have alcohol related problems, and to engage in heavy drinking than women without a history of childhood sexual abuse (A. H. Clark & Foy, 2000; D. B. Clark et al., 2010; Kendler et al., 2000).

Besides childhood sexual abuse history, previous studies have examined the relationship between childhood physical abuse and problem alcohol use in adulthood (Caetano et al., 2003; MacMillan et al., 2001; M. P. Thompson et al., 2004). For example, using national representative data, Caetano et al. (2003) found that a history of childhood physical assault was an important predictor of alcohol problems in adult women. Using a community sample, MacMillan et al. (2001) also pointed out that women with a history of childhood physical abuse had significantly higher lifetime rates of alcohol abuse/dependence than those without such a history. In addition, Thompson et al. (2004) examined gender differences in long-term health consequences of physical abuse of children using a nationally representative sample and reported that physical abuse experiences increased the odds of heavy drinking regardless of gender.

Second, experiences of sexual or physical violence experience have been reported as a predictor of mental health problems. For example, women who experienced sexual or physical violence in their childhood have significantly higher levels of anxiety and higher levels of depressive symptoms when compared to women who did not experience sexual abuse (Cogle et al., 2010; Nelson et al., 2002; Paolucci, Genuis, & Violato, 2001; Timko et al., 2008). From a twin study, Nelson et al. (2002) reported that significantly increased risks of adverse psychological outcomes were found in women with childhood

sexual abuse history compared to men. Specifically, Nelson et al. (2002) found that women with a history of childhood sexual abuse have a higher risk of having major depression, attempts at suicide, and/or social anxiety. Moreover, from national representative data, childhood sexual abuse history was found to be a risk factor that increases the odds of having mood disorders (e.g., depression, dysthymia, and mania) and anxiety disorders (e.g., agoraphobia, panic attack, panic disorder, PTSD, and social phobia) (Molnar, Buka, & Kessler, 2001).

Third, women who experienced sexual or physical violence in childhood are more likely to engage in indiscriminant sexual behaviors such as having multiple sexual partners than women without childhood experiences of sexual or physical violence (B. L. Green et al., 2005; Lemieux & Byers, 2008; Tyler, 2002). For example, previous studies reported that women with experiences of childhood sexual or physical abuse are more likely to engage in indiscriminate sexual behaviors by having briefer sexual relationships and/or having more sexual partners than women without such experience (Merrill, Guimond, Thomsen, & Milner, 2003; Senn et al., 2007). These indiscriminate sexual behaviors increase the chance of exposure to a variety of sexually transmitted diseases (STDs) (Senn et al., 2007; von Sternberg, Cardoso, Jun, Learman, & Velasquez, 2012), including HIV or AIDS (Bensley et al., 2000), or unintended pregnancy (Foster et al., 2004).

However, few of these studies examined the associations between childhood sexual or physical violence, problem alcohol use, mental health problems, and indiscriminant sexual behaviors within sex, even though they found gender differences

(Bensley et al., 2000; Schilling et al., 2007; M. P. Thompson et al., 2004). In addition, previous studies mainly used cross-sectional designs, making it difficult to examine causal relationships. Prior research also did not examine the structural associations between childhood experiences of sexual or physical violence, problem alcohol use, mental health problems, and indiscriminant sexual behaviors.

Alcohol Use and Mental Health Problems

The 2001-2002 National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) reported that approximately 20 percent of all persons in the general population to experience a comorbid substance use disorder also had at least one current independent mood disorder (e.g., major depression, dysthyma, mania, or hypomania) (Grant, Dawson, et al., 2004).

Previous research has reported that large numbers of female drinkers experience psychiatric comorbidity such as depression, anxiety, and PTSD (Grant, Stinson, et al., 2004; Kendler et al., 2003; Nolen-Hoeksema, 2004; Petrakis et al., 2002). Many studies point out that psychiatric comorbidity is more common in women than men (Davis, Bush, Kivlahan, Dobie, & Bradley, 2003; Kendler et al., 2003; Molnar et al., 2001). For example, previous studies noted that alcohol use disorders and major depression, panic disorder, and phobia are often comorbid with each other and this comorbidity is consistently greater among women than men (Davis et al., 2003). Specifically, previous research has reported a significant association between alcohol use and psychiatric disorders such as depression, anxiety, and PTSD among women (Austin & Irwin, 2010; Chassin, Pitts, & Prost, 2002; Hill & Angel, 2005; Ullman et al., 2005). For example,

Ullman et al. (2005) noted that high levels of PTSD were associated with alcohol problems among community-residing women. Chassin, Pitts, and Prost (2002) also reported the strong relationship between depressive symptoms and quantity of later alcohol use among children of alcoholics. In addition, using the longitudinal data, Hill and Angel (2005) studied low-income women and found that women who had high levels of fearful anxiety and depression at baseline and whose psychological distress worsened over time ultimately drank more heavily. Austin and Irwin (2010) studied lesbians and found that depression and stress were also significantly correlated with their heavy drinking.

Even though previous studies have reported significant association between alcohol use and mental health problems, little is known about short-term or long-term effects of childhood experiences of sexual or physical violence on comorbid associations between problem alcohol use and mental health problems over time. In addition, limited numbers of studies have examined racial/ethnic differences in the associations.

Indiscriminant Sexual Behaviors

Indiscriminant sexual behaviors are defined as having multiple sexual partners and/or having briefer casual partners (Cooper, 2002; Merrill et al., 2003). As reviewed, indiscriminant sexual behaviors were significantly associated with negative health outcomes such as unintended pregnancy, STDs, and HIV (Foster et al., 2004; Holmes, Levine, & Weaver, 2004; O'Campo, Faden, Gielen, Kass, & Anderson, 1993).

Alcohol use and mental health problems have been examined as significant predictors of indiscriminant sexual behaviors (J. L. Brown & Venable, 2007; Cooper, 2002; Stoner, George, Peters, & Norris, 2007). First, previous studies consistently reported a significant association between alcohol use and indiscriminate sexual behaviors (Graves, 1995; The American College Health Association, 2008). For example, women who engage in binge or heavy drinking are more likely to have greater numbers of sexual partners and engage in briefer and casual relationships (Santelli, Brener, Lowry, Bhatt, & Zabin, 1998; Santelli, Robin, Brener, & Lowry, 2001). Second, prior studies have also found significant relationships between mental health problems and indiscriminant sexual behaviors (Mazzaferro et al., 2006; A. G. Rubin, Gold, & Primack, 2009). For example, women who have high levels of depressive symptoms or anxiety are more likely to engage in indiscriminant sexual behaviors (Mazzaferro et al., 2006). In addition, research also reports childhood sexual or physical violence as a predictor of engaging in indiscriminant sexual behaviors (Hillis, Anda, Felitti, & Marchbanks, 2001; Senn et al., 2007).

Even though previous studies reported associations between childhood sexual or physical violence experiences, alcohol use, mental health problems, and indiscriminant sexual behaviors, little is known about the mechanisms by which childhood sexual or physical violence increases the likelihood of indiscriminant sexual behaviors in adulthood. Understanding of the effects of problem alcohol use and depressive symptoms on the relationship between childhood sexual or physical violence and indiscriminant sexual

behaviors is also limited. In addition, research that examines racial/ethnic differences on the mechanisms is even scarcer.

Typologies of Alcohol Use

Previous studies attempted to find dynamic patterns of problem alcohol use using cross-sectional (Dauber et al., 2009; Reboussin, Song, Shrestha, Lohman, & Wolfson, 2006; Stewart & Power, 2002) and longitudinal study designs (Chassin et al., 2002; Flory et al., 2006). Most of these studies were based on the frequency and quantity of alcohol use and problem alcohol use. Prior studies using either cross-sectional or longitudinal study designs have found that problem alcohol users or heavy drinkers are more likely to show higher levels of emotional distress (e.g., depression) (Chassin et al., 2002; Cheadle & Whitbeck, 2011; Dauber et al., 2009; Lee, Kosterman, McCarty, Hill, & Hawkins, 2012).

With respect to cross-sectional studies, previous studies were mainly focused to identify types of alcohol use among adolescents (Dauber et al., 2009; Stewart & Power, 2002). For example, using the cluster analyses, Stewart and Power (2002) found eight common adolescent drinking patterns: light, parent, family occasion, date, moderate-friend, party, outdoor, and heavy multiple-context drinkers. In addition, using the latent class analysis, Reboussin et al (2006) studied a national representative samples of under-age drinker and identified three types of drinkers: problem drinkers, risky drinkers, and regular drinkers.

Some studies have identified the dynamic course of problem alcohol use patterns over time (Chassin et al., 2002; Dauber et al., 2011; Li, Duncan, & Hops, 2001; Orlando,

Tucker, Ellickson, & Klein, 2005; Wiesner, Weichold, & Silbereisen, 2007). For example, Chassin et al. (2002) examined binge drinking from adolescence to early adulthood using 238 children of alcoholics and identified four groups, early heavy, late-moderate, infrequent, and non-bingers using growth mixture modeling. In addition, using a longitudinal data of East German adolescents, Wiesner et al. (2007) identified four groups among adolescent girls: rare users, increasers, decreasers, and regular users.

Only a few studies examined racial/ethnic differences in dynamic patterns of problem alcohol use, especially among adolescents at a single point in time (Dauber et al., 2009) or over time (Flory et al., 2006; Orlando et al., 2005). These studies have found that White adolescents are more likely than African American adolescents to be in risky subtypes of drinking patterns characterized by escalating levels of alcohol use and associated with higher levels of alcohol related problems over time. For example, from the cross-sectional studies, Dauber et al. (2009) found four types of drinkers (abstainers, experimenters, heavy drinkers, and problem drinkers) among White girls and three types of drinkers (abstainers, experimenters, and problem drinkers) among African American adolescent girls. In addition, using longitudinal data, Flory et al. (2006) reported that a group of abstainers was found only in African American adolescents and the subtypes that were characterized by higher rates of alcohol use were found only for White adolescents.

Almost all of these studies did not target women, even though they found gender differences (Wiesner et al., 2007; Windle, Mun, & Windle, 2005). In addition, current literature about heterogeneity in alcohol use lacks information on the association between

experiences of childhood sexual or physical violence and heterogeneous patterns of alcohol use over time. Specifically, up to our knowledge, no studies examined whether women who experienced childhood sexual or physical violence are more likely to be in the risky subtypes of problem alcohol use patterns. Furthermore, no studies tested racial/ethnic differences in the long-term associations between experiences of childhood's sexual or physical violence and heterogeneous problem alcohol use patterns over time.

Racial/Ethnic Considerations

Prior studies have reported racial/ethnic differences in the prevalence rates of alcohol use (Johnston, O'Malley, Bachman, & Schulenberg, 2011; National Institute on Alcohol Abuse and Alcoholism, 2009), childhood sexual or physical violence (U.S. Department of Health and Human Services et al., 2011), mental health problems (Needham, 2007; Turner & Gil, 2002), and indiscriminant sexual behaviors (Adimora et al., 2002; Adimora et al., 2011) among women. First, White women show higher rates of alcohol use than African American women (Johnston et al., 2011; National Institute on Alcohol Abuse and Alcoholism, 2009). Specifically, according to the 2001-2002 NESARC, among female alcohol abusers, 81% were White and 6.6% were African American. In addition, among female alcohol dependents, 72% were White and 12% were African American. White women are more likely to report alcohol related problems than African American women (Dauber et al., 2009; Dauber et al., 2011). With respect to the prevalence rates of childhood sexual or physical violence, White women constitute the largest group of childhood violence survivors (Kenny & McEachern, 2000; U.S.

Department of Health and Human Services et al., 2011). Approximately 44.8 percent of victimized children were White and 21.9 percent were African Americans (U.S.

Department of Health and Human Services et al., 2011). With respect to prevalence rates of indiscriminant sexual behaviors, previous studies reported that African American women are more likely to engage in risky sexual behaviors such as multiple sexual partners (Adimora et al., 2002) or failure to use contraceptives (Cubbin et al., 2001; Rennison & Welchans, 2000) compared to other racial/ethnic groups. With respect to mental health problems, there are mixed findings. Several studies have reported that African American women reported lower levels of depressive symptoms and/or PTSD than White women (Schilling et al., 2007; Turner & Gil, 2002). In contrast, some studies reported higher levels of depressive symptoms of African American women compared to White women (J. S. Brown, Meadows, & Elder, 2007; Harris et al., 2006; Needham, 2007).

With respect to the impact of experiences of childhood sexual or physical violence on negative consequences including problem alcohol use, mental health problems, and indiscriminant sexual behaviors, studies have reported mixed findings. While some studies reported that the effects of childhood experiences of sexual or physical violence on problem alcohol use and mental health problems are greater for African American women than White women (Kilpatrick et al., 2003; Roberts et al., 2011), other studies have found that the effects of experiences of childhood sexual or physical violence on problem alcohol use and mental health problems greater for White women than African American women (Kaukinen & DeMaris, 2005; Widom et al., 2013).

Some prior studies, even, have not found racial/ethnic differences on the association between experiences of childhood sexual or physical violence, problem alcohol use, and mental health (Caetano et al., 2003; Glover et al., 2010; Ullman et al., 2005). For example, using the nationally representative samples, Caetano, Field, and Scott (2013) found that childhood physical abuse is associated with greater levels of alcohol problems in adulthood in both white and black females.

Despite these racial/ethnic considerations and different prevalence rates, there are limited numbers of studies examining the racial/ethnic differences in the associations between childhood sexual or physical violence, problem alcohol use, mental health problems, and indiscriminant sexual behaviors.

Brief Description of Data and Sample

This study utilized the 1994-2008 National Longitudinal Study of Adolescent Health (Add Health), which is de-identified, that is publicly released through the Interuniversity Consortium for Political and Social Research (ICPSR) website (Harris & Udry, 2011). Add Health is a longitudinal study of a nationally representative sample of adolescents in grades 7-12 in the United States during the 1994-1995 school years (wave 1). Add Health cohort has been followed into young adulthood, the most recent in 2007-2008 (wave 4), when the sample was aged 24-32. Add Health was conducted to measure the effects of family, peer group, school, neighborhood, religious institution, and community influences on health risks, such as tobacco, drug, and alcohol use. This data includes key variables for this study such as experiences of childhood sexual or physical violence, alcohol use, depressive symptoms, and indiscriminant sexual behaviors.

Add Health began in 1994-1995 with an in-school questionnaire administered to a nationally representative sample of 90,000 students in grades 7 to 12 at 144 schools around the United States using brief, machine-readable questionnaires during a regular class period. At the same year, interviews also were conducted with randomly selected 20,000 students who completed the in-school survey in the students' homes using a combined computer assisted personal interviewing and (CAPI) and audio computer assisted self interview (ACASI) design (wave 1). Students who were administered the in-home survey were followed up with three additional in-home interviews (waves 2 through 4). In wave 2, conducted in 1996, about 15,000 students in grades 8 to 12 were interviewed a second time in their homes. In 2001-2002 (wave 3), about 15,000 of the

original Add Health respondents, who were aged 18 to 26 years, were re-interviewed to investigate how adolescent experiences and behaviors are related to outcomes during the transition to adulthood. Lastly, wave 4 was conducted in 2007-2008 when the approximately 15,000 respondents were aged 24 to 32 years.

This study utilized all four waves of Add Health data which is publicly released through the Interuniversity Consortium for Political and Social Research (ICPSR) website. For the first two aims, this study used waves 1, 2, and 3 of Add Health because the first three waves have the same measures regarding alcohol use frequency (numbers of binge drinking days and numbers of days of getting drunk) and alcohol related problems. For the third aim, this study utilized wave 4 Add Health to examine structural mechanisms between childhood experiences of sexual or physical violence, problem alcohol use, depressive symptoms, and indiscriminant sexual behaviors among young adult women.

Publicly released Add Health includes information of 6,504 adolescents who completed wave 1 in-home survey in 1994-1995 aged 12 to 19 years. Of 6,504 adolescents, 4,834 (74.32%) were remained until wave 2 on 1995-1996, 4,882 (75.06%) were remained until wave 3 on 2001-2002, and 5,114 (78.63%) completed the wave 4 survey on 2007-2008 Add Health. At wave 2, of 4,834 adolescents, 2,519 (52.11%) were women, aged 13 to 20 years. At wave 3, of 4,882 young adults, 2,628 (53.83%) were women, aged 18 to 26 years. In addition, of 5,114 young adults who completed wave 4 survey, 2,761 (53.99%) were women, aged 24 to 32 years old. Specific sample selection

procedures and sample characteristics were explored in Chapter 2, 3, and 4. Similarities and differences in data, sample, measure, and data analyses are presented in appendices.

Chapter 2. Trajectories of Problem Alcohol Use during the Transition from Adolescence to Young Adulthood: Latent Class Growth Modeling

Abstract

Purpose: Current literature lacks a longitudinal understanding of the predictability of the long-term development of problem alcohol use based on individuals' childhood experiences of sexual or physical violence. As such, no studies have explored racial/ethnic differences in determining any long-term associations between childhood experiences of sexual or physical violence and heterogeneous problem alcohol use patterns over time. Using latent class growth modeling (LCGM), this study was to (a) identify heterogeneous trajectories of women's problem alcohol use as subjects transit from adolescence to young adulthood, (b) explore whether childhood sexual or physical violence experience predict young women's varying problem alcohol use trajectories by the time they reach young adulthood, and (c) examine racial/ethnic differences in relation to women's childhood sexual or physical violence and problem alcohol use trajectories.

Methods: From three waves of 1994-2002 Longitudinal Survey of Adolescent Health data, 1,702 women (1,252 non-Hispanic White and 450 non-Hispanic African American women) who completed all three waves and those with no missing information on problem alcohol use were included in the analyses. LCGM with centered normal distribution was used to identify heterogeneous trajectories of problem alcohol use. Bivariate level analyses were performed to explore racial/ethnic differences in latent class membership of problem alcohol use in relation to childhood experiences of sexual or physical violence.

Findings: Four trajectories of problem alcohol use emerged from the current study: (a) stable abstainers ($n=550$, 32.31%); (b) decliners whose problem alcohol use decreased from moderate to low ($n=182$, 10.69%); (c) incliners whose problem alcohol use increased from low to moderate ($n=245$, 14.39%); and (d) incliners whose problem alcohol use increased most radically from low to high ($n=725$, 42.60%). Bivariate level analyses findings indicate that, in reference to stable abstainers, non-Hispanic White women with sexual or physical violence experience during childhood, compared to women without such experiences, were more likely to share group membership with the incliners whose problem alcohol use showed rapid growth from low into high level over time ($OR=1.67$). However, this finding did not apply to non-Hispanic African American women, as statistically significant association was not identified between childhood sexual or physical violence experience and latent class memberships of problem alcohol use.

Conclusion: Findings imply the need for more aggressive implementation of alcohol prevention programs for young women whose levels of problem alcohol use are likely to increase rapidly as they move onto young adulthood from adolescence. Educational programs should be available for young girls that provide understanding on the link between adverse childhood events and the increased likelihood of engaging in substance using behaviors in the long run.

Trajectories of Problem Alcohol Use during the Transition from Adolescence to Young Adulthood: Latent Class Growth Modeling

Women's problem alcohol use is an important health issue considering its manifest problems, including adverse health outcomes (e.g., cancer and sexually transmitted diseases) (J. L. Brown & Vanable, 2007; National Institute on Alcohol Abuse and Alcoholism, 2004; Singletary & Gapstur, 2001) and negative pregnancy outcomes (e.g., unintended pregnancy, low-birth weight, and Fetal Alcohol Spectrum Disorders) (Cook & Clark, 2005; Laborde & Mair, 2012). In addition, a large numbers of studies have reported that women who drink excessively are also more likely to simultaneously experience mental health problems such as depression and/or anxiety (Marmorstein, 2010; Nolen-Hoeksema, 2004; Petrakis et al., 2002).

Despite understanding the multifaceted damage that alcohol has on the bodies, minds, and social relationships, a large number of women still drink and excessively. In fact, the 2010 National Survey on Drug Use and Health (NSDUH) (Substance Abuse and Mental Health Services Administration [SAMHSA], 2011) estimated that among women aged 15 to 44, nearly 70 percent reported current alcohol use, 28 percent had three or more drinks on one occasion on at least one day in the past 30 days, and approximately 7 percent of women reported that they had three or more drinks on the same occasion for five or more days in the past 30 days. Other statistics, such as those provided by the National Health Interview Survey, reported increased drinking levels between 1997 and 2008. Their findings, compared to data from 1997, showed that the number of women who had more than three drinks per week in the past year increased from 6.6 to 8.3

percent and the number of women who drank more than one drink per day increased from 3.3 to 5 percent, while the number of female abstainer and light drinkers remained the same (National Institute on Alcohol Abuse and Alcoholism, 2009).

Exploring the longitudinal progression of drinking as a way of understanding long-term behavior patterns and identifying those who may be at higher risk has been a recent trend in substance abuse literature (Chassin et al., 2002; Cheadle & Whitbeck, 2011; Lee et al., 2012). Longitudinal insight can help researchers identify heterogeneous clusters of people who share the same trajectorial membership and exhibit similar behavior patterns over time (Nagin, 1999). Cross-sectional studies cannot identify dynamic patterns that developing across time or help in understanding long-term effects. Prior studies have applied longitudinal designs with an assumption of homogeneous growth trajectory of problem alcohol use (Ammon et al., 2008; Chen & Jacobson, 2012; M. P. Thompson et al., 2008). However, other research has found that trajectories of problem alcohol use are likely to vary across individuals (Chassin et al., 2002; Li et al., 2001; Shin, Miller, & Teicher, 2013). These studies assumed that heterogeneous sub-clusters form distinct behavior groups presenting a dynamic course of problem alcohol use patterns over time (Dauber et al., 2011). Based on the frequency and quantity of alcohol use and problems of alcohol use, these studies have consistently found four types of drinkers, especially in White samples, including stable abstainers, increasers, decreasers, and chronic heavy drinkers (Dauber et al., 2011; Wiesner et al., 2007). Yet, a limitation still lies in understanding racial/ethnic differences in forming dynamic patterns of problem alcohol use, as only few studies have targeted this issue. Although few, these

studies suggest that White adolescents are more likely than African American adolescents to be in risky subtypes of drinking patterns characterized by escalating levels of alcohol use and associated with higher levels of alcohol related problems over time (Dauber et al., 2011; Flory et al., 2006; Stewart & Power, 2002). Also, a few studies targeted women (Wiesner et al., 2007; Windle et al., 2005), but not enough.

There is also relatively little longitudinal exploration of the development of problem alcohol use in relation to individuals' adverse childhood experiences, such as sexual or physical violence. Various cross-sectional studies suggest greater vulnerability for women in adolescence, young adulthood, and even in older age if they experienced traumatic events such as sexual abuse in childhood (Briere & Elliott, 2003; Bulik, Prescott, & Kendler, 2001; Hussey, Chang, & Kotch, 2006). Specifically, prior studies have consistently found that women who experienced sexual or physical violence in their childhood were more likely to engage in binge or heavy drinking and/or experience alcohol related problems (e.g., problems at work and problems with family or friends) both in adolescence and young adulthood (D. B. Clark et al., 2010; Grayson & Nolen-Hoeksema, 2005; Miranda et al., 2002). Nonetheless, current literature lacks a longitudinal understanding of predictable long-term development of problem alcohol use based on individuals' childhood experiences of sexual or physical violence. In fact, no longitudinal studies have examined whether women with childhood experiences of sexual or physical violence are more likely to be in the risky subtypes of problem alcohol use patterns. Furthermore, no studies have explored racial/ethnic differences in determining

long-term associations between experiences of childhood sexual or physical violence and heterogeneous problem alcohol use patterns over time.

The rationale for considering racial/ethnic differences in studying alcohol use is based on contrasting alcohol use prevalence rates reported by young girls and women. For instance, some studies suggest that White women report higher rates of alcohol use (Johnston et al., 2011; National Institute on Alcohol Abuse and Alcoholism, 2009) and alcohol related problems (Dauber et al., 2011; Orlando et al., 2005) than African American women. With respect to childhood experiences of sexual or physical violence, approximately 44.8 percent of victimized children were White and 21.9 percent were African Americans (U.S. Department of Health and Human Services et al., 2011). Inconsistencies are found in the literature related to the associations between childhood sexual or physical violence and problem alcohol use. Some studies reported no racial/ethnic differences (Caetano et al., 2003), while other studies have reported significant differences by race/ethnicity (Kaukinen & DeMaris, 2005; Kilpatrick et al., 2003; Widom et al., 2013). Among those who reported significant differences, Widom et al. (2013) studied community-residing children and suggested that White adolescents with childhood maltreatment experiences are likely to drink more than their African American peers. In contrast, using the National Survey of Adolescents, Kilpatrick et al. (2003) found that effects of childhood sexual abuse on problem alcohol use are greater for African Americans than White adolescents.

Conceptual Framework

Various theories may be adopted to explain the association between childhood sexual or physical violence and problem alcohol use. This study was developed based on the tension reduction hypothesis (Conger, 1956). The tension reduction hypothesis explains that problem alcohol use is a means to self-medicate or cope with one's negative feelings (Greeley & Oei, 1999; B. A. Miller & Downs, 1993; B. A. Miller et al., 1993). While negative feelings may vary and intensity or severity differ, previous studies have consistently reported that people who experienced childhood sexual or physical violence are likely to present intense emotions, which the individual may fail to regulate successfully, such as depression, anxiety, and/or PTSD that people without such experiences (Grayson & Nolen-Hoeksema, 2005; Miranda et al., 2002). In response to these powerful emotions, the tension reduction hypothesis suggests that people may engage in binge or heavy drinking because it initially provides emotional relaxation or euphoria, even for a short period of time, hence self-medicating the symptoms of emotional suffering (Greeley & Oei, 1999). The current study is guided by the understanding of the relationship between sexual or physical violence experiences and problem alcohol use as a self-medication tool.

This current study used latent class growth modeling (LCGM) to: (a) identify heterogeneous trajectories of women's problem alcohol use during the transition from adolescence to young adulthood (aged from 12 to 25); (b) explore whether childhood experiences of sexual or physical violence may predict young women's varying problem alcohol use trajectories by the time they reach young adulthood; and (c) examine

racial/ethnic differences in relation to their childhood sexual or physical violence and problem alcohol use trajectories.

Method

Data and Sample

The data for this study were from waves 1, 2, and 3 of the National Longitudinal Study of Adolescent Health (Add Health), publicly released through the Interuniversity Consortium for Political and Social Research (Harris & Udry, 2011). Students, grades 7-12, in public and private high schools with at least 30 students where were randomly selected through a multistage stratified cluster design, were administered in-school surveys during the 1994-1995 school year (Harris & Udry, 2011). A random sample of adolescents who completed the in-school interviews were administered the in-home survey between April and December of 1995 (in-home survey wave 1) and followed into young adulthood with three additional interviews (waves 2 through 4) over the course of 13 years. This study utilized data from the in-home portion of wave 1 through wave 3 because all three waves have the same measures regarding frequency of alcohol use (numbers of binge drinking days and drunken days) and alcohol related problems. This study was approved by the Institutional Review Board at the University of Texas at Austin.

Of the 6,504 adolescents who completed the initial in-home survey during wave 1, 4,882 (75.06%) individuals remained in the study of 2001-2002 (wave 3). Of these young adults, 2,628 (53.83%) were female participants, aged 18 to 25 years old. The analytic sample used in this study included the 1,702 women who were (a) either non-Hispanic

White (White) ($n=1,252$, 73.56%) or non-Hispanic African American (African American) ($n=450$, 26.44%), (b) those who completed all three waves of Add Health, and (c) those with all three waves of longitudinal information on problem alcohol use. This study excluded Hispanic women ($n=265$), those from other racial/ethnic origin ($n=119$), and women whose race/ethnicity information was missing ($n=10$) due to insufficient sub-sample size. In addition, as significant differences were observed between completers and non-completers in regards to the demographic characteristics and problem alcohol use in the attrition analyses, this study excluded women who missed one or more waves of Add Health. Also, excluded were women who did not have information on problem alcohol use for all three waves.

Of the 1,702 final sample of women, 24.44 percent ($n=416$) reported at least one experience of sexual or physical violence by the time they entered 6th grade. The mean age of the sample was 14.83 years ($SE=0.12$). Less than half of the respondents' parents had a college degree or higher education ($n=688$, 40.42%). Approximately half of the respondents were living with two biological parents at wave 1 ($n=966$, 56.76%) and one-tenth of respondents had income below the federal poverty line ($n=201$, 11.81%).

Measures

Problem alcohol use from wave 1 through wave 3. Problem alcohol use at each wave was operationalized by the following three domains of alcohol use within the last 12 months: (a) binge drinking episodes (≥ 5 drinks in a row); (b) episodes of getting drunk; and (c) alcohol related problems. First, binge drinking episodes that originally had six ordinal categories (0=*none* to 6=*everyday/almost every day*) was dichotomized (1=*binge*

at least one day, 0=no episode). Second, episodes of getting drunk that was composed of six ordinal categories was also dichotomized (1=*getting drunk at least one day*, 0=no episode). Third, with respect to alcohol related problems, Add Health originally contained seven alcohol related problems including getting into physical fights, problems at school, problems at work, problems with friends, or problems with family members. This current study created a dichotomous variable of alcohol related problems. If a woman reported one or more alcohol related problems, she was assigned 1 for the alcohol related problems. Using three dichotomous variables of binge drinking episodes, episodes of getting drunk, and alcohol related problems, an overall problem alcohol use score was calculated by summing all these three dichotomized variables for each wave (Swahn & Donovan, 2005; M. P. Thompson et al., 2008). The total score of problem alcohol use ranged from 0 to 3.

Childhood sexual or physical violence before 7th grade. Childhood sexual or physical violence before 7th grade was retrospectively measured at wave 3. Respondents were asked: “How often did a parent or adult caregiver hit you with a fist, kick you, or throw you down on the floor, into a wall, or down stairs?” and “How often did a parent or other adult caregiver touch you in a sexual way, force you to touch him or her in a sexual way, or force you to have sexual relations?” From these two questions, a dichotomous variable of childhood sexual or physical violence experience was created with a score of “1” indicating at least one incident of either and “0” indicating no incident.

Level of depressive symptoms at wave 1. Respondents were asked nine questions from the Center for Epidemiologic Studies Depression Scale (CES-D) (Radloff,

1977). The CES-D evaluates depressive symptoms within the last week from the time point at which the scale was administered, with each item having four response categories from 0 (*rarely or none of the time*) to 3 (*most or all of the time*), and a total score ranging between 0 and 27. Question items included “I felt depressed”, “I felt sad”, and “I felt that I was too tired to do things.” Higher CES-D scores represent greater levels of depressive symptoms. Cronbach’s alpha calculated for this study indicated adequate internal consistency at wave 1 ($\alpha = .80$).

Individual and family/parental characteristics at wave 1. Respondent’s age, race/ethnicity, and parental and family characteristics (i.e., family poverty, parental education attainment, and family structure) at wave 1 were included in the descriptive analyses as covariates. With respect to parental and family characteristics, family poverty was calculated by dividing before-tax family income by household size. This study measured family poverty level in 100 percent increments based on the 1994 federal poverty level. Parental education attainment was defined as the highest education attainment by either parent. As previous studies suggested (Cubbin, Santelli, Brindis, & Braveman, 2005), family structure was categorized into four groups: two biological parents, one biological and one non-biological parent, single parent, and other arrangement (two non-biological parents).

Analysis Plan

Latent class growth modeling (LCGM) using individually-varying times of observation was employed to test the growth parameters across the respondent’s age. Add Health collects data of several different age cohorts (Harris & Udry, 2011). To examine

problem alcohol use growth patterns over time, this study applied cohort sequential design instead of examining change patterns of problem alcohol use by waves. However, rather than restructuring the data based on the chronological age of respondents, as most previous studies have done (Shin et al., 2013; M. P. Thompson et al., 2008; Wickrama & Wickrama, 2010), this study utilized individually-varying times of observation, which were measured as a grand mean centered on respondent's age, for identifying problem alcohol use trajectories by the respondent's age (L. Muthén & Muthén, 2010). This is because restructuring the data brings greater numbers of missing cases by design since this study utilized data from only wave 1 to wave 3 with widely spanned age range from 12 to 25 years old.

LCGM, developed by Nagin and Land (Nagin & Land, 1993), was used to define dynamics of changes in problem alcohol use during the transition from adolescence to young adulthood. Unlike standard latent growth modeling which estimates a single growth trajectory, LCGM identifies distinct subgroups of the sample that follow different growth trajectories based on individuals' response patterns over time (Andruff, Carraro, Thompson, Gaundreau, & Louvet, 2009; Jung & Wickrama, 2008; Nagin, 1999). In LCGM, the variances of slope and the intercept are fixed equally across individuals within a trajectory. Thus, each latent growth trajectory is heterogeneous from each other but homogenous within the sub-groups of individuals who follow similar growth patterns. LCGM model has been adopted in many substance abuse studies to examine behavior changes over time (Chassin et al., 2002; Cheadle & Whitbeck, 2011; Lee et al., 2012).

Given the high number of abstainers and the distribution of problem alcohol use across the three waves, LCGM with the censored normal distribution option was performed. In addition, since prior studies using LCGM consistently recommend including the covariates in identifying growth trajectories (Jung & Wickrama, 2008; B. Muthén, 2004), this study tested both unconditional and conditional models. To choose the best-fitting LCGM model, this study compared the model fits using chi-square difference tests with $-2 \log$ likelihood and numbers of free parameters. As research has suggested (B. Muthén, 2004), models without the important covariates (e.g., age, race/ethnicity, childhood sexual or physical violence, and depressive symptoms) may misclassify growth trajectories of problem alcohol use. Only individual characteristics that showed significant association with problem alcohol use in bivariate level were included as covariates. This study tested covariates separately and then together. Both unconditional and conditional models began with a two-class model and successive models were tested with an increasing number of classes until the best-fitting model was identified.

Mplus software (version 6.11; Muthen & Muthen, Los Angeles, CA) was used to test the model fit and identify the number of latent trajectory classes of problem alcohol use. Model fit and numbers of classes were decided based on the Bayesian information criteria (BIC) value, the Akaike information criteria (AIC) value, and the entropy value. This study also examined the average latent class probabilities for most likely latent class memberships by latent classes (posterior probability). In general, a model with a smaller

BIC or AIC, a higher entropy value, and higher levels of posterior probabilities indicates a better model (Jung & Wickrama, 2008; L. Muthén & Muthén, 2010).

Following the LCGM, this study also examined differences in individual and parental/family characteristics among latent classes on problem alcohol use using chi-square and *F* tests. This study further tested the bivariate associations between childhood experiences of sexual or physical violence and latent class membership of White and African American women using multinomial logistic regression analyses to explore racial/ethnic differences in latent class membership in relation to childhood experiences of sexual or physical violence. All analyses took into account the clustered sample design and weighting (Bell et al., 2012; Chantala & Tabor, 1999).

Results

Model Fit Statistic Comparison and Model Selection

As planned, this study tested LCGM models with and without covariates of age, race/ethnicity, childhood sexual or physical violence experience, and depressive symptoms. Table 2.1 presents LCGM model fit statistics of both unconditional and conditional models with different numbers of latent classes. Compared to unconditional models, in general, conditional models with covariates indicated better model fits. In addition, models with four latent classes showed a better fit than models with 2 or 3 latent classes in both unconditional and conditional models. Among models with 4 latent classes, the conditional model including age, race/ethnicity, childhood experiences of sexual or physical violence, and levels of depressive symptoms demonstrated the best fit with the lowest AIC (11539.25) and sample size adjusted BIC (11616.18). This model

also showed high levels of posterior probabilities (>.915). The four class conditional model, controlling for age, race/ethnicity, childhood sexual or physical violence experience and levels of depressive symptoms, significantly improved the model fit compared to the model without covariates (unconditional model), $\Delta \chi^2(30, 1702) = 917.68, p < .001$.

Table 2.1

Model Fit Statistics and Model Selection

	AIC	Sample Adjusted BIC	Entropy
Model with no covariates			
2 classes	12745.98	12764.14	.98
3 classes	12513.37	12538.35	.99
4 classes	12416.93	12448.72	.87
Model with age			
2 classes	12429.57	12454.55	.97
3 classes	12219.84	12253.90	.91
4 classes	12008.10	12051.25	.83
Model with childhood violence			
2 classes	12656.29	12681.18	.98
3 classes	12433.36	12467.30	.98
4 classes	12441.34	12484.34	.89
Model with race/ethnicity			
2 classes	12577.06	12602.03	.98
3 classes	12374.66	12408.72	.98
4 classes	12373.19	12416.34	.83
Model with depressive symptoms			
2 classes	12646.76	12671.74	.98
3 classes	12428.27	12462.32	.98
4 classes	12276.98	12320.12	.87
Model with age & childhood violence			
2 classes	12333.19	12364.87	.97
3 classes	12241.44	12284.44	.95
4 classes	11912.74	11967.06	.83
Model with age & race/ethnicity			
2 classes	12244.36	12276.15	.97
3 classes	12140.00	12183.14	.91
4 classes	12041.51	12096.01	.83

Table 2.1, cont.

	AIC	Sample Adjusted BIC	Entropy
Model with age & depressive symptoms			
2 classes	12298.23	12330.02	.96
3 classes	12100.26	12143.39	.91
4 classes	11806.90	11861.39	.89
Model with violence & race/ethnicity			
2 classes	12488.17	12519.86	.98
3 classes	12295.54	12338.54	.98
4 classes	12186.82	12241.14	.86
Model with violence & depressive symptoms			
2 classes	12558.02	12634.18	.98
3 classes	12349.07	12392.06	.98
4 classes	12184.34	12238.64	.88
Model with race/ethnicity & depressive symptoms			
2 classes	12463.51	12495.29	.98
3 classes	12275.59	12318.72	.98
4 classes	12117.16	12171.65	.87
Model with age, childhood violence, & race/ethnicity			
2 classes	12277.88	12416.35	.97
3 classes	11863.94	11916.00	.93
4 classes	11744.62	11810.26	.83
Model with age, childhood violence, & depressive symptoms			
2 classes	12202.08	12240.55	.96
3 classes	12007.67	12059.71	.91
4 classes	11793.13	11858.75	.92
Model with age, race/ethnicity, & depressive symptoms			
2 classes	12098.50	12137.09	.96
3 classes	12055.72	12107.93	.86
4 classes	11622.52	11688.36	.89
Model with childhood violence, race/ethnicity, & depressive symptoms			
2 classes	12377.90	12416.37	.98
3 classes	12199.22	12251.26	.98
4 classes	12036.03	12101.65	.88
Model with age, childhood violence, race/ethnicity, & depressive symptoms			
2 classes	12004.32	12049.58	.96
3 classes	11752.47	11813.56	.93
4 classes	11539.25	11616.18	.89

Trajectories of Problem Alcohol Use

Controlling for age, race/ethnicity, childhood experiences of sexual or physical violence, and levels of depressive symptoms, four trajectories of problem alcohol use emerged from the analyses: (a) stable abstainer ($n=550$, 32.31%); (b) decliners whose problem alcohol use decreased from moderate to low ($n=182$, 10.69%); (c) incliners whose problem alcohol use relatively radically from low to high ($n=725$, 42.60%); and (d) incliners whose problem alcohol use from low to moderate ($n=245$, 14.39%). This indicates that four out of ten women's problem alcohol use tend to increase fairly rapidly over time, while approximately one-third of women do not drink at all, or their problem alcohol use stay at a relatively very low levels over time. Figure 2.1 shows growth trajectories of problem alcohol use.

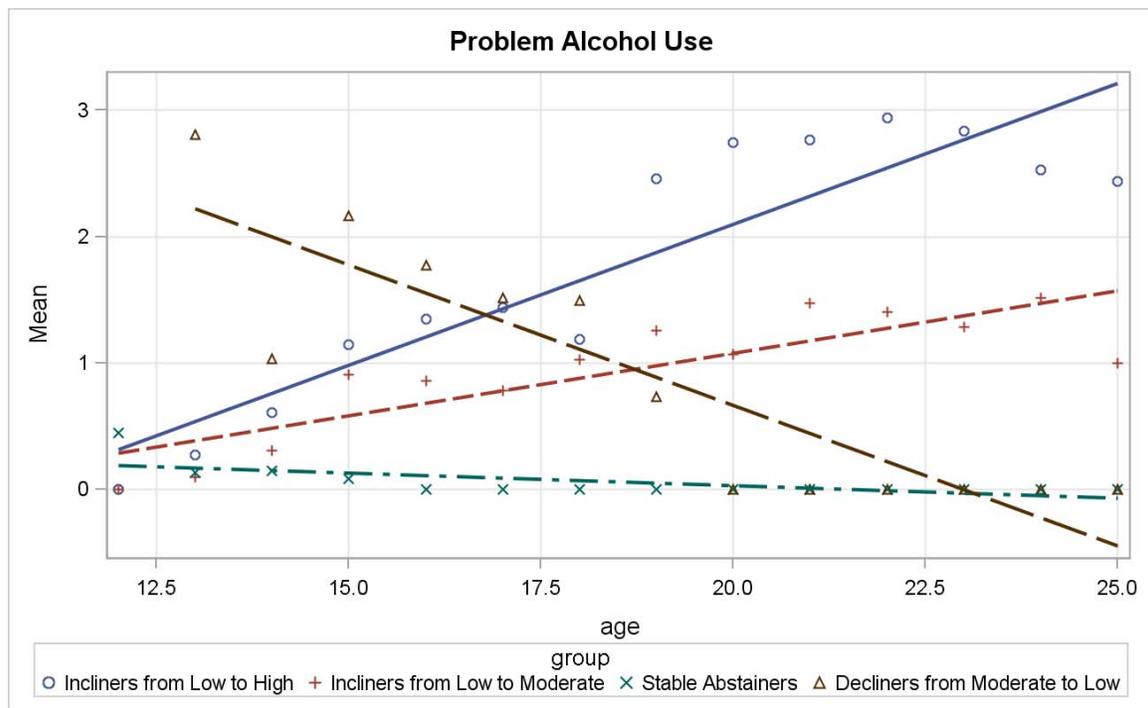


Figure 2.1. Scatter plot and fitted regression line of problem alcohol use by latent classes

Using ANOVA and chi-square analyses, individual and parental/family characteristics differences were also observed at wave 1 by identifying four growth trajectories of problem alcohol use (see Table 2.2). Compared to a class of stable abstainers, women in the rapid incliners group of problem alcohol use were more likely to be White ($\chi^2(3, 1702) = 144.24, p < .001$) and to have experienced childhood sexual or physical violence ($\chi^2(3, 1702) = 19.44, p < .001$). White women were more likely to be in the rapid incliners group of problem alcohol use (50.16%), while African American women were more likely to be in the group of stable abstainers (51.56%). In addition, parental educational attainment ($\chi^2(9, 1606) = 65.65, p < .001$), family structure ($\chi^2(9, 1702) = 32.05, p < .01$), and family poverty ($\chi^2(15, 1702) = 120.87, p < .001$) significantly differed by varying trajectories of problem alcohol use.

Table 2.2

Descriptive Statistics by Problem Alcohol Use Trajectories (Weighted Means)

	Total Sample (N=1,702)		Incliners from Low to High (n=725)		Incliners from Low to Moderate (n=245)		Decliners from Moderate to Low (n=182)		Stable Abstainers (n=550)		χ^2
	Freq	(%) ^a	Freq	(%) ^b	Freq	(%) ^b	Freq	(%) ^b	Freq	(%) ^b	
Childhood sexual/physical violence	416	(24.44)	208	(50.00)	64	(15.38)	109	(26.20)	35	(8.41)	19.44 **
Respondent's race/ethnicity ^c											
White	1252	(73.56)	628	(50.16)	187	(14.93)	119	(9.50)	318	(25.44)	144.2
African American	450	(26.44)	97	(21.56)	58	(12.89)	63	(14.00)	232	(51.56)	4***
Parental education attainment (w1)											
< High school	74	(4.35)	13	(17.57)	9	(12.16)	16	(21.62)	36	(48.65)	65.65
High school	501	(29.44)	185	(36.93)	83	(16.57)	67	(13.37)	166	(33.13)	***
Some college	343	(20.15)	162	(47.23)	51	(14.87)	37	(10.79)	93	(27.11)	
≥College graduated	688	(40.42)	342	(49.71)	91	(13.23)	38	(5.52)	217	(31.54)	
Family structure (w1)											
2 biological parents	966	(56.76)	443	(45.86)	140	(14.49)	77	(7.97)	306	(31.68)	
1 biological/1non-biological parent	242	(14.22)	115	(47.52)	34	(14.05)	31	(12.81)	62	(25.62)	32.05 **
Single parent	479	(28.14)	162	(33.82)	69	(14.41)	73	(15.24)	175	(36.53)	
Other	15	(0.88)	5	(33.33)	2	(13.33)	1	(6.67)	7	(46.67)	

Table 2.2, cont.

	Total Sample (N=1,702)		Incliners from Low to High (n=725)		Incliners from Low to Moderate (n=245)		Decliners from Moderate to Low (n=182)		Stable Abstainers (n=550)		χ^2
	Freq	(%) ^a	Freq	(%) ^b	Freq	(%) ^b	Freq	(%) ^b	Freq	(%) ^b	
Family poverty (w1)											
0-100%	201	(11.81)	47	(23.38)	31	(15.42)	39	(19.40)	84	(41.79)	120.8
101-200%	293	(17.22)	107	(36.52)	52	(17.75)	39	(13.31)	95	(32.42)	7***
201-300%	291	(17.10)	142	(48.80)	35	(12.03)	21	(7.22)	93	(31.96)	
301-400%	216	(12.69)	104	(48.15)	35	(16.20)	19	(8.80)	58	(26.85)	
401%+	353	(20.74)	211	(59.77)	42	(11.90)	23	(6.52)	77	(21.81)	
Missing	348	(20.45)	114	(32.76)	50	(14.37)	41	(11.78)	143	(41.09)	
	<i>M</i>	(<i>SE</i>)	<i>M</i>	(<i>SE</i>)	<i>M</i>	(<i>SE</i>)	<i>M</i>	(<i>SE</i>)	<i>M</i>	(<i>SE</i>)	<i>F</i>
Age (w1)	14.83	(0.12)	14.69	(0.13)	14.99	(0.15)	15.78	(0.16)	14.61	(0.14)	12.35 ***
Levels of depressive symptoms (w1)	6.05	(0.16)	6.17	(0.26)	5.39	(0.35)	7.83	(0.38)	5.54	(0.19)	1.13

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

- For the total sample, this study utilized column percentages to show proportions by individual characteristics.
- For each latent classes, this study utilized row percentages to show proportions of women in each latent class of problem alcohol use within each individual characteristics.
- White indicates non-Hispanic White and African American indicates non-Hispanic African American.

Racial/Ethnic Differences in Latent Class Membership of Problem Alcohol Use

This study further explored the associations between childhood sexual or physical violence experiences and membership of problem alcohol use trajectories of White and African American women. Table 2.3 shows odds ratios of belonging in any of the three latent classes of problem alcohol use trajectories in reference to the membership in the stable abstainers. To summarize, in reference to the stable abstainers, White women with childhood experiences of sexual or physical violence, compared to women without such experience(s), were more likely to share group membership with the incliners whose problem alcohol use showed rapid growth from low into high levels over time ($OR=1.67$, $p <.01$) or with the group of incliners whose problem alcohol use increased from low to moderate levels ($OR=1.69$, $p <.05$). However, African American women did not show statistically significant association between childhood experiences of sexual or physical violence and class membership of problem alcohol use.

Table 2.3

*Bivariate Level Multinomial Logistic Regression Results of White and African American**Women*

	Incliners from Low to High		Incliners from Low to Moderate		Decliners from Moderate to Low	
	<i>OR</i>	[95% CI]	<i>OR</i>	[95% CI]	<i>OR</i>	[95% CI]
White						
Childhood sexual/physical violence	1.67	[1.18-2.37]	1.69	[1.05-2.72]	0.69	[0.39-1.21]
African American						
Childhood sexual/physical violence	1.86	[0.97-3.56]	1.27	[0.59-2.75]	2.09	[0.85-5.12]

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

Note. Reference group was a group of stable abstainers for both White and African American women.

Discussion

This study is unique in that it examined the association between experiences of childhood sexual or physical violence and heterogeneous trajectories of problem alcohol use over time. To summarize the findings of the study, four heterogeneous trajectories of problem alcohol use were identified among women during their transition from adolescence to young adulthood: (a) stable abstainers; (b) decliners whose problem alcohol use decreased from moderate to low; (c) incliners whose problem alcohol use relatively radically from low to high; and (d) incliners whose problem alcohol use from low to moderate. Additionally, as expected, women with childhood sexual or physical violence experiences were more likely to be in the group that started low but rapidly increased to high levels of problem alcohol use than in the groups of abstainers.

In addition to identifying varying trajectories of problem alcohol use over the course of thirteen years as young girls transition from adolescence to young adulthood, this study further explored racial/ethnic differences in problem alcohol use trajectories and the association between childhood sexual or physical violence experience and latent class membership of problem alcohol use. First, with respect to differences in problem alcohol use trajectories, White women were more likely to be in the high risk subgroups of problem alcohol use trajectories, as they were more likely to be the incliners whose problem alcohol use increased from low to high levels, compared to the African American women (Chassin et al., 2002; Dauber et al., 2011; Wiesner et al., 2007). Second, with respect to racial/ethnic differences in the association between childhood sexual or physical violence and problem alcohol use trajectories membership, even among the White women, women who experienced childhood sexual or physical violence were more likely to be in the rapid incliner group of those whose problem alcohol use increased from low to high levels with the same observation period. This phenomenon did not appear amongst African American women.

The key finding of the current study is that White women who may have one or more episodes of sexual or physical violence during childhood may be at higher risk of developing problem alcohol use. This may be due to the lower prevalence rates of alcohol use among African American women compared to White Women (National Institute on Alcohol Abuse and Alcoholism, 2009), or because White women typically experience childhood sexual or physical violence for more sustained periods of time than African American women (Mennen, 1995). Specifically, using community-residing sample of

women, Mennen (1995) reported white women experienced childhood sexual abuse at younger age (8.56 years old vs. 9.08 years old) and for longer period of time (3.99 years vs. 2.23 years) than African American women.

In addition, different racial/ethnic associations between childhood experiences of sexual or physical violence and problem alcohol use trajectories may be due to other co-occurring risk factors including psychiatric disorders (e.g., depressive symptoms, anxiety, or conduct disorder) (Widom et al., 2013), or peer and/or family relationships (Dauber et al., 2011; Watt, 2008). With respect to other co-occurring psychiatric disorders, Widom et al. (2013) studied community-residing adolescents and suggested that an increased extent of psychiatric disorders as a result of childhood adverse experiences is greater for White adolescents than African American adolescents. Additionally, with respect to peer and/or family relationships, Dauber et al. (2011) stated that, among White women, peer relationships had a greater impact on developing problem alcohol use, while family relationships influence on subsequent problem alcohol use is greater for African American women. This study may not have a large enough sample size to detect statistical significance in the association between childhood sexual or physical violence experiences and problem alcohol use trajectories among African American women. Thus, future studies should take into account the length and severity of childhood sexual or physical violence. Other co-occurring risk factors to be included in future investigations include racial/ethnic differences in the association between childhood sexual or physical violence and heterogeneous problem alcohol use trajectories.

Furthermore, previous studies suggested adverse effects of long-term problem alcohol use on health outcomes for women such as risky sexual behaviors (J. L. Brown & Vanable, 2007; Cooper, 2002) and/or pregnancy outcomes (Cook & Clark, 2005; Laborde & Mair, 2012). Future studies examining health outcomes of problem alcohol use may also need to consider simultaneously including childhood sexual or physical violence as covariates in further improving our understanding of women's development of problem alcohol use and associated negative consequences.

The limitations of this study are that the analyses relied heavily on self-reported data. This data has potential reliability issues including non-response issues, under or over-estimation of individuals' health conditions, or possible socially desirable answers on their perceived drinking behaviors. In addition, a retrospective measure of childhood experiences of sexual or physical violence has a potential recall bias. Additionally, this study explored the bivariate level associations between childhood sexual or physical violence and trajectories of problem alcohol use. Thus, future studies explaining the influence of confounding factors (e.g., depression and level of educational attainment) on the associations between childhood adverse experience and problem alcohol use trajectories are also suggested.

Despite the aforementioned limitations, the study findings emphasize the importance of identifying individuals who are likely to require clinical attention for problem alcohol use. Also, findings imply the need for more aggressive implementation of alcohol prevention programs for young women whose levels of problem alcohol use are likely to increase rapidly as they move into young adulthood from adolescence.

Understanding the heterogeneous trajectories of problem alcohol use provides relevant evidence for social workers and/or community practitioners to better plan and carry out targeted activities to prevent or intervene in women's problem alcohol use. This study also provides implications for social workers, community practitioners and policy makers to better understand the association between childhood sexual or physical violence and problem alcohol use developed during the transition from adolescence to young adulthood. Furthermore, this study develops profiles of groups at higher risk for developing into more severe problem alcohol use. Development and testing of culturally specific interventions that explicitly address problem alcohol use are also necessary for both White and African American women. Given that women with childhood experiences of sexual or physical violence were more likely to show rapidly increased problem alcohol use over time, findings also stress the necessity of developing an integrative care system that can meet the needs of comorbid clients who may exhibit both mental health and alcohol use issues before either one exacerbates. Finally, educational programs should be available for young girls that can provide an understanding of the link between adverse childhood events and the increased likelihood of engaging in substance using behaviors in the long run.

**Chapter 3. Longitudinal Effects of Childhood Sexual or Physical Violence on
Subsequent Development of Problem Alcohol Use and Depressive Symptoms of
White and African American Women**

Abstract

Purpose: Little is known about whether there is a racial/ethnic difference in the effects of adverse childhood events on problem alcohol use and depressive symptoms as teenage girls transit into the young adulthood. The purpose of this study was to examine whether the longitudinal associations between childhood experiences of sexual or physical violence, problem alcohol use, and depressive symptoms differ for White and African American women.

Methods: A secondary data analysis was conducted using autoregressive, cross-lagged path models to test longitudinal associations between childhood experiences of sexual or physical violence, problem alcohol use and depressive symptoms of White and African American women. Seven years' of longitudinal data collected from a total of three waves from the National Longitudinal Study of Adolescent Health were analyzed, containing a total of 1,756 women, 1,284 non-Hispanic White (White) and 472 non-Hispanic African American (African American) women.

Results: White and African American women showed different associations between childhood experiences of sexual or physical violence and problem alcohol use during the transition from adolescence to young adulthood, while both groups of women showed similar associations between childhood experiences of sexual or physical violence and subsequent development of depressive symptoms.

Conclusions: Findings of this study highlight the importance of designing and providing effective prevention and culturally appropriate treatment programs for women who experienced childhood sexual or physical violence to interrupt subsequent development of problem alcohol use and depressive symptoms.

Longitudinal Effects of Childhood Sexual or Physical Violence on Subsequent
Development of Problem Alcohol Use and Depressive Symptoms of White and African
American Women

In 2010, the U.S. Department of Health and Human services reported that approximately 17.6 percent of children experienced physical abuse and 9.2 percent of children suffered sexual abuse (U.S. Department of Health and Human Services et al., 2011). In addition, analyses of national surveys suggest that between 6-23 percent of women experienced physical or sexual abuse and/or assault during their childhood (Cogle et al., 2010; J. G. Green et al., 2010; Lown et al., 2011). Given that adverse childhood events, including childhood sexual abuse or physical violence, are a significant predictor for lower levels of academic achievement (Boden, Horwood, & Fergusson, 2007; Paolucci et al., 2001), higher rates of delinquency and crime (Jespersen, Lalumière, & Seto, 2009; Kim, Tajima, Herrenkohl, & Huang, 2009), re-victimization (Arata, 2002; Barnes, Noll, Putnam, & Trickett, 2009), suicidal attempts (Borges et al., 2010; Bruffaerts et al., 2010), as well as psychiatric problems (Bulik et al., 2001; J. G. Green et al., 2010; Kendler et al., 2000), it is important that early intervention is provided for these children before the problems exacerbate.

More specifically, research has illustrated the negative short- and long-term effects of childhood sexual or physical violence experiences on subsequent development of alcohol use and mental health problems (Briere & Elliott, 2003; Bulik et al., 2001; Nelson et al., 2002; Paolucci et al., 2001). With respect to problem alcohol use, adolescent girls who experienced sexual or physical violence are more likely to drink

heavily, abuse or be dependent on alcohol, and consequently experience alcohol related problems (e.g., problems at school or work and problems with friends or family) compared to girls without such experiences (Ullman et al., 2005; Widom et al., 2013). High rates of heavy drinking and alcohol related problems during the transition from adolescence to young adulthood are also found in women with a history of childhood sexual or physical violence (D. B. Clark et al., 2010; Jasinski et al., 2000; Shin et al., 2013). Similar to problem alcohol use, it is also reported that girls who experienced childhood sexual or physical violence are more likely to suffer from depression than their non-abused counterparts (Hussey et al., 2006; Nelson et al., 2002). Greater levels of depressive symptoms are also reported among adult women with childhood experiences of sexual or physical violence (Chapman et al., 2004; Schilling et al., 2007; Timko et al., 2008).

Problem Alcohol Use and Depressive Symptoms

Research has reported comorbid vulnerability between problem alcohol use and levels of depressive symptoms both in adolescence (Fleming, Mason, Mazza, Abbott, & Catalano, 2008; Hussong, Jones, Stein, Baucom, & Boeding, 2011; McCarty et al., 2012) and young adulthood (Chassin et al., 2002; Nolen-Hoeksema, 2004; Petrakis et al., 2002). Levels of problem alcohol use and depressive symptoms are likely to escalate each other over time, and both of them are associated with other subsequent health-related problems (Dannefer, 2003).

The 2001-2002 NESARC reported that approximately 20 percent of adults experienced a comorbid substance use disorder with at least one current independent

mood disorder (e.g., major depression, dysthymia, mania, or hypomania) (Grant, Stinson, et al., 2004). This association has shown to be stronger for women than men in both clinical (Brady & Randall, 1999; Davis et al., 2003) and community samples (Hill & Angel, 2005; Kendler et al., 2003). Female alcoholics, in particular, were more likely to experience depression, panic disorder, and phobia(s) than male alcoholics (Brady & Randall, 1999). Chassin et al. (2002) also reported that high levels of depressive symptoms were associated with greater alcohol use among adult women. In addition, Hill and Angel (2005) found that women who had high levels of depression at baseline and whose psychological distress worsened over time ultimately drank more heavily.

Conceptual Framework

This study examined the longitudinal impact of childhood sexual or physical violence on problem alcohol use and depressive symptoms, and long-term comorbid associations between problem alcohol use and levels of depressive symptoms. There are various psychosocial models have been used to explain the associations between childhood sexual or physical violence, problem alcohol use, and levels of depressive symptoms. This current study was developed based on the tension reduction hypothesis (Conger, 1956) and bidirectional model of problem alcohol use and depressive symptoms (Breslau, Peterson, Schultz, Chilcoat, & Andreski, 1998; Mueser, Drake, & Wallach, 1998). The tension reduction hypothesis explains that people with childhood sexual or physical violence are more likely to engage in heavy drinking or have alcohol related problems than people without these experiences as a means to self-medicate or cope with depressive symptoms caused by childhood violence experience (Grayson & Nolen-

Hoeksema, 2005; Miranda et al., 2002). The bidirectional model explains the interactive, reciprocal linkages between problem alcohol use and depressive symptoms (Breslau et al., 1998; Mueser et al., 1998; Sherry et al., 2012). Previous studies employing the bidirectional model have indicated that drinking as a self-medicating response to depression becomes a significant predictor of increasing depression (Sherry et al., 2012).

Consideration of Race/Ethnicity

Research has indicated racial/ethnic differences in the prevalence rates of childhood sexual or physical violence (U.S. Department of Health and Human Services et al., 2011), problem alcohol use (National Institute on Alcohol Abuse and Alcoholism, 2009), and depressive symptoms (J. S. Brown et al., 2007; Turner & Gil, 2002).

Approximately 44.8 percent of victimized children were reported to be White and 21.9 percent were African Americans (U.S. Department of Health and Human Services et al., 2011). Previous studies have reported higher prevalence rates of alcohol use among White women than African American women (Johnston et al., 2011; National Institute on Alcohol Abuse and Alcoholism, 2009). White women also showed greater levels of alcohol related problems than African American women (Dauber et al., 2011; Orlando et al., 2005). However, findings are missed with respect to levels of depressive symptom. Several studies have reported that African American women experience lower levels of depressive symptoms than White women (Schilling et al., 2007; Turner & Gil, 2002); while some studies have found that African American women reported higher levels of depressive symptoms than White women (J. S. Brown et al., 2007; Needham, 2007). In

addition, another group of studies have found no racial/ethnic differences in depressive symptoms (Franko et al., 2004).

In addition, previous studies failed to agree on differences in problem alcohol use and levels of depressive symptoms by race/ethnicity as a result of childhood sexual or physical violence experience. Some studies reported that the effects of childhood experiences of sexual or physical violence on problem alcohol use and depressive symptoms are greater for African American women than White women (Kilpatrick et al., 2003; Roberts et al., 2011), while others have found that the effects are greater for White individuals than African Americans (Kaukinen & DeMaris, 2005; Widom et al., 2013).

Another set of studies has not found racial/ethnic differences on the association between childhood sexual or physical violence, problem alcohol use, and levels of depressive symptoms (Caetano et al., 2003; Glover et al., 2010; Ullman et al., 2005). For example, using national representative sample, Caetano and colleagues (2003) found that childhood physical abuse is associated with greater levels of alcohol problems in adulthood in both White and African American females.

Current Study

Previous studies have suggested that childhood experiences of sexual and physical violence are a significant predictor for problem alcohol use and depressive symptoms in both adolescence and young adulthood (Caetano et al., 2003; Cogle et al., 2010; Timko et al., 2008). However, these studies did not examine the associations between childhood sexual or physical violence, problem alcohol use, and levels of depressive symptoms within women, even though they found gender differences. In addition, previous studies

used mainly cross-sectional designs making it difficult to examine causal relationships. Little is known about the long-term effects of childhood experiences of sexual or physical violence on problem alcohol use and depressive symptoms during the transition from adolescence to young adulthood. Studies examining the comorbid associations between problem alcohol use and depressive symptoms are also scarce. In addition, limited numbers of studies have examined racial/ethnic differences in the proposed associations.

Given that little is known about the long-term effects of experiences of childhood sexual or physical violence on problem alcohol use and depressive symptoms during the transition from adolescence to young adulthood, the current study attempted to provide insight into (a) whether antecedent experiences of childhood sexual or physical violence are associated with increased levels of problem alcohol use and depressive symptoms during the transition from adolescence to young adulthood for both White and African American women and (b) whether problem alcohol use and depressive symptoms are associated with each other over time for both groups of women.

Methods

Data and Sample

The data used for this secondary analyses were waves 1, 2, and 3 of the National Longitudinal Study of Adolescent Health (Add Health), publicly released through the Interuniversity Consortium for Political and Social Research (Harris & Udry, 2011). In the original data, public and private high schools with at least 30 students were randomly selected through a multistage stratified cluster design (Harris & Udry, 2011). A random sample of adolescents in grades 7-12 were administered the in-home survey in the

1994/95 school year (wave 1) and were then followed into young adulthood with three additional interviews (waves 2 through 4). This study utilized data from the wave 1 to wave 3 in-home surveys because all three waves assessed same measures of alcohol frequency (numbers of episodes of binge drinking and getting drunk) and alcohol related problems.

Of the 6,504 adolescents who completed the initial in-home survey during wave 1, 4,882 (75.06%) individuals remained in the study through wave 3, of which 2,628 (53.83%) were women. The findings of this study are presented based on analyses of total of 2,234 women, excluding Hispanic women ($n=265$), those from other racial/ethnic origin ($n=119$), and ten women whose race/ethnicity information was missing due to insufficient sub-sample size. Of these 2,234 non-Hispanic White and non-Hispanic African American women, the majority ($n=1,756$, 78.60%) of women completed all three waves, and remaining 478 (21.40%) were non-completers who missed at least one wave information needed for the analyses. From the attrition analyses, significant differences were observed at $p < .05$ between the completers and non-completers in regards to the demographic characteristics, problem alcohol use, and levels of depressive symptoms. Thus, the final analytic sample was comprised of the 1,756 women who completed all three waves, with 1,284 being non-Hispanic White (White) women and 472 non-Hispanic African American (African American) women. This study was approved by the Institutional Review Board at the University of Texas at Austin.

Measures

Problem alcohol use from wave 1 through wave 3. Problem alcohol use at each wave was defined by three domains of alcohol use within the last 12 months: (a) episodes of having five or more drinks in a row; (b) episodes of getting drunk; and (c) alcohol related problems. First, episodes of having five or more drinks in a row was created by dichotomizing the response to the question, “Over the past 12 months, on how many days have you drink five or more drinks in a row?” If a woman reported one or more episodes within the past 12 months, she was coded as 1. Second, episodes of getting drunk was also dichotomized based on the response to the question, “Over the past 12 months, on how many days have you gotten drunk or “very, very high” on alcohol?” Third, with respect to alcohol related problems, Add Health includes seven items to measure alcohol related problems, including problems at work, at school, problems with friends, or getting into physical fights. From the sum of these seven items, this study created a dichotomous variable (1=*experienced one or more alcohol related problems*, 0=*no problems*). The overall problem alcohol use score was calculated by summing the three dichotomous variables of episodes of having five or more drinks in a row, episodes of getting drunk, and alcohol related problems (Swahn & Donovan, 2004; M. P. Thompson et al., 2008). Total score of problem alcohol use ranged from 0 to 3 at each wave.

Level of depressive symptoms from wave 1 through wave 3. Respondents were asked nine items from the Center for Epidemiologic Studies Depression Scale (CES-D) (Radloff, 1977) for all three waves. The CES-D evaluates depressive symptoms within the last week from the time point of the scale administered, with each item having four

response categories from 0 (*rarely or none of the time*) to 3 (*most or all of the time*), total score ranging between 0 and 27. Question items include “I felt depressed”, “I felt sad”, and “I felt that I was too tired to do things.” Higher CES-D scores represent greater level of depressive symptoms. Cronbach’s alpha calculated from this study indicated adequate internal consistency across all three waves (all $\alpha > .81$).

Childhood sexual or physical violence before 7th grade. At wave 3, respondents were asked about experiences of childhood sexual or physical violence experience before they entered 7th grade: “How often did a parent or adult caregiver hit you with a fist, kick you, or throw you down on the floor, into a wall, or down stairs?” and “How often did a parent or other adult caregiver touch you in a sexual way, force you to touch him or her in a sexual way, or force you to have sexual relations?” From these two questions, a dichotomous variable of childhood sexual or physical violence experience was created with a score of “1” indicating at least one incident of either or both childhood sexual and physical violence and “0” indicating neither experience.

Covariates. Respondents’ ages at all waves, parental and family characteristics (i.e., family poverty, parental education attainment, and family structure) at wave 1, and respondents’ demographic characteristics (i.e., marital status, education attainment, and personal income level) at wave 3 were included as covariates. With respect to parental and family characteristics, family poverty was calculated by dividing before-tax family income by household size. This study categorized family poverty level in 100 percent increments based on the 1994 federal poverty level. Parental education attainment was defined as the highest education attainment by either parent and was noted as either less

than high school, high school graduates, some college, or college or higher education. The respondent's education attainment was categorized using the same categories as parental education variable. Family structure was categorized into four groups: two biological parents; one biological and one non-biological parent; single parent and other arrangements (two non-biological parents) (Cubbin et al., 2005). Among respondents' demographic characteristics, marital status was dichotomized (1=*married/cohabited*, 0=*not married*). Personal income, measured by respondent's personal earnings before taxes, was categorized into six ordinal categories.

Analyses

Separate analyses were conducted for White and African American women to examine possible racial/ethnic differences in associations between childhood sexual or physical violence, problem alcohol use, and depressive symptoms during the transition from adolescence to young adulthood. Descriptive statistics were conducted using the SAS version 9.2 (SAS Institute Inc.), taking into account the clustered sample design and weighting. Individual sociodemographic characteristics were explored by race/ethnicity using chi-square and *t*-tests.

For each group of women, the same autoregressive, cross-lagged path models were adopted to examine longitudinal associations among the variables, controlling for all covariates (see Figure 3.1). Autoregressive, cross-lagged path modeling allows us to examine longitudinal impacts of one variable from the other variables and to test the autoregressive effects of the variable from itself (Bollen & Curran, 2004). Hence the proposed autoregressive, cross-lagged path models examine the (a) effects of childhood

sexual or physical violence experience on problem alcohol use and depressive symptoms over time, (b) autoregressive effects of the same variable at the previous time point (i.e., effect of problem alcohol use at wave 1 on problem alcohol use at wave 2), and (c) cross-lagged effects of the other variable at the previous time point (i.e., impact of problem alcohol use at wave 1 on level of depressive symptoms at wave 2).

Cross-lagged effects of problem alcohol use and depressive symptoms between wave 2 and 3 were not examined. Two or three years between studies is the maximum recommended timeframe to examine the cross-lagged effects between variables (Taris, 2000). Add Health wave 2 and wave 3 were seven years apart, thus it was difficult to assume the levels of depressive symptoms at wave 2 would influence problem alcohol use at wave 3 and vice versa.

To assess whether the proposed model fits the data, this study utilized model fit statistics including root mean square of error approximation (RMSEA), chi-square statistics, and comparable fit indices (CFI). In general, model fit statistics of 0.96 or greater for CFI and less than 0.05 for the RMSEA are suggested as cut-off values for a “good” fit (Yu, 2002). Autoregressive, cross-lagged path models were tested by using Mplus version 6.11 (L. Muthén & Muthén, 2010), taking into account the clustered sample design and weighting (Chantala & Tabor, 1999).

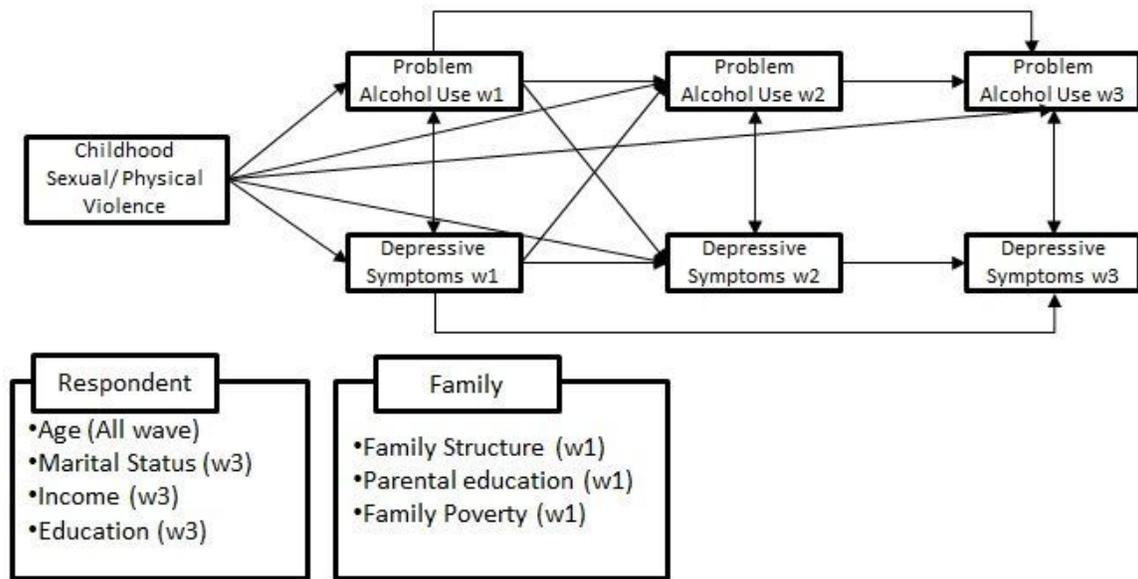


Figure 3.1. Full autoregressive cross-lagged path models

Results

Demographic Characteristics by Race/Ethnicity

As Table 3.1 shows, there was no significant difference in childhood experiences of sexual or physical violence between White and African American women. However, significant differences in problem alcohol use and levels of depressive symptoms were observed across all waves, except for the levels of depressive symptoms at wave 3. In addition, parental education attainment ($\chi^2(3, 1,653) = 14.80, p < .01$), family structure ($\chi^2(3, 1,756) = 124.78, p < .001$), family poverty ($\chi^2(4, 1,395) = 86.41, p < .001$), respondents' marital status ($\chi^2(1, 1,755) = 28.27, p < .001$), respondents' education attainment ($\chi^2(3, 1,756) = 9.37, p < .05$), and their personal income ($\chi^2(4, 1,756) = 17.48, p < .05$) significantly differed between White and African American women.

Table 3.1

Descriptive Characteristics of White and African American Women (Weighted Means)

	Total Sample (N=1,756)		White (n=1,284)		African American (n=472)		χ^2
	Freq	(%)	Freq	(%)	Freq	(%)	
Childhood sexual/physical violence	426	(24.26)	316	(24.61)	110	(23.31)	0.13
Parental education attainment (w1)							
< High school	123	(7.00)	77	(6.00)	46	(9.75)	14.80**
High school	521	(29.67)	387	(30.14)	134	(28.39)	
Some college	347	(19.76)	269	(20.95)	78	(16.53)	
≥College graduated	707	(40.26)	518	(40.34)	189	(40.04)	
Family structure (w1)							
2 biological parents	992	(56.49)	809	(63.01)	183	(38.77)	124.78** *
1 biological/1 non- biological parent	248	(14.12)	188	(14.64)	60	(12.71)	
Single parent	501	(28.53)	274	(21.34)	227	(48.09)	
Other	15	(0.85)	13	(1.01)	2	(0.42)	
Family poverty (w1)							
0-100%	212	(12.07)	113	(8.80)	99	(20.97)	86.42***
101-200%	303	(17.26)	227	(17.68)	76	(16.10)	
201-300%	298	(16.97)	234	(18.22)	64	(13.56)	
301-400%	220	(12.53)	185	(14.41)	35	(7.42)	
401%+	362	(20.62)	308	(23.99)	54	(11.44)	
Respondent marital status (w3)							
Married	312	(17.77)	266	(20.72)	46	(9.75)	28.27***
Respondent education attainment (w3)							
< High school	271	(15.43)	183	(14.25)	88	(18.64)	9.38*
High school	326	(18.56)	228	(17.76)	98	(20.76)	
Some college	521	(29.67)	387	(30.14)	134	(28.39)	
≥College graduated	638	(36.33)	486	(37.85)	152	(32.20)	

Table 3.1, cont.

	Total Sample (N=1,756)		White (n=1,284)		African American (n=472)		χ^2
	Freq	(%)	Freq	(%)	Freq	(%)	
Respondent personal income (w3)							
< \$10,000	1198	(68.22)	845	(65.81)	353	(74.79)	17.48 *
\$10,001-\$15,000	224	(12.76)	168	(13.08)	56	(11.86)	
\$ 15,001-\$20,000	149	(8.49)	119	(9.27)	30	(6.36)	
\$20,001-\$30,000	133	(7.57)	108	(8.41)	25	(5.30)	
\$30,001-\$40,000	34	(1.94)	27	(2.10)	7	(1.48)	
\$40,001 +	18	(1.03)	17	(1.32)	1	(0.21)	
	<i>M</i>	<i>(SE)</i>	<i>M</i>	<i>(SE)</i>	<i>M</i>	<i>(SE)</i>	<i>t</i>
Age (w1)	14.83	(0.12)	14.78	(0.13)	15.01	(0.20)	1.10
Problem alcohol use (w1)	0.69	(0.05)	0.75	(0.05)	0.38	(0.05)	-5.00***
Problem alcohol use (w2)	0.81	(0.05)	0.90	(0.05)	0.39	(0.05)	-7.80***
Problem alcohol use (w3)	1.44	(0.06)	1.62	(0.05)	0.62	(0.06)	- 12.06***
Depression (w1)	6.04	(0.15)	5.81	(0.16)	7.10	(0.30)	3.99 ***
Depression (w2)	6.13	(0.12)	5.92	(0.13)	7.07	(0.30)	3.62 ***
Depression (w3)	4.97	(0.13)	4.87	(0.15)	5.45	(0.29)	1.74

*p <.05. ** p<.01. ***p<.001.

Distribution of Problem Alcohol Use and Depressive Symptoms by Race/Ethnicity

Figure 3.2 shows distributions of problem alcohol use and levels of depressive symptoms. In general, White women reported greater problem alcohol use and lower levels of depressive symptoms than their African American counterparts. In addition, women who experienced childhood sexual or physical violence showed greater levels of problem alcohol use and levels of depressive symptoms than those without such experiences. With respect to the distribution problem alcohol use, the levels of problem alcohol use for women with childhood sexual or physical violence experiences increased over time for both White and African American women (0.76, 0.62 at wave 1, 0.95, 0.44

at wave 2, and 1.87, 0.80 at wave 3, respectively), with higher averages reported by White women. With respect to level of depressive symptoms, it has slightly increased from wave 1 to wave 2 and decreased from wave 2 to wave 3 for White women (6.33 at wave 1, 6.82 at wave 2, and 5.97 at wave 3), while gradual and consistent decline was observed among African American women during the same time period (7.72 at wave 1, 7.23 at wave 2, and 6.66 at wave 3).

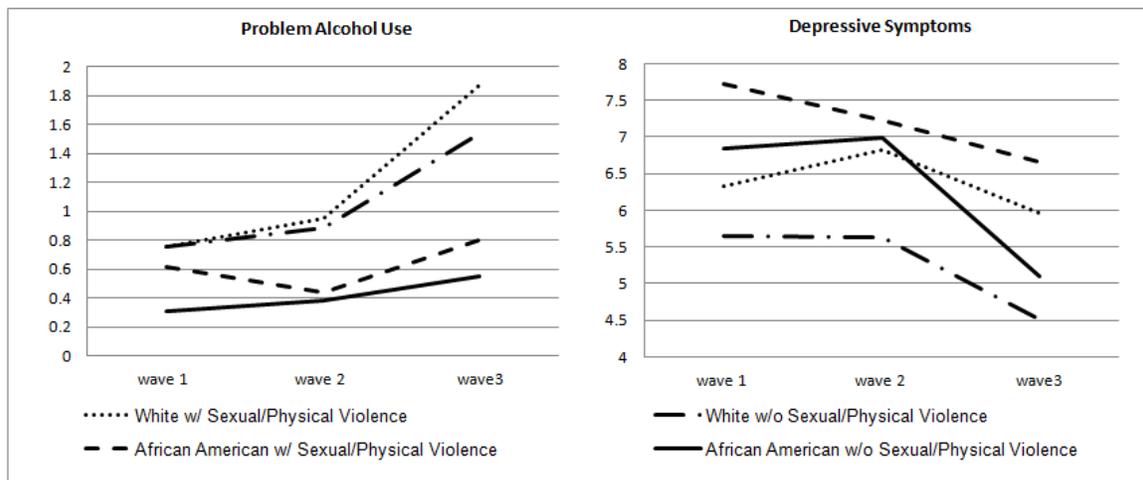


Figure 3.2. Trends of problem alcohol use and depressive symptoms over time by experiences of childhood sexual or physical violence of White and African American women

Autoregressive Cross-lagged Pathways for White Women

The autoregressive, cross-lagged pathways model between problem alcohol use and levels of depressive symptoms for White women was tested and showed a good fit with the data, $\chi^2(53, 1,043) = 101.86, p < .001, RMSEA = .030$ (95% CI: .021-.038), CFI=.980, and TLI=.964. The total variance explained in problem alcohol use and levels

of depressive symptoms ranged from 5.0 to 34.9 percent and path coefficients ranged from 0.02 to 0.55. Figure 3.3 presents the standardized path coefficients and *R* squares.

With respect to the associations with childhood sexual or physical violence, problem alcohol use, and levels of depressive symptoms, childhood experiences of sexual or physical violence were directly associated with increased levels of problem alcohol use at both wave 2 ($\beta=.02, p <.05$) and wave 3 ($\beta=.08, p <.001$), and levels of depressive symptoms at wave 2 ($\beta=.08, p <.001$), controlling for all covariates. Increased levels of problem alcohol use and depressive symptoms was positively associated with each other at both wave 2 ($\beta =.10, p <.05$). In addition, increased levels of depressive symptoms at wave 2 was positively associated with depressive symptoms at wave 3 ($\beta =.25, p <.001$). Moreover, problem alcohol use and depressive symptoms at wave 3 were positively associated each other ($\beta =.09, p <.001$). For White women, childhood sexual or physical violence increased levels of problem alcohol use both in adolescence and young adulthood. Childhood experiences of sexual or physical violence had short-term direct effects on levels of depressive symptoms in adolescence and further continuously predicted levels of depressive symptoms in young adulthood. Furthermore, findings indicated that increased levels of problem alcohol use and depressive symptoms due to childhood sexual or physical violence experience were highly comorbid with each other both in adolescence and young adulthood.

Besides the associations with childhood sexual or physical violence, study findings suggest significant autoregressive associations for both problem alcohol use and levels of depressive symptoms among White women. For example, greater problem

alcohol use at wave 2 was associated with greater problem alcohol use at wave 3 ($\beta = 16$, $p < .05$), controlling for all covariates. Similarly, higher levels of depressive symptoms in adolescence predicted higher levels of depressive symptoms in young adulthood. This indicates that White women's both problem alcohol use and level of depressive symptoms continued from adolescence to young adulthood from adolescence.

Significant cross-lagged paths were also identified between problem alcohol use and depressive symptoms. Greater problem alcohol use at wave 1 significantly predicted higher levels of depressive symptoms at wave 2 ($\beta = .03$, $p < .05$) and higher levels of depressive symptoms at wave 1 significantly predicted greater problem alcohol use at wave 2 ($\beta = .07$, $p < .05$).

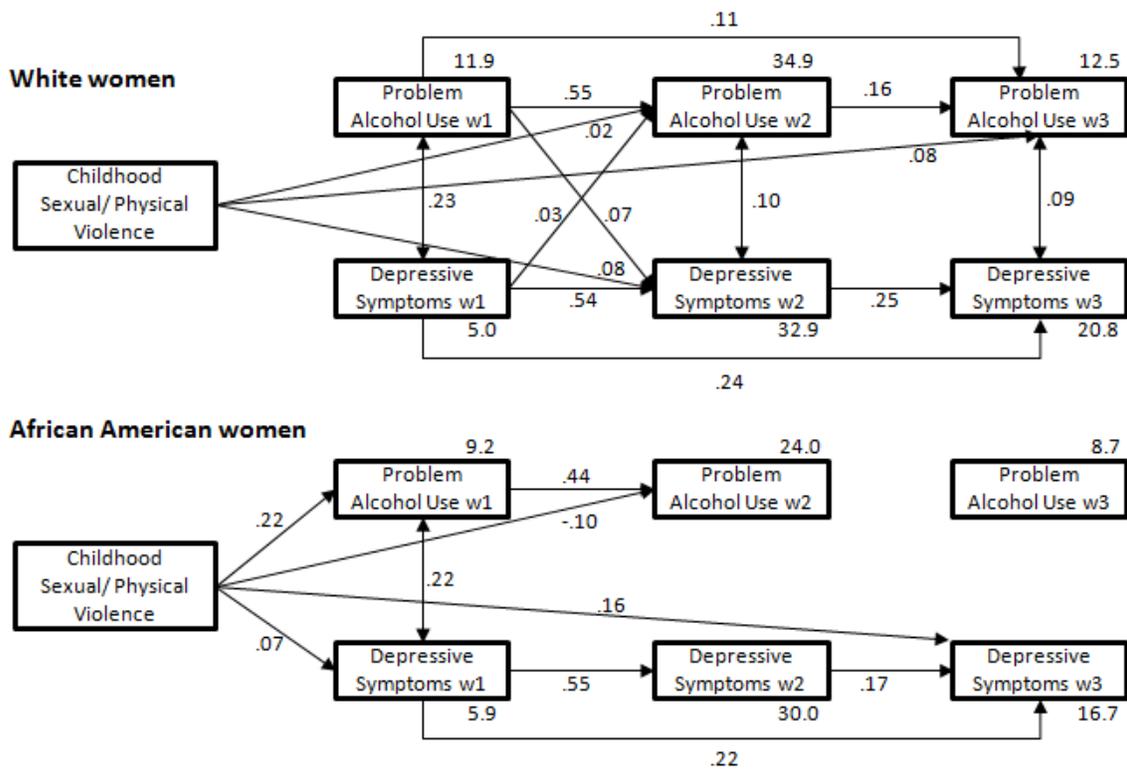


Figure 3.3. Autoregressive cross-lagged path models with standardized path coefficients of White and African American women

Autoregressive Cross-lagged Pathways for African American Women

The same autoregressive, cross-lagged pathways model between problem alcohol use and depressive symptoms were tested for African American women. The proposed model showed a moderate fit with the data, $\chi^2(53, 472) = 69.92, p = .085, RMSEA = .029$ (95% CI: .000-.048), CFI=.939, and TLI=.903. The total variance explained in problem alcohol use and depressive symptoms ranged from 5.9 to 30.0 percent and path coefficients ranged from 0.07 to 0.55.

With respect to the association with childhood sexual or physical violence, women who experienced childhood sexual or physical violence are more likely to report

higher levels of both problem alcohol use and depressive symptoms at wave 1 ($\beta = .22, p < .05$; $\beta = .07, p < .001$, respectively) and higher levels of depressive symptoms at wave 3 ($\beta = .16, p < .01$). Problem alcohol use and depressive symptoms at wave 1 were positively associated each other ($\beta = .22, p < .001$). For African American women, childhood sexual or physical violence has increasing short-term risks of problem alcohol use and levels of depressive symptoms and increased levels of problem alcohol use were more likely to be comorbid with higher levels of depressive symptoms in adolescence. In addition, sexual or physical violence experiences in childhood were shown to have consistent adverse effect on depressive symptoms in adolescence and through young adulthood. However, childhood sexual or physical violence showed a negative association with problem alcohol use at wave 2 ($\beta = -.10, p < .001$), which indicates that women with childhood experiences of sexual or physical violence reported lower levels of problem alcohol use at that time point.

Besides the significant link between childhood sexual or physical violence, problem alcohol use, and depressive symptoms, findings also suggest autoregressive associations in levels of depressive symptoms. For example, levels of depressive symptoms at each wave were associated with depressive symptoms at the prior wave. Also, unlike White women, African American women's problem alcohol use at wave 2 was not associated with their problem alcohol use at wave 3, indicating that problem alcohol use did not continue into young adulthood from adolescence. No significant cross-lagged paths between problem alcohol use and levels of depressive symptoms were observed across all three waves.

Discussion

This study is unique in that it examined long-term autoregressive cross-lagged associations between childhood sexual or physical violence, problem alcohol use and levels of depressive symptoms during the transition from adolescence to young adulthood by race/ethnicity, specifically among White and African American women. Findings suggest both similar as well as different associations between White and African American women on the impact of childhood sexual or physical violence on subsequent development of problem alcohol use and depressive symptoms. First, findings suggest no racial/ethnic difference in the effect of childhood sexual or physical violence experience on levels of depressive symptoms during adolescence. Importantly, the increased levels of depressive symptoms in adolescence continued as women progressed into young adulthood. These findings are noteworthy as previous studies found no racial/ethnic differences in subsequent development of depressive symptoms among childhood violence victims (Franko et al., 2004; Ullman et al., 2005).

This study indicates racial/ethnic differences in several associations. First, current study found that effects of childhood sexual or physical violence on problem alcohol use were salient for White women. Specifically, childhood sexual or physical violence increased the risk of problem alcohol use directly in adolescence and continued into young adulthood for White women. However, for African women, childhood sexual or physical violence increased the risk of problem alcohol use only in adolescence. Unlike White women, increased levels of problem alcohol use of African American women did not continued to young adulthood.

Second, there were racial/ethnic differences in significant associations between problem alcohol use and levels of depressive symptoms across time. Co-occurring problem alcohol use and levels of depressive symptoms were consistently observed during the transition from adolescence to young adulthood for White women, while this association was found only during adolescence for African American women.

Even though this study did not support racial/ethnic differences in subsequent development of levels of depressive symptoms, the findings of the current study in terms of the association between childhood experiences of sexual or physical violence and subsequent problem alcohol use are consistent with previous studies (Kaukinen & DeMaris, 2005; Widom et al., 2013). This study emphasizes the significant impact of childhood sexual or physical violence on problem alcohol use and levels of depressive symptoms, particularly that this is greater for White women than African American women. Greater levels of problem alcohol use and high comorbidity between problem alcohol use and levels of depressive symptoms of White women may be due to the fact that White women typically experience childhood sexual or physical violence longer than African American women (Mennen, 1995). In addition, greater effects of childhood sexual or physical violence on problem alcohol use and levels of depressive symptoms may also be due to other psychiatric disorders that were not fully examined in the current study (McCarty et al., 2012; Widom et al., 2013). Previous studies have reported that adolescents with childhood experiences of sexual or physical violence have an increased chance of experiencing psychiatric disorders (e.g., PTSD and conduct disorder) than adolescents without such experiences (Glover et al., 2010; Nelson et al., 2002). However,

the increased extent of psychiatric disorders is greater for White adolescents than African American adolescents (Widom et al., 2013). Therefore, compared to African American women, White women's increased psychiatric disorders associated with childhood sexual or physical violence and its associations with problem alcohol use and levels of depressive symptoms may linger on for a longer time period, thus effects persist longer into young adulthood.

Racial/ethnic differences in the association between childhood sexual or physical violence, problem alcohol use, and levels of depressive symptoms may also be due to peers drinking behaviors and levels of deviant behaviors which present differently between White and African American adolescents (Dauber et al., 2011; Ludden & Eccles, 2007; Watt & Rogers, 2007). Specifically, African American adolescents are less likely to be influenced by peers drinking behaviors (Watt & Rogers, 2007) compared to White adolescents. In addition, as Dauber et al. (2011) pointed out, African American adolescents are more likely to be under parent's supervision. Even though African American women in this study were living with single parents, they may have strong supports from kinship network or other caregivers that buffer against problem alcohol use as a result of childhood experiences of sexual or physical violence (French et al., 2002; T. T. Watt, 2008). This may explain the findings of a negative association between childhood sexual or physical violence and problem alcohol use observed at wave 2 for African American women.

A limitation of this study is that the analyses were conducted on self-reported data, which can be problematic because of its non-response bias, under or over-estimating

one's behaviors, or socially desirability problems. This study may also have recall bias since childhood sexual or physical violence was measured retrospectively. Women may experience difficulty in fully remembering the time when childhood violence occurred or suppress memories about such incidences. In addition, due to sample size issue, this study was not able to fully capture all racial/ethnic groups in learning about the associations between childhood sexual or physical violence, problem alcohol use, and depressive symptoms. Because previous studies have reported that levels of depressive symptoms are higher among Hispanic females than White or African American females (McLaughlin, Hilt, & Nolen-Hoeksema, 2007; McLeod & Owens, 2004), future studies may incorporate Hispanic females as a reference group in investigating the association between mental health and substance use.

Despite these limitations, this study adds to the literature on racial/ethnic differences in longitudinal effects of childhood experiences of sexual or physical violence on problem alcohol and depressive symptoms during the transition from adolescence to young adulthood. This study highlights the importance of designing and providing effective treatments for women who experienced childhood sexual or physical violence in order to interrupt subsequent development of problem alcohol use and depressive symptoms from adolescence to young adulthood (Schulenberg & Maggs, 2002).

Development and testing of interventions that explicitly address co-occurring problem alcohol use and depressive symptoms are also necessary for both adolescents and young adults. Culturally appropriate prevention and treatment for women who experienced childhood sexual or physical violence are also necessary. Educators, health professionals

(e.g., social workers, clinical psychologists), and child violence service providers should collaborate and be trained to implement violence prevention and treatment programs for both adolescents and young adults to reduce the risk of subsequent problem alcohol use and depressive symptoms among women with childhood experiences of sexual or physical violence.

**Chapter 4. Childhood Sexual/Physical Violence, Alcohol use, Depressive Symptoms,
and Indiscriminant Sexual Behaviors of Young White and African American
Women: A Multigroup Structural Equation Modeling Approach**

Abstract

Purpose: Mechanisms explaining the relationships between childhood sexual or physical violence and indiscriminant sexual behaviors are poorly understood. Furthermore, relatively little is known about the cumulative effects of problem alcohol use and depressive symptoms on the likelihood of indiscriminant sexual behaviors and racial/ethnic differences in these behaviors. The purpose of this study was to examine the relationship between childhood sexual or physical violence and indiscriminant sexual behaviors, with problem alcohol use and depressive symptoms as mediators and to examine racial/ethnic differences in the proposed relationships.

Methods: From the 2007-2008 National Longitudinal Study of Adolescent Health, 1,388 sexually active women (1,021 non-Hispanic White and 367 non-Hispanic African American women) were included in the study. Structural equation modeling (SEM) and multigroup SEM were used to test pathways between an experience of childhood sexual or physical violence and indiscriminant sexual behaviors and to examine differences in structures and path coefficients between non-Hispanic White and non-Hispanic African American women.

Findings: In the SEM, problem alcohol use and depressive symptoms partially mediated the relationship between childhood sexual or physical violence and indiscriminant sexual behaviors. From the multigroup SEM, non-Hispanic White and non-Hispanic African

American women showed different structures in the proposed associations and different magnitudes on path coefficients. For non-Hispanic White women, both problem alcohol use and levels of depressive symptoms mediated the association between childhood sexual or physical violence and indiscriminant sexual behaviors, while only depressive symptoms mediated the proposed association for non-Hispanic African American women.

Conclusion: This study highlights the importance of providing effective and targeted treatment for women with childhood sexual or physical violence experiences.

Childhood Sexual/Physical Violence, Alcohol use, Depressive Symptoms, and
Indiscriminant Sexual Behaviors of Young White and African American Women: A
Multigroup Structural Equation Modeling Approach

Approximately 6-23 percents of women experience sexual or physical abuse and/or assault during their childhood (Cogle et al., 2010). Childhood sexual violence is defined as situations in which an individual's experiences forced sexual acts including physically forced kissing or touching, coerced sexual intercourse, and/or physically forced vaginal, oral and anal penetration when one was younger than 18 years old (Grayson & Nolen-Hoeksema, 2005). Physical violence is defined as an experience of having one's life threatened and/or injury by a perpetrator such as being pushed, grabbed, or shoved; having something thrown at them; being kicked; bitten or punched; or being hit with something (MacMillan et al., 2001). Prior studies provided evidence of a significant positive association between childhood experiences of sexual or physical violence and indiscriminant sexual behaviors (e.g., multiple sexual partners) (Hillis et al., 2001; Lemieux & Byers, 2008; Merrill et al., 2003), heavy drinking (e.g., binge drinking and getting drunk) (Caetano et al., 2003; Shin et al., 2009; Timko et al., 2008), or poor mental health (e.g., depression and anxiety) (Cogle et al., 2010; Molnar et al., 2001; Tyler, 2002).

Indiscriminant Sexual Behaviors

Prior studies have highlighted that indiscriminant sexual behaviors can result in increased risks of sexually transmitted infections including HIV, and/or unintended pregnancies (Adimora et al., 2002; Santelli, Lowry, Brener, & Robin, 2000; von

Sternberg et al., 2012). Research reports that women who experienced childhood sexual or physical violence (Hillis et al., 2001; Senn et al., 2007), greater levels of problem alcohol use (J. L. Brown & Venable, 2007; Cooper, 2002), and greater levels of depressive symptomatology (Mazzaferro et al., 2006; A. G. Rubin et al., 2009) are more likely to engage in indiscriminant sexual behaviors compared to women without such experiences.

Problem Alcohol Use and Depressive Symptoms

Both problem alcohol use and depressive symptoms have been examined as (a) a predictor of indiscriminant sexual behaviors (J. L. Brown & Venable, 2007; Santelli et al., 2001; von Sternberg et al., 2012) and (b) a result of childhood sexual or physical violence (Caetano et al., 2003; Goldstein et al., 2013; Kaukinen & DeMaris, 2005; Timko et al., 2008). First, research showed adverse influences of problem alcohol use and depressive symptoms on young women's indiscriminant sexual behaviors (Cooper, 2002; Santelli et al., 2001; von Sternberg et al., 2012). For example, women who engage in indiscriminant sexual behaviors are more likely to have engaged in binge drinking, to have alcohol related problems, and/or to have greater levels of depressive symptoms than women who do not engage in indiscriminant sexual behaviors. Second, studies suggested problem alcohol use and depressive symptoms as consequences of childhood sexual or physical violence (Sartor et al., 2012; Shin et al., 2009; M. P. Thompson et al., 2004; Timko et al., 2008). For example, women with childhood experiences of sexual or physical violence are more likely to drink heavily, have more alcohol problems, abuse alcohol, and/or have greater levels of depressive symptoms than women without such experiences.

Furthermore, prior studies have reported a significantly positive association between problem alcohol use and depressive symptoms (Marmorstein, 2010; Petrakis et al., 2002).

Conceptual Framework of Racial/Ethnic Considerations

Various theories have been used to explain the negative consequences of adverse childhood experiences of people from different racial and ethnic backgrounds. One is the racial invariance model (Sampson & Bean, 2006), in which people with adverse experience are expected to show similar negative consequences regardless of their racial/ethnic backgrounds. This model argues that the impact of social influences on negative consequences due to childhood adverse experiences should be similar across race/ethnicity when individuals are exposed to similar social circumstances and risk factors (Sampson & Bean, 2006). Previous studies have supported the racial invariance model in terms of the relationship between childhood sexual or physical violence experience, problem alcohol use, and depressive symptoms among women (Caetano et al., 2003; Needham, 2007). Second is the double jeopardy model that suggests the negative effects of adverse childhood experiences will be significantly greater for African Americans (McLeod & Owens, 2004; Pearlin et al., 2005). This model posits that the effects of childhood adverse experiences are compounded by experiences of racism and exposure to other forms of victimization and violence (Wyatt, 1990). Support for the double jeopardy model is found in examination of indiscriminate sexual behaviors, with research indicating that African American women are more likely to engage in these behaviors than White women (Adimora et al., 2002; Adimora et al., 2011). Third is the resilience model, which argues that the negative consequences of adverse childhood

experiences will be significantly smaller for African Americans due to resilience developed by living in environments with more stressors (e.g., low socioeconomic status, higher crime rates) and experiencing cultural factors (e.g., supportive kinship networks, religion) that buffer against the effects of adverse childhood experiences (French et al., 2002; Watt, 2008; Widom et al., 2013).

Current Study

The purpose of this study is to examine (a) whether problem alcohol use and depressive symptoms mediate the relationship between childhood sexual or physical violence and indiscriminant sexual behaviors, and (b) whether the proposed mechanisms are different for White and African American women. Previous studies have examined the effects of childhood sexual or physical violence on negative consequences for young women including problem alcohol use (Caetano et al., 2003; Grayson & Nolen-Hoeksema, 2005; Sartor et al., 2012), depressive symptoms (Kaukinen & DeMaris, 2005; Molnar et al., 2001; Timko et al., 2008), and indiscriminant sexual behaviors (Lemieux & Byers, 2008; Merrill et al., 2003; Senn et al., 2007). However, little is known about the mechanisms by which childhood sexual or physical violence increases the likelihood of indiscriminant sexual behaviors in adulthood. Understanding of the effects of problem alcohol use and depressive symptoms on the relationship between childhood sexual or physical violence and indiscriminant sexual behaviors is also limited. In addition, research that examines racial/ethnic differences on the mechanisms is even more scarce, which impedes the development of appropriate prevention and treatment programs.

Methods

Data and Sample

The data used for this study are from the 2007-2008 National Longitudinal Study of Adolescent Health (Add Health), publicly released through the Interuniversity Consortium for Political and Social Research (Harris & Udry, 2011). A random sample of adolescents in grades 7-12 who completed in-school interviews were surveyed between 1994 and 1995 at home (wave 1) and followed into young adulthood (aged 24-32 at wave 4) with three additional follow-up interviews (waves 2 through 4). Of the 6,504 adolescents in the in-home sample, 5,114 (78.63%) remained in the study in 2007-2008 (wave 4). Within this subgroup, 2,761 (53.99%) were women. This study excluded women without valid sample weights ($n=904$) in order to provide nationally representative estimates (Chantala & Tabor, 1999). Women with Hispanic ($n=186$) or other racial/ethnic origin ($n=75$) were also excluded due to the small sample size available for multigroup analysis. Of the remaining 1,596 women, women who are not sexually active (had not had oral sex, or vaginal or anal intercourse) ($n=67$) and women with missing information on risky sexual behaviors ($n=184$) or childhood sexual or physical violence ($n=7$) were further eliminated. The final sample for this study was 1,388 women including 1,021 non-Hispanic White (White) women and 367 non-Hispanic African American (African American) women in the in-home sample at wave 4. This study was approved by the Institutional Review Board at the University of Texas at Austin.

Of the total 1,388 women in the study sample, 19.52 percent ($n=271$) women experienced sexual or physical violence before their 18th birthday. Approximately 41.64 percent ($n=578$) of the total sample have college graduation or higher degree, followed by some college ($n=450$, 32.42%), a high school degree ($n=273$, 19.74%), and less than a high school degree ($n=87$, 6.27%). The mean age of the sample was 27.7 years old ($SE=0.12$). Slightly over half of the total sample was married or cohabiting with a partner ($n=721$, 51.94%) at the time of survey.

Measures

Dependent Variable. The dependent variable, indiscriminant sexual behaviors, was operationalized as having had multiple sexual partners. Respondent were asked: “In the past 12 months, did you have sex with more than one partner at around the same time?” The response produced a dichotomous variable, “yes (=1)” or “no (=0)”.

Independent variable. The independent variable, childhood sexual or physical violence experience, was created based on the response to the following two questions; “Before your 18th birthday, how often did a parent or adult caregiver hit you with a fist, kick you, or throw you down on the floor, into a wall, or down stairs?” and “how often did a parent or other adult caregiver touch you in a sexual way, force you to touch him or her in a sexual way, or force you to have sexual relations?” Both questions were ordinal variables with a range between 0 (*this has never happened*) and 5 (*more than ten times*). Women were considered to have experience of childhood sexual or physical violence if they reported one or more experiences for either question.

Mediating variables. Mediating variables were problem alcohol use and levels of depressive symptoms. Problem alcohol use, a latent factor, was measured using six ordinal items. Two items measure drinking frequency and four items examined problems related to drinking behavior consistent with prior research using Add Health data (Swahn & Donovan, 2005; M. P. Thompson et al., 2008). The drinking frequency items were frequency of binge drinking episodes (≥ 5 drinks in a row) and frequency of getting drunk during the past 12 month. Both frequency items had six response categories (0=*none* to 6=*every day or almost every day*). The alcohol problems items included problems with people, problems at school or work, legal problems, and putting oneself in a risky situation. All four items had three response categories (0=*never*, 1=*1 time*, 2=*more than 1 time*). For the bivariate analyses, three dichotomous variables (0=*no*, 1=*yes*) were created from these questions; binge drinking, getting drunk, experience of any problems related to alcohol. Calculated scores of problem alcohol use ranged from 0 to 3.

Depressive symptoms, another latent factor, were measured by the 11-item Center for Epidemiologic Studies Depression Scale (CES-D) (Radloff, 1977). The CES-D evaluates depressive symptoms within the last week from the time of the scale was administered, with each item having four response categories (0=*rarely or none of the time*, 1=*some or a little of the time*, 2=*occasionally or a moderate amount of time*, 3=*most or all of the time*). Question items included “I felt depressed”, “I felt that people disliked me”, and “I felt that I was too tired to do things.” The total CES-D score, calculated for the bivariate analyses, ranged between 0 and 33 with high scores representing greater depressive symptoms. Cronbach’s alpha was .84.

Covariates. Measures of age, marital status, education attainment, and personal income were also included. Marital status was dichotomized based on the response to the question, “are you currently married to (cohabiting with) the partner?” Levels of education attainment, originally consisting of 13 categories, were collapsed into four categories: less than high school, high school graduate, some college, or college or higher education. Personal income, measured by respondent’s personal earnings before taxes, was log-transformed due to non-normality.

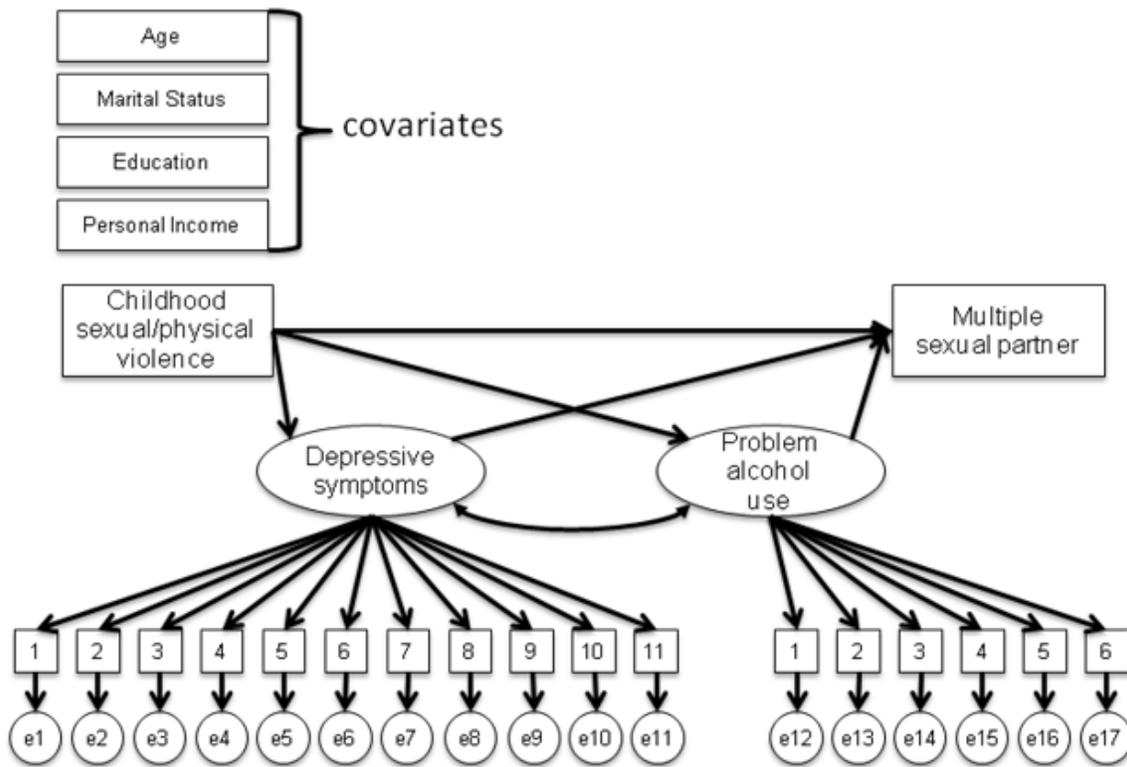


Figure 4.1. Full model examining pathways from childhood sexual or physical violence to multiple sexual partners

Statistical Analysis

Three levels of analyses were performed for this study. First, chi-square and *t*-tests were conducted to examine bivariate relationships between the independent variables (childhood violence experience, depressive symptoms, problem alcohol use) and having multiple sexual partners. All bivariate analyses were performed using the SAS version 9.2 (SAS Institute Inc) taking into account the clustered sample design and weighting.

Second, structural equation modeling (SEM) was used to test the conceptual path model between childhood experiences of sexual/physical violence and multiple sexual partners (see Figure 4.1). This study chose SEM because it provides a comprehensive approach to test complex mediation models in a parsimonious manner over multiple regression analyses (Goldsmith et al., 2009). SEM is often employed for theory building (Kline, 2005) and also strengthen the accuracy of the model estimation by correcting for measurement errors and residual errors (Byrne, 2001).

With respect to the process of multigroup SEM, first, the proposed SEM model was tested with the entire sample. Second, the same model was then used to test the samples of White and African American women separately to establish baseline model fit and examine structural differences for the two groups. Third, using both White and African American women, a multigroup SEM was performed to test where structural path differences occurred. The multigroup SEM model compares overall model paths between an unconstrained model for the two groups and a model with constrained-to-be-equal parameters between the two groups (L. Muthén & Muthén, 2010). This study examined

whether there were significant chi-square differences between the unconstrained model and the constrained-to-be-equal model. A significant chi-square difference indicates that the overall model path coefficients are non-invariant (not the same) between groups. If non-invariance is found in the overall model, this study then conducted a process of constraining each of the components (e.g., factor loadings and path covariance) to determine statistically where the non-invariance occurred.

Model fit statistics, such as root mean square of error approximation (RMSEA) and comparable fit indices (CFI), were utilized to assess whether the predicted relationships in the model fit the actual data (Byrne, 2001). Studies examining model fit statistics suggest cut-off values for “good” fit to be at 0.96 or greater for CFI and TLI and less than 0.05 for RMSEA (L. Muthén & Muthén, 2010; Yu, 2002). All SEM analyses were conducted using Mplus version 6.21 (L. Muthén & Muthén, 2010), taking into account the clustered sample design and weighting.

Results

Bivariate Results

As Table 4.1 shows, women with childhood experiences of sexual or physical violence were more likely to have multiple sexual partners ($\chi^2(1, 1,183) = 45.19, p < .001$), greater problem alcohol use ($t(129) = 2.46, p < .05$), and higher levels of depressive symptoms ($t(129) = 6.21, p < .001$) than women who had not experienced sexual or physical violence in childhood. In addition, Table 4.2 showed that problem alcohol use ($t(129) = 6.12, p < .001$) and level of depressive symptoms ($t(129) = 4.77, p < .001$) were significantly related to having multiple sexual partners.

Table 4.1

*Sample Characteristics by Childhood Experiences of Sexual or Physical Violence**(Weighted Means)*

	Total Sample (N=1,388)		Childhood Sexual/Physical Violence (n=271)		No Childhood Sexual/Physical Violence (n=1,117)		χ^2
	Freq	(%)	Freq	(%)	Freq	(%)	
Indiscriminant sexual behaviors							
Multiple sexual partners	172	(12.39)	47	(17.34)	125	(11.19)	7.93**
Married	721	(51.95)	123	(45.39)	598	(53.54)	3.71
African American	367	(26.44)	65	(23.99)	302	(27.04)	3.33
Education attainment							
< High school	87	(6.27)	24	(8.86)	63	(5.64)	19.83*
High school	273	(19.67)	52	(19.19)	221	(19.79)	*
Some college	450	(32.42)	111	(40.96)	339	(30.35)	
≥College graduated	578	(41.64)	84	(31.00)	494	(44.23)	
	<i>M</i>	<i>(SE)</i>	<i>M</i>	<i>(SE)</i>	<i>M</i>	<i>(SE)</i>	<i>t</i>
Age	27.76	(0.12)	27.83	(0.13)	27.74	(0.12)	0.81
Personal income (log-transformed)	9.05	(0.10)	9.03	(0.19)	9.06	(0.11)	-0.17
Depressive symptoms	7.31	(0.17)	9.41	(0.40)	6.79	(0.18)	6.21** *
Problem alcohol use	1.36	(0.05)	1.53	(0.08)	1.31	(0.05)	2.46*

*p < .05. ** p < .01. ***p < .001.

Table 4.2

Sample Characteristics by Indiscriminant Sexual Behaviors (Weighted Means)

	Total Sample (N=1388)		Multiple Sexual Partners (n=172)		No Multiple Sexual Partners (n=1216)		χ^2
	Freq	(%)	Freq	(%)	Freq	(%)	
Childhood sexual/physical violence	271	(19.52)	47	(27.33)	224	(18.42)	7.93**
Married	721	(51.95)	37	(21.51)	684	(56.25)	76.14***
African American	367	(26.44)	51	(29.65)	316	(25.99)	0.002
Education attainment							
< High school	87	(6.27)	12	(6.98)	75	(6.17)	4.42
High school	273	(19.67)	34	(19.77)	239	(19.65)	
Some college	450	(32.42)	65	(37.79)	385	(31.66)	
≥College graduated	578	(41.64)	61	(35.47)	517	(42.52)	
	<i>M</i>	<i>(SE)</i>	<i>M</i>	<i>(SE)</i>	<i>M</i>	<i>(SE)</i>	<i>t</i>
Age	27.76	(0.12)	27.46	(0.20)	27.81	(0.12)	-2.02*
Personal income (log- transformed)	9.05	(0.10)	9.59	(0.17)	8.97	(0.11)	3.17**
Depressive symptoms	7.31	(0.17)	9.59	(0.48)	6.98	(0.18)	4.77***
Problem alcohol use	1.36	(0.05)	1.92	(0.09)	1.27	(0.05)	6.12***

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

Structural Equation Model of Total Sample

To examine the overall fit of the proposed model, the model was first tested with the total sample. The proposed model showed a good fit of the data, $\chi^2(248, 1,388) = 590.02, p < .001$, RMSEA=.032, CFI=.967, TLI=.962. The structural model explained 25.0 percent of the total variance in reported multiple sexual partners. Path coefficients ranged from .05 to .26. The standardized path coefficients and *R* squares are presented in Figure 4.2. Controlling for individual sociodemographic characteristics, having experienced sexual or physical violence in childhood had a direct effect on problem alcohol use ($\beta = .16, p < .01$) and depressive symptoms ($\beta = .26, p < .001$). In addition, levels of problem alcohol use and depressive symptoms were significantly associated

with each other ($\beta = .12, p < .001$). Problem alcohol use and depressive symptoms mediated the relationship between childhood sexual or physical violence and multiple sexual partners (indirect effect = $.16 \times .26 = .04, p < .05$; indirect effect = $.26 \times .15 = .04, p < .001$, respectively). Thus, the model suggests that women who experienced childhood sexual or physical violence are more likely to have greater levels of problem alcohol use and higher levels of depressive symptoms. The increased problem alcohol use and depressive symptoms increased the likelihood of having multiple sexual partners.

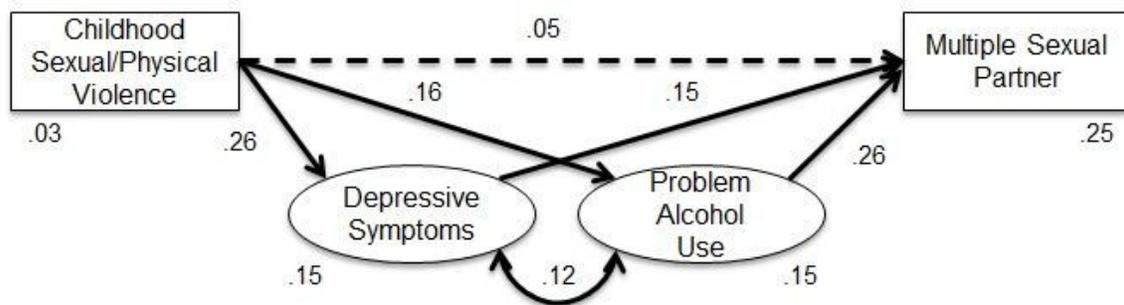


Figure 4.2. Structural model with standardized path coefficients of total sample ($N=1,388$)

Structural Differences between White and African American Women

To examine the structural differences between White and African American women, separate SEM models were tested with each group to determine whether the same structure model would be appropriate across the two groups. The proposed model showed a good fit of the data for White women, $\chi^2(246, 1,021) = 433.55, p < .001$, RMSEA=.027, CFI=.976, TLI=.973 and African American women, $\chi^2(246, 367) = 414.12, p < .001$, RMSEA=.043, CFI=.971, TLI=.967. As Figure 4.3 shows, in general, both White and African American women followed the similar paths from childhood sexual or physical violence to having multiple sexual partners. However, relationships

between problem alcohol use and having multiple sexual partners and between depressive symptoms and problem alcohol use were not statistically significant for African American women.

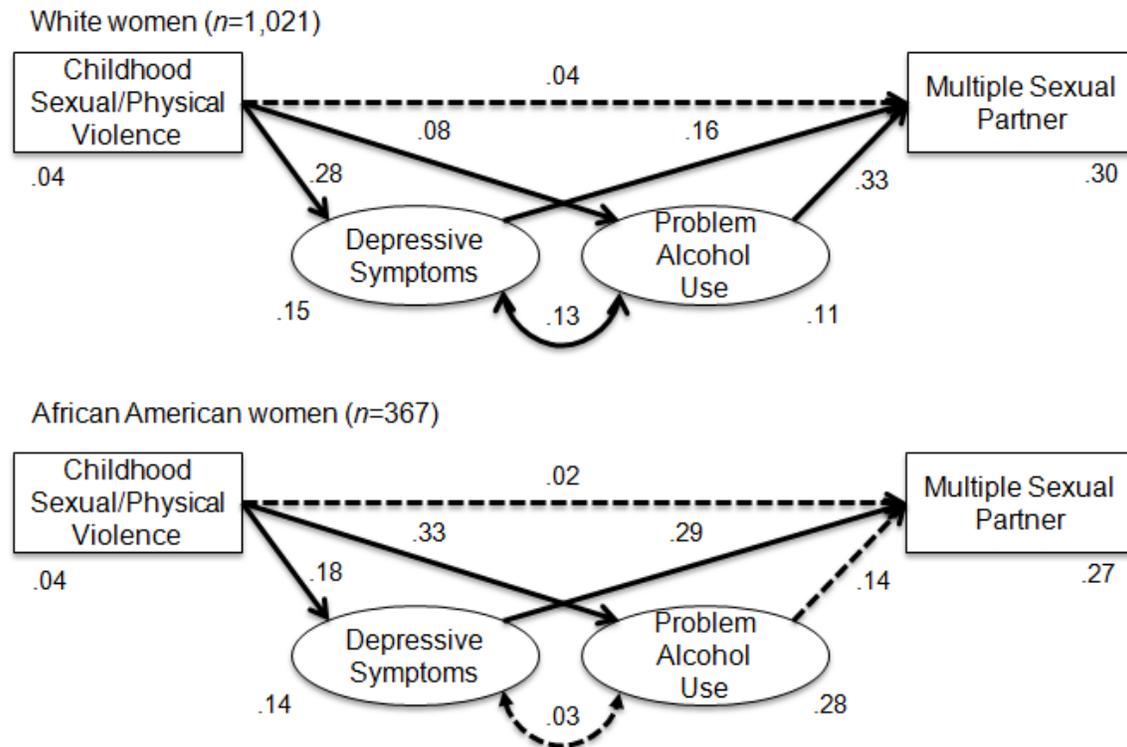


Figure 4.3. Structural model with standardized path coefficients of White and African American women

Multigroup SEM

To examine overall model path differences between White and African American women, a multigroup SEM was conducted using both groups (See Table 4.3). Overall model fit of the constrained-to-be-equal SEM showed a good fit of the data, $\chi^2(567, 1,388) = 995.70, p < .001, RMSEA = .033, CFI = .974, TLI = .972$. A chi-square difference test between the unconstrained ($\chi^2(526, 1,388) = 927.68, p < .001$) and constrained-to-be-

equal models was conducted, which indicated that the model differs significantly between White and African American women, $\Delta \chi^2(41, 1,388) = 68.03, p < .01$. From the process of constraining each of the path covariance and factor loadings, this study found that White and African American women showed significantly different path coefficient from the childhood sexual or physical violence to problem alcohol use, $\Delta \chi^2(1, 1,388) = 6.15, p < .05$. In addition, significant different factor loadings on levels of depressive symptoms were also found between White and African American women.

Table 4.3

Chi-square Difference Test Results for Multigroup SEM

	χ^2	<i>df</i>	$\Delta\chi^2$	Δdf	P_{diff}
Unconstrained model	927.68	526			
Constrained measurement model ^a	966.40	545	38.72	19	.005
Constrained structural model ^a	979.95	552	52.27	26	.002
Fully constrained model ^a	995.70	567	68.03	41	.005
Free childhood violence- problem alcohol use ^b	989.55	566	6.15	1	.013
Free childhood violence- depressive symptoms	993.92	566	1.79	1	.181
Free multiple sexual partner-problem alcohol use	993.30	566	2.41	1	.121
Free multiple sexual partner-depressive symptoms	998.47	566	2.77	1	.096
Free multiple sexual partners-childhood violence	999.06	566	3.35	1	.067
Free problem alcohol use with depressive symptoms	993.44	566	2.27	1	.132
Free episodes of getting drunk	992.98	566	2.72	1	.099
Free episodes of binge drinking	993.18	566	2.53	1	.112
Free problem alcohol use item 1	992.41	566	3.29	1	.070
Free problem alcohol use item 2	993.93	566	1.77	1	.183
Free problem alcohol use item 3	996.32	566	0.62	1	.431
Free problem alcohol use item 4	995.28	566	0.43	1	.514
Free depressive symptoms item 1	988.89	566	6.82	1	.009
Free depressive symptoms item 2	992.86	566	2.84	1	.092
Free depressive symptoms item 3	994.34	566	1.36	1	.244
Free depressive symptoms item 4	993.38	566	2.32	1	.128
Free depressive symptoms item 5	984.29	566	11.42	1	<.001
Free depressive symptoms item 6	993.48	566	2.22	1	.136
Free depressive symptoms item 7	993.74	566	1.96	1	.161
Free depressive symptoms item 8	994.24	566	1.47	1	.226
Free depressive symptoms item 9	996.79	566	1.08	1	.298
Free depressive symptoms item 10	993.65	566	2.05	1	.152
Free depressive symptoms item 11	989.92	566	5.78	1	.016

a. Chi-square difference tests were conducted between unconstrained model and constrained models.

b. From this row, chi-square difference tests were conducted between fully constrained model and partially constrained models.

Discussion

This study examined pathways from childhood sexual or physical violence experience to indiscriminant sexual behaviors, operationalized as multiple sexual partners among young White and African American women. This study is unique in that it examines differences in pathways by race/ethnicity. Bivariate analyses indicated that childhood violence experiences, problem alcohol use, depressive symptoms, and having multiple sexual partners were significantly related to each other. These associations were also found in the SEM model with the total sample. Women with childhood experiences of sexual or physical violence were more likely to have greater levels of problem alcohol use and depressive symptoms. Problem alcohol use and depressive symptoms increased the likelihood of having multiple sexual partners. These findings have consistently been shown in previous studies (J. L. Brown & Vanable, 2007; Lemieux & Byers, 2008; Timko et al., 2008).

However, the multigroup SEM analysis in the current study suggests different structures and path coefficients for White and African American. For African American women, increased levels of problem alcohol use among women with childhood experiences of sexual or physical violence was not associated with an increased likelihood of having multiple sexual partners, while White women with increased levels of problem alcohol use and childhood experiences of sexual or physical violence were at significant increased risk for having multiple sexual partners. In addition, while White women showed a significant association between problem alcohol use and depressive symptoms, African American women did not show the association between them. This

finding support the resiliency model that suggests African American women are more resilient, perhaps due to living in environments with multiple stressors (e.g., poverty, violence, and discrimination) and a supportive culture (e.g., religion and supportive kinship networks) that buffer against the effects of adverse childhood experience on indiscriminant sexual behaviors (French et al., 2002; Watt, 2008; Widom et al., 2013). In addition, Mennen (1995) also found that White girls experience a longer duration of abuse than their African-American peers, a factor which could not be tested in the current study. Different findings between African American and White women may be due to the smaller sample size of African American women. Thus, future studies should include the duration of childhood sexual or physical violence and increase the sample size of African American women in examining the relationships between childhood violence experience and indiscriminant sexual behaviors.

Another limitation of this study is that the analyses relied heavily on self-reported data. Despite using reliable, validated scales, self-reported data can be problematic due to non-response bias, under or over-estimating one's behaviors or providing socially desirable answers on questions about depression and drinking behaviors. Since childhood experiences of sexual or physical violence was measured retrospectively, this study may also have recall bias. In addition, this study utilized cross-sectional design, so it is difficult to explain causal relationship between childhood experiences of sexual or physical violence, problem alcohol use, depressive symptoms, and indiscriminant sexual behaviors.

Additionally, this study does not fully capture the dynamics of pathways of diverse racial/ethnic groups. Even though Add Health includes diverse race and ethnic groups, women of Hispanic, Asian and Pacific Islanders, and other race were not included due to the small sample size. Future studies with more diverse racial/ethnic groups are needed to increase insight in to pathways by race/ethnicity. Findings will be useful for practitioners to gain a better perspective on the racial/ethnic differences in relationships between childhood sexual or physical violence, problems alcohol use, depressive symptoms, and indiscriminant sexual behaviors. These will, in turn, provide practitioners evidence to develop culturally specific prevention and treatment programs for women with childhood experiences of sexual or physical violence.

Clinical Implications

Despite these limitations, this study adds to the literature on risk factors associated with indiscriminant sexual behaviors and effectively illustrates the vulnerability of survivors of childhood sexual or physical violence for having multiple sexual partners. It also highlights the importance of providing targeted treatment to survivors of childhood sexual or physical violence in order to limit the negative consequences they experience, including excessive alcohol use, poorer mental health, and indiscriminant sexual behaviors (Hillis et al., 2001; Timko et al., 2008; Tyler, 2002). This study also increases the understandings of racial/ethnic differences on these associations. Effective and targeted screening, intervention, and referrals are necessary. In addition, women receiving services for sexual or physical violence should be provided information on their risks for indiscriminant sexual behaviors, and how to decrease these risks.

Services targeting children exposed to childhood abuse are especially critical to reduce the personal and social burden associated with the long-term negative consequences (e.g., development of problem alcohol use, depressive symptoms, and indiscriminant sexual behaviors) in later life. These services, which require increased collaboration, cross-training, and information-sharing between health care and childhood violence service providers, are essential to prevent the negative outcomes of women who experienced childhood sexual or physical violence.

Chapter 5. Conclusion

Summary of Findings

This study examined (a) heterogeneous growth trajectories of problem alcohol use behaviors during the transition from adolescents to young adulthood and impacts of childhood experiences of sexual/physical violence on problem alcohol use trajectories, (b) the longitudinal impacts of childhood experiences of sexual or physical violence on subsequent development of problem alcohol use and depressive symptoms, and (c) the structural associations between childhood experiences of sexual/physical violence, problem alcohol use, depressive symptoms and indiscriminant sexual behaviors. This study also examined racial/ethnic differences in these associations between White and African American Women.

The first paper, “*Trajectories of problem alcohol use during the transition from adolescence to young adulthood: Latent class growth modeling*”, identified four heterogeneous trajectories of problem alcohol use among women during their transition from adolescence to young adulthood: (a) stable abstainers; (b) decliners whose problem alcohol use decreased from moderate to low; (c) incliners whose problem alcohol use increased from low to moderate; and (d) incliners whose problem alcohol use increased most radically from low to high. This study found that women with experiences of childhood sexual or physical violence were more likely to be in the group that started low, but rapidly increased to high levels of problem alcohol use than in the groups of abstainers (support Hypothesis 1.1).

This study also explored racial/ethnic differences in problem alcohol use trajectories and the association between experiences of childhood sexual or physical violence and latent class membership of problem alcohol users. First with respect to differences in problem alcohol use trajectories, as expected, White women are more likely to be in the high risk subgroups of problem alcohol use trajectories, a class of rapidly increased from low to high levels of problem alcohol use, than African American women (support Hypothesis 1.2). Second, with respect to racial/ethnic differences in the association between childhood sexual or physical violence and problem alcohol use trajectories membership, this study found that, among White women, women with childhood sexual or physical violence experience were more likely to be in the group of rapidly increased to high levels of problem alcohol use (support Hypothesis 1.3). However, this study could not find the significant differences in membership of problem alcohol use trajectories by childhood sexual or physical violence experience among African American women (reject Hypothesis 1.4).

The second paper, *“Longitudinal effects of childhood sexual or physical violence on subsequent development of problem alcohol use and depressive symptoms of White and African American women”*, examined racial/ethnic differences in effects of childhood sexual or physical violence on problem alcohol use and depressive symptoms during the transition from adolescence to young adulthood among White and African American women. Findings from this study suggest similar as well as different associations between White and African American women on the impact of childhood sexual or physical violence on subsequent development of problem alcohol use and depressive

symptoms. First, this study found no racial/ethnic difference in the effect of childhood experiences of sexual or physical violence on levels of depressive symptoms during adolescence. For both racial/ethnic groups of women, childhood sexual or physical violence increased the levels of depressive symptoms in adolescence (support hypotheses 2.1.3 and 2.2.3). An important finding is that the increased levels of depressive symptoms continued and also progressed into young adulthood (support hypotheses 2.1.4 and 2.2.4).

Furthermore, this study found racial/ethnic differences in several associations. First, the current study found that the associations between childhood sexual or physical violence and problem alcohol use are different for White and African American women. Negative effects of childhood sexual or physical violence were salient for White women. More specifically, for White women, childhood sexual or physical violence increased the risk of problem alcohol use directly in adolescence and young adulthood (support Hypothesis 2.1.1). Increased levels of problem alcohol use in adolescence continued to young adulthood for White women (support Hypothesis 2.1.2). However, for African American women, childhood sexual or physical violence increased the risk of problem alcohol use only in adolescence (support Hypothesis 2.2.1). Unlike White women, increased levels of problem alcohol use of African American women did not continue to young adulthood (reject Hypothesis 2.2.2). Second, there were racial/ethnic differences in comorbid associations between problem alcohol use and levels of depressive symptoms across time. Co-occurring phenomenon between problem alcohol use and levels of depressive symptoms were consistently observed during the transition from adolescence to young adulthood for White women (support Hypotheses 2.1.5 and 2.1.6), while this

associations was found only during adolescence for African American women (support Hypothesis 2.2.5 and reject Hypothesis 2.2.6).

The third paper, “*Childhood Sexual/Physical Violence, Problem Alcohol use, Depressive Symptoms, and Indiscriminant Sexual Behaviors of Young White and African American Women: A Multigroup Structural Equation Modeling Approach*”, examined pathways from childhood experiences of sexual or physical violence to indiscriminant sexual behaviors operationalized as multiple sexual partners among young White and African American women. Using the SEM model with the total sample, findings indicate that women who experienced childhood sexual or physical violence were more likely to engage in indiscriminant sexual behaviors in young adulthood (support Hypothesis 3.1). Women with experiences of childhood sexual or physical violence were also more likely to have greater levels of problem alcohol use and depressive symptoms (support Hypothesis 3.2). Increased levels of problem alcohol use and depressive symptoms as a result of childhood experiences of sexual or physical violence increased the likelihood of having multiple sexual partners (support Hypothesis 3.4). In addition, greater levels of alcohol use were significantly associated with greater levels of depressive symptoms in young adulthood (support Hypothesis 3.3).

However, the multigroup SEM analysis in the current study suggests different structures and path coefficients for White and African American women (support Hypothesis 3.5). For African American women, increased levels of problem alcohol use among women with childhood sexual or physical violence was not associated with an increased likelihood of having multiple sexual partners, while White women with

increased levels of problem alcohol use and childhood sexual or physical violence were at significant increased risk for having multiple sexual partners. In addition, while White women showed an association between problem alcohol use and depressive symptoms, African American women did not demonstrate the association between them.

First, with regard to the theoretical framework of this study, all three papers support the tension reduction hypothesis (Conger, 1956). As expected, women who experienced childhood sexual or physical violence showed increased tension, such as high levels of depressive symptoms (Caetano et al., 2003; Grayson & Nolen-Hoeksema, 2005; Miranda et al., 2002). In all three papers, women with experiences of childhood sexual or physical violence were more likely to show greater levels of problem alcohol use during the transition from adolescence to young adulthood. As the tension reduction hypothesis suggests, this findings shows that women engage in problem alcohol use to self-medicate or cope with their negative feelings (e.g., depressive symptoms) caused by childhood sexual or physical violence (Grayson & Nolen-Hoeksema, 2005; Miranda et al., 2002).

Second, with respect to racial/ethnic differences, this study supports the resilience model that argues that the negative consequences of adverse childhood experiences are significantly smaller for African Americans (French et al., 2002; Widom et al., 2013). In all three papers, the significant impact of childhood sexual or physical violence on problem alcohol use and levels of depressive symptoms was particularly greater for White women than African American women, even though this study found no racial/ethnic differences in the association between childhood sexual or physical violence

and levels of depressive symptoms. The resilience model explains that African Americans develop resilience through living in environments with more stressors (e.g., low SES and higher crime rates) and experiencing cultural factors (e.g., supportive kinship networks and religion) that buffer against the effects of adverse childhood experience (French et al., 2002; Watt, 2008; Widom et al., 2013). Previous studies have supported this model in terms of the impact of experiences of childhood sexual or physical violence on problem alcohol use and levels of depressive symptoms (Harris et al., 2006; Kaukinen & DeMaris, 2005).

Racial/ethnic differences in the association between experiences of childhood sexual or physical violence, problem alcohol use, and levels of depressive symptoms may be due to African American women using less alcohol than White women (National Institute on Alcohol Abuse and Alcoholism, 2009), or may be because White women experience childhood sexual or physical violence longer than African American women (Mennen, 1995). Additionally, greater effects of childhood sexual or physical violence on problem alcohol use and levels of depressive symptoms may also be due to other psychiatric disorders that were not fully examined in the current study (McCarty et al., 2012; Widom et al., 2013). Previous studies have reported that adolescents with childhood sexual or physical violence have an increased chance of experiencing psychiatric disorders (e.g., PTSD and conduct disorder) than adolescents without childhood sexual or physical violence. However, the increased extent of psychiatric disorders is greater for White adolescents than African American adolescents (Widom et al., 2013). Therefore, compared to African American women, White women's increased

psychiatric disorders associated with childhood sexual or physical violence and its associations with problem alcohol use and levels of depressive symptoms may linger for a longer time, thus effects persist longer into young adulthood.

Furthermore, racial/ethnic differences in the association between childhood sexual or physical violence, problem alcohol use, and levels of depressive symptoms may also be due to peers' drinking behaviors and levels of deviant behaviors presented differently between White and African American Adolescents (Ludden & Eccles, 2007; Watt & Rogers, 2007). Specifically, African American adolescents are less likely to be influenced by peers drinking behaviors (Watt & Rogers, 2007) compared to White adolescents. In addition, using the national representative sample of women, Dauber et al. (2011) stated that peer relationships had a greater impact for developing problem alcohol use for White women, while family relationships influence subsequent problem alcohol use for African American women.

The three papers provided somewhat inconsistent findings in the associations between experiences of childhood sexual or physical violence and problem alcohol use for African American women. In the first two papers that utilized waves 1, 2, and 3 Add Health data, significant association was not found between childhood sexual or physical violence and problem alcohol use during the transition from adolescence to young adulthood for African American women. In addition, the second paper also found a negative association between childhood sexual or physical violence and problem alcohol use in later adolescence (wave 2). However, the SEM paper found that African American

women with experiences of childhood sexual or physical violence were more likely to engage in problem alcohol use in young adulthood.

These findings may be due to the revictimization experiences (Arata, 2002; Barnes et al., 2009; Ullman & Najdowski, 2009) and psychiatric comorbidities (Bulik et al., 2001; J. G. Green et al., 2010; MacMillan et al., 2001). Specifically, women who experienced childhood sexual or physical violence are more likely to be a victim of other violence in later life such as intimate partner violence (Caetano et al., 2003). In this regard, this study utilized slightly different measures of childhood sexual or physical violence experiences. The first two papers measured childhood sexual or physical violence before women started 7th grade and the last paper measured it before their 18th birthday. Thus, women who experienced sexual or physical violence before they started 7th grade may have experienced another sexual or physical violence before their 18th birthday.

Another possibility is the psychiatric comorbidity between problem alcohol use and psychiatric disorders (e.g., anxiety, depression, and conduct disorders). The second paper found that increased depressive symptoms due to experiences of childhood sexual or physical violence continued into young adulthood for African American women. As mentioned, previous studies reported comorbidity between depressive symptoms and other types of psychiatric disorders and between psychiatric disorders and problem alcohol use. Thus, other types of psychiatric disorders that this study could not address may play a role in increased levels of problem alcohol use in young adulthood measured at wave 4.

Limitation and Future Studies

Limitations of this study are that the analyses of all three papers relied heavily on self-reported data that has potential reliability issues including non-response issues, under or over-estimation of individuals' health conditions, or possible socially desirable answers on their perceived drinking behaviors. This study may also have recall bias since we utilized retrospectively measured childhood sexual or physical violence, as women may experience difficulty in fully remembering the time when childhood violence occurred or any suppression attempts to forget about such incidences.

Additionally, this study has limitations in measures. First, this study follows the definition of a standard drink of Add Health that measured as a glass of wine, a can of beer, a wine cooler, a shot glass or liquor, or a mixed drink. Add Health does not provide standard of a single standard drink in detail as NIAAA provides. In addition, the definition of a standard drink is slightly different by countries and has changed over time. Thus, this study may underestimate or overestimate the quantity of alcohol use. Second, with respect to measure women's binge drinking episodes, this study utilized the definition of binge drinking as having five or more drinks on one occasion because Add Health data utilizes criteria of ≥ 5 drinks per occasion for measuring numbers of days of binge drinking episodes. Thus, this study may underestimate binge drinking episodes. Third, an episode of getting drunk was calculated from as a question: "over the past 12 months, on how many days have you gotten drunk or "very, very high" on alcohol?" This question does not provide clear definition of episodes of getting drunk. Thus, this study may underestimate or overestimate the experience of gotten drunk. Finally, this study

defined childhood experiences of sexual or physical violence using the following two questions: “how often did a parent or adult caregiver hit you with a fist, kick you, or throw you down on the floor, into a wall, or down stairs?” and “how often did a parent or other adult caregiver touch you in a sexual way, force you to touch him or her in a sexual way, or force you to have sexual relations?” These questions are not inclusive of childhood experiences of sexual or physical violence by other types of perpetrators such as neighbors, friends, or the unknown. Thus, this study may underestimate the experiences of childhood sexual or physical violence.

Moreover, this study, due to sample size issue, was not able to fully capture all racial/ethnic groups in learning about the associations between experiences of childhood sexual or physical violence, problem alcohol use, and levels of depressive symptoms. Since previous studies have reported that levels of depressive symptoms are higher among Hispanic females than white or African American females (McLaughlin et al., 2007; McLeod & Owens, 2004), future studies may incorporate Hispanic females.

Given that studies suggest adverse effects of long-term problem alcohol use on health outcomes for women, such as risky sexual behaviors (e.g., no contraceptive use and STDs) (J. L. Brown & Venable, 2007; Cooper, 2002), revictimization (McKinney, Caetano, Ramisetty-Mikler, & Nelson, 2009; Ullman & Najdowski, 2009), and/or pregnancy outcomes (e.g., unintended pregnancy and FASD) (Barr & Streissguth, 2001; Naimi, Lipscomb, Brewer, & Gilbert, 2003), studies examining health outcomes of problem alcohol use in regards to the association with childhood sexual or physical violence are suggested to improve current understanding of this relationship.

Implications

The findings of three papers of this study highlight the importance of providing effective treatment to survivors of childhood sexual or physical violence in order to limit the negative consequences they experience, including excessive alcohol use, mental health problems, and indiscriminant sexual behaviors. First, by identifying individuals who are likely to require clinical attention with problem alcohol use, this study emphasized that aggressive implementation of prevention programs is needed for women whose problem alcohol use increased rapidly. Understanding the heterogeneous trajectories of problem alcohol use provides relevant evidence for social workers and/or community practitioners to better plan and carries out targeted activities to prevent or reduce women's problem alcohol use. Second, this study supports the need to design and provide targeted treatment for women with childhood sexual or physical violence experience to interrupt subsequent development of problem alcohol use and depressive symptoms from adolescence to young adulthood. Development and testing of interventions that explicitly address co-occurring problem alcohol use and depressive symptoms are also necessary for both adolescents and young adults. Third, this study emphasizes that women receiving services for sexual or physical violence should be provided information on their risks for indiscriminant sexual behaviors, and how to decrease these risks.

To reduce the impact of childhood sexual or physical violence on problem alcohol use, depressive symptoms levels, and indiscriminant sexual behaviors, this study suggests developing and sustaining an integrative care system for clients who experienced

childhood violence. Effective and targeted screening, intervention, and referrals are also necessary. Educators, health professionals (e.g., social workers, clinical psychologists), and child violence service providers and policy makers need to understand the association between childhood sexual or physical violence and problem alcohol use developed during the transition from adolescence to young adulthood. They should also collaborate and be trained to implement violence prevention and treatment programs for both adolescents and young adults to reduce the risk of subsequent problem alcohol use and depressive symptoms among women with experiences of childhood sexual or physical violence.

In addition, education, treatment, and/or prevention programs for women who suffering from co-occurring problem alcohol use and psychiatric problems are necessary in addiction treatment setting. Addiction treatment settings should provide effective prevention and education programs to prevent negative consequences of excessive drinking of women.

Besides the programs for the victims of childhood experiences of sexual or physical violence, programs for perpetrators or caregivers are also necessary to prevent childhood sexual or physical violence and the negative effects of childhood adverse experiences. Specifically, for perpetrators, since previous studies reported substance-related problems and psychiatric problems among them (Babcock, Green, & Robie, 2004), interventions related to these problems should be provided for perpetrators. For caregivers of childhood violence victims, self-help groups and/or family interventions may be effective for caregivers to deal with their negative feelings and to take care of their children who experienced childhood sexual or physical violence.

Additionally, from the first paper, this study provides information of groups who may be at higher risk for developing more severe problem alcohol use. With this information, development and testing of culturally specific interventions that explicitly address problem alcohol use are also necessary for both White and African American women.

Appendices

Table A. 1

Sample Comparison

	Sample (women)
Aim 1 (n=1,702)	<ol style="list-style-type: none">1) Non-Hispanic White or non-Hispanic African American2) Those with complete information on all 3 waves of Add Health (from attrition analysis)3) Those with all 3 waves of longitudinal information on problem alcohol use
Aim 2 (n=1,756)	<ol style="list-style-type: none">1) Non-Hispanic White or non-Hispanic African American2) Those with complete information on all 3 waves of Add Health (from attrition analysis)
Aim 3 (n=1,388)	<ol style="list-style-type: none">1) Non-Hispanic White or non-Hispanic African American2) Those with valid sample weights of wave 43) Those who were sexually active

Table A. 2

Measure Comparison

	Aim 1	Aim 2	Aim 3
Childhood sexual/physical violence	Before 7 th grade	Before 7 th grade	Before 18 th birthday
Problem alcohol use	Summed scores of 3 dichotomized variables (binge drinking, getting drunk, experience of alcohol related problems): wave 1-3	Summed scores of 3 dichotomized variables (binge drinking, getting drunk, experience of alcohol related problems): wave 1-3	Latent variable with 6 items : wave 4
Depressive symptoms (CES-D)	Summed scores of 9 items: wave 1 ($\alpha=.80$)	Summed scores of 9: wave 1-3 ($\alpha >.81$)	Latent variable with 11 items: wave 4 ($\alpha =.84$)
Covariates	Age, race/ethnicity, parental and family characteristics (family poverty, parental education attainment, family structure): wave 1	Age at all waves , parental and family characteristics (family poverty, parental education attainment, family structure) at wave 1 , respondent's demographic characteristics (marital status, education attainment, personal income) at wave 3	Age, marital status, education attainment, personal income: wave 4

Table A. 3

Analysis Comparison

	Aim 1	Aim 2	Aim 3
Study design	Longitudinal	Longitudinal	Cross-sectional
Analysis	Latent class growth modeling using individually-varying times of observations	Autoregressive, cross-lagged path model	Structural equation modeling (SEM) & multigroup SEM
Model fit criteria	BIC, AIC, Entropy, & posterior probability	RMSEA, CFI, TLI, & Chi-square value with df	RMSEA, CFI, TLI, & Chi-square value with df
Racial/ethnic consideration	LCGM using all and then examined racial/ethnic differences in bivariate level	Separately analyzed models	SEM using all and multigroup SEM using separate and all samples
Cluster	Cluster2_w1	Cluster2_w1	Cluster2_w4
Sample weights	Wave 1 weight	Wave 1 weight	Wave 4 weight
Program	Mplus 6.11 and SAS 9.2	Mplus 6.11 and SAS 9.2	Mplus 6.21 and SAS 9.2

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