FACTORS INFLUENCING ADOLESCENT ALCOHOL AND MARIJUANA USE: THE ROLE OF RELIGIOSITY, SCHOOL-BASED PREVENTION PROGRAMS, PARENTAL INFLUENCE, AND PEER INFLUENCE

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PARENTAL INFLUENCE, AND PEER INFLUENCE

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This study investigates the impact of personal and environmental factors, with greater emphasis on the impact of religiosity on alcohol and marijuana use (Ys) among white, African American, and Asian American adolescents. Specifically, this study aims to (1) examine if the parental influence, peer influence, religiosity, and school-based prevention programs independently and significantly predict the Ys, controlling for background factors; (2) explore whether or not the expected impact of religiosity on Ys is qualified by race, gender and age; and (3) explore if religiosity acts as a mediator of the relationships of age, race and gender with alcohol and marijuana use. This study hypothesizes that (1) religiosity, school-based prevention programs, parental support, parental monitoring, parental disapproval, peer use, and peer disapproval will together significantly explain alcohol and marijuana use; and (2) higher religiosity, attending alcohol and drug training programs, higher parental support, higher parental monitoring, parental disapproval, peer disapproval, and less peer use will independently and separately be related to lower likelihood of marijuana and alcohol use, controlling for background factors.

The scope of this study aims at White, African American, and Asian American adolescents aged 12 to 17 years old. A total of 12,984 adolescents were computed from the 2013 National Survey on Drug Use and Health (NSDUH) data. Separate binary logistic regression analyses were conducted to examine the impact of individual religiosity, parental influence, peer influence, and school-based prevention programs on alcohol and marijuana use among the study

participants. Also, combination of OLS regression analysis and binary logistic regression analyses was used to explore the moderation and mediation effects of religiosity, age, race, and gender on alcohol and marijuana use among the study participants.

Findings confirm the study hypotheses. Results of exploratory analyses reveal that religious girls are less likely to use alcohol and marijuana than religious boys; religiosity is not impactful on alcohol and marijuana use among Asian American youth, which needs further investigations; and religiosity can serve as a mediator on alcohol and marijuana use among African American youth and female adolescents. Implications for social work practice, future research, and drug policy are also discussed.

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1.0   INTRODUCTION

1.1   STATEMENT OF THE PROBLEM

Adolescent substance use is a big public health and public safety concern in the United States (Humphreys & McLellan, 2010). According to the National Survey on Drug Use and Health (NSDUH) in 2013, approximately 24.6 million Americans aged 12 or older were current illicit drug users. Marijuana was the most commonly used illicit drug, accounting for 19.8 million users or 80.6%. The report also revealed that current alcohol drinkers aged 12 or older were 136.9 million. Of this group, 16.5 million and 60.1 million people were heavy and binge drinkers respectively. Alcohol and marijuana use increases with age. For youth aged 12 to 17, the rates of marijuana use increased from 1.0% at ages 12 or 13 to 5.8% at ages 14 or 15 and to 14.2% at ages 16 or 17. Similarly, the rate of alcohol use increased from 2.1% among persons aged 12 or 13 to 9.5% of persons aged 14 or 15, and to 22.7% of 16 or 17 year olds. Each year, substance use costs the United States over $600 billion to cover expenses related to medical, economic, criminal justice, and social impacts (SAMHSA, 2013).

Alcohol use is one of the main causes leading to morbidity and mortality among adolescents (DHHS, 2007). Underage binge drinking is strongly correlated with other health risks such as physical problems, unprotected sexual activity, physical and sexual assault, higher risk for suicide and homicide, memory problems, changes in brain development, and even death from alcohol poisoning (CDC, 2010; Miller, Naimi, Brewer, and Jones, 2007). Similar to teen drinking, drug use is also attributable to negative health consequences such as cardiovascular disease, stroke, cancer, HIV/AIDS, hepatitis B and C, lung disease, and mental disorders (NIDA, 2010). In addition to health problems, substance use also puts adolescents at high risks of poor academic performance and increased school drop-outs (Chatterji, 2006; Malhotra & Biswas,

2006), increased peer substance use (Curran, Stice, and Chassin, 1997; Farrell and White, 1998), and involvement in crime and violent activities (Corwyn & Benda, 2002; Popovici, Homer, Fang, and French, 2012).

1.2   ACOHOL AND DRUG PROBLEMS IN THE UNITED STATES

Adolescent alcohol and marijuana use is part of alcohol and drug problems in the United States, which is complex and unpredictable. Therefore, in order to have adequate knowledge of alcohol and marijuana use among adolescents, it is necessary to understand socio-economic factors that have a significant influence on the development of alcohol and drug problems in the country. These factors may include history of the United States, social values and beliefs, demographics, as well as social stigmas and inadequate treatment.

1.2.1   Historical background

Alcohol and alcoholism, which are critical parts of many Americans' lives, have a very long history (Kleiman & Hawdon, 2011). Over the past centuries, both the colonists and the U.S government have tried to ban alcohol and control alcoholism several times such as promulgation of the 1672 law prohibiting the payment of wages in alcohol, and the Volstead Act or the National Prohibition Act in 1919 outlawing the manufacture, importation, exportation, sale, distribution, and transportation of alcohol. However, the efforts were not successful for many reasons such as increasing smuggling alcohol at large scale, illicit manufacture of alcohol, and costs related to law enforcements (Korsmeyer & Kranzler, 2009). Finally the U.S government officially legalized alcohol content of 3.2% after the ratification of the Twenty-first Amendment in 1933 followed by the Cullen-Harrison Act (Levinson, 2000; Morgan, 1981).

Similar to alcohol, other illicit drugs such as opium, morphine, marijuana, morphine, cocaine, and amphetamine have been used for both recreational and medical purposes in The

U.S. for many years. For example, marijuana was commonly used for recreation and medication as an anticonvulsant and relaxant among the Mexican immigrants during the mid-nineteenth century. By early 20th century, the drug problems drastically increased among men, women, and children in the U.S. There were several reasons resulting in the drug problems such as the returning home of addicted American soldiers from World War I, the influx of illicit drugs to the U.S. smuggled by organized criminal gangs, and rebelling of many young baby boomers – the hippie subculture (Gahlinger, 2001; Durrant & Thakker, 2003; Korsmeyer & Kranzler, 2009). As drug use and addiction were blamed for the causality of social evil and crime, the U.S. government gradually took action to end the laissez-faire approach to drugs and control the substances through promulgation of numerous laws such as the Pure Food and Drug Act of 1906, the Harrison Act of 1914, the Narcotic Drug Import and Export Act or Jones-Miller Act, the Heroin Act of 1924, and the Marijuana Tax Act of 1937 (Kleiman & Hawdon, 2011; Durrant & Thakker, 2003). For example, the Harrison Act of 1914 regulated the use of opiates and cocaine for non-medical purposes as an illegal behavior, which transformed drug addicts from patients to criminals (Acker, 1993). The U.S. government's view toward addiction treatment fluctuates over time. Treatment clinics were first established in 1913, then were shut down in 1925, and were not re-opened until another decade with the initiation of two prison-liked narcotic farms - at Lexington, Kentucky in 1935 and in Fort Worth, Texas in 1938 (White, 1998). Addiction was not treated as a disease instead of crime until after a declaration of the Supreme Court in 1962 (Levinson, 2002). Recently, Office of the National Drug Control Policy (ONDCP) has released the 2014 National Drug Policy Strategy which clearly states that addiction is a brain disease that can be prevented, treated for recovery, and not a moral failure on the individual. According to the new strategy, the U.S. government will implement comprehensive measures such as

increasing preventive methods, providing early intervention, making access to treatment, eliminating barriers to recovery, and reforming the criminal and juvenile justice system which inclines towards treatment versus incarceration for non-violent and low-level offenders (ONDCP, 2014).

Adolescent drug problems were at crisis level in the 1960s. The U.S. government and nonprofit organizations made great efforts to prevent adolescents from using drugs. Nonprofit organizations such as PRIDE (Parents' Resource Institute for Drug Education) took a lead in a strong movement against drug use, especially marijuana among school students in the U.S. in the 1970s and 1980s (Levinson, 2002; Durrant & Thakker, 2003). They brought parents together to share drug information and protect their communities from drug influence. Similarly, the U.S government also implemented various school-based drug prevention programs such as D.A.R.E (Drug Abuse Resistance Education) to deal with adolescent drug problems in 1983(Korsmeyer & Kranzler, 2009). However, these programs were ineffective and even exacerbated adolescent drug problems (Braucht, Follingstad, Brakarsh, and Berry, 1973; Randall & Wong, 1976). Adolescent substance use is still increasing and unsolvable in the U.S as seen in the 2013 NSDUH report.

1.2.2. Social values and beliefs

Alcohol and drug problems are complex and they are viewed differently over time in the U.S. During the laissez-faire period (prior to the 1906 Pure Food and Drug Act) alcohol and drugs were freely sold in the market for any purposes. At that time, nobody including physicians regarded alcohol and drugs as social problems (Durrant & Thakker, 2003; Gahlinger, 2001; White, 1998). However, social attitudes and beliefs toward substance use gradually changed due to addiction and drug-related problems such robbery and other criminal activities (Korsmeyer &

Kranzler, 2009; Levinson, 2002). Additionally, there were other latent reasons contributing to social concerns about substance use and addiction. For example, Whites framed opium smoking and marijuana use, which are part of custom of the Chinese and Mexican immigrants, as an immoral sign and social stigma in order to compete with these low-paid workforces (Korsmeyer & Kranzler, 2009).

There are different beliefs about the causality of addiction. Many Americans blame addiction on the development of machine-age life, low moral standards, over prescribing medications subject to abuse, and inadequate law enforcement (Levinson, 2002). Meanwhile, the U.S. government believes that addiction is a consequence of both supply and demand sides. Internationally they collaborate with other foreign countries such as Mexico and Columbia to reduce drug supply to the U.S. Domestically they attack the demand through law enforcement and treatment services (Durrant & Thakker, 2003; Morgan, 1981). However, the "war on drugs" drug policy is not effective as it fails to eliminate the drug problem in America.

1.2.3 Socio-economic status, race, and gender

The correlation between socioeconomic status and substance use is quite complex and varies significantly among studies. Goodman and Huang (2002), in a cross-sectional study, found that adolescents living in low SES families, as measured by household income and parental education, were more vulnerable to alcohol and cocaine use than those who lived in affluent families. However, there is also evidence that adolescents with higher SES have greater risks for developing substance use behaviors. Three cross-sectional studies showed that adolescents growing up in higher SES families were more likely to use substances than those who were born in lower SES families (Blum et al., 2000; Humensky, 2010; Hanson & Chen, 2007). For high SES adolescents, family income is a stronger predictor of substance use than family status

(Hanson & Chen, 2007). According to the researchers, it may be that the availability of financial resources is more influential on teen substance use than the social status associated with having parents with high education and good jobs. Neighborhood SES is also predictive of adolescent substance use, and this correlation is moderated by parental substance use. Trim & Chassin (2008), in a longitudinal study, found that children of non-alcoholics were at higher risk of alcohol use, living in a higher SES neighborhood; and children of alcoholics were more susceptible to higher risk of alcohol use, living in lower SES neighborhood.

Adolescent substance use affects across all races. Still, its impact is different from race to race. Four cross-sectional studies showed that White adolescents had higher rates of substance use than Black, Hispanic, and Asian Americans (Blum et al, 2000; Mason, Mennis, Linker, Bares, & Zaharakis, 2013; Thai, Connell, and Tebes, 2010; Barnes, Welte, and Hoffman, 2002). The finding is supported by Tanner-Smith (2012) who conducted a longitudinal study and found that White adolescents had the highest level of alcohol and marijuana use at follow-ups in comparison with Hispanic and Black. Asian adolescents are reported to have the lowest level of alcohol use, binge drinking, and illicit drug use in comparison with Whites, Blacks, Hispanics, West Indians, American Indians, and other races in the U.S. (Barnes, Welte, and Hoffman, 2002). Meanwhile, American Indian youth have the highest levels of alcohol use, binge drinking, and illicit drug use (Barnes, Welte, and Hoffman, 2002). Cultural, socialization, and individual factors could be predictive of the racial differences in the study, with such factors protecting Asian youth and putting American Indian adolescents at higher risk of substance use (Barnes, Welte, and Hoffman, 2002).

Adolescent substance use is also different among males versus females. Cross-sectional studies show that males are more sensitive and susceptible to substance use than females

(Barnes, Welte, and Hoffman, 2002; Svensson, 2003). There is also a difference among females and males related to racial differences. White females drink more alcohol, and black males use more marijuana than other ethnic groups (Mason, Mennis, Linker, Bares, & Zaharakis, 2013). Lack of parental supervision is predictive of the development of adolescent substance use. Both male and female adolescents who use drugs often have less parental supervision than those who do not use drugs, regardless of SES (Svensson, 2003). Additionally, peer attitude significantly contributes to both male and female substance use (Mason, Mennis, Linker, Bares, & Zaharakis, 2013).

1.2.4. Social stigmas and treatment services

Statistics show that not many individuals with alcohol and drug problems have access to treatment services due to inadequate availability of treatment programs (Lo & Cheng, 2011; SAMHSA, 2012). Treatment services for adolescents are both inadequate and underdeveloped; they largely depend on models for adult treatment which do not take into account adolescents' developmental stages (Cavanaugh & White, 2003). Currently, there is a lack of empirically supported outpatient treatment programs which specifically meet the needs of adolescents with alcohol and marijuana problems (McWhirter, 2008). Also, there is a little attention given to the practice settings, service delivery systems, and staff's qualification (Cavanaugh, Kraft, Muck, & Merrigan, 2011). There are numerous reasons leading to inadequate treatment for adolescents such as lack of coordination among federal and state agencies, differences between federal and state agencies in using resources, fragmentation of child serving services, inadequate service delivery, and lack of qualified staff (Cavanaugh & White, 2003). Over the past years, many evidence-based and behavioral treatment programs for adolescents such as Motivational Interviewing, Multidimensional Family Therapy, and 12 step programs (NIDA, 2012) have been

implemented to provide services for adolescents who use substances. However, the effects of these programs are not always confirmed. For example, Barnett and colleagues (2012) conducted a meta-analysis of 39 Motivational Interviewing studies on adolescent drug use, including two quasi-experimental studies and 37 randomized control trials (31 randomized by individuals and 6 randomized by groups) in various settings. They found that 28 of the 39 studies (72%) showed significant reductions in drug use, including seven studies on alcohol use, six studies on tobacco use, seven studies on marijuana use, and eight studies on other drug use. Eleven studies including four on tobacco, two on alcohol, two on marijuana, and three on other drugs showed no effect at all.

Social stigmas also create barriers for people who have substance abuse problems to access to treatment (McFarling et al, 2011). A report by Clinical Practice Guideline Treating Alcohol and Drug Use and Dependence (2008) revealed that drug users were often described with such words as "sinner", "irresponsible", "selfish, and "weak". Such stigmas make drug users fear and prevent them from seeking help (Erickson, 2007) and reflects the long-standing "moral model" of addiction etiology.

1.2.5. Summary

Alcohol and drug problems in the U.S. are consequences of numerous structured elements such as historical legacy, socio-economic condition, social values and beliefs, political perspectives, inadequate treatment, and social stigma. These elements either contribute to the development of the problems or hinder efforts to solve the problems (McFarling et al, 2011). So far, substance use has expanded to all races, classes, ages, and gender in America. Adolescents are the most vulnerable population as they are more likely to get involved in substance use due to

environmental and developmental factors. Despite numerous efforts, adolescent substance use problem is still unsolvable and increasing among adolescents.

1.3   PURPOSE OF THE STUDY

Given the increasing alcohol and marijuana problems, complex history of the problems in the United States, and negative consequences of the problems, this study aims to explore factors influencing the use of substances among adolescents. As living in a social context, the initiation and development of substance use among adolescents are strongly influenced by personal and environmental factors such as religious beliefs, family, and friends, which are inter-relatedly connected. Besides, school-based prevention programs, which provide adolescents with knowledge of substance use and coping skills, play an important role in deterring or decreasing substance use among this population. Examining the effects of personal and environmental factors, and prevention programs is not a new area of research. However, none of studies in the past have examined the effects of all of these factors together in one study. In addition, it is worth using a large national sample from a most recent data set to re-examine the effects of these factors with greater emphasis on individual religiosity. Therefore, this study aims to:

1.   report descriptive statistics on independent and dependent variables;

2.   evaluate relationships between a set of anticipated predictors of marijuana and alcohol use and report the aggregate amount of explanation they provide;

3.   examine if the predictors independently and significantly predict the Ys, controlling for basic background factors, and focusing in particular on the influence of religiosity;

4.   explore whether or not the expected impact of religiosity on Y is qualified by race, gender and age. In other words, is the effect invariant across these major background variables?

5.	explore if religiosity acts as a mediator of the expected relationships of age, race and gender with alcohol and marijuana use.

1.4   RESEARCH QUESTIONS

1.	(A) Do individual religiosity, school-based prevention programs, parental influence, and peer influence significantly predict adolescent alcohol and marijuana use as have been found in previous research?; (B) Do they remain predictors controlling for background (age, race, and gender) in a multivariate context?

2.	Is the anticipated influence of religion on lower alcohol and marijuana use moderated by age, gender and race of the youth? Some past research suggests that females, African-Americans and younger youth may be particularly less likely to use drugs and alcohol if they are more religious.

3.	Does religiosity act as a mediator of the presumed tendency for younger, African American and female youth to use marijuana and alcohol with lower likelihood? The rationale for this question is that religious youth (Z) have been shown to be less likely to use alcohol and marijuana (Y). And, the background variables (Xs) of age, gender and race have been found to relate to amount of religiosity. Analyses will be done to determine if the obtained relationships are consistent with mediation and thereby provide a basis for more formal mediation analyses subsequently.

1.5   HYPOTHESES

1.	Religiosity, school-based prevention programs, parental support, parental monitoring, parental disapproval, peer use, and peer disapproval will together significantly explain alcohol and marijuana use.

2. Higher religiosity, attending alcohol and drug training programs, higher parental support, higher parental monitoring, parental disapproval, peer disapproval, and less peer use will independently and separately be related to lower likelihood of marijuana and alcohol use, controlling for background factors.

2.0   LITERATURE REVIEW

2.1   RELIGIOSITY AND ADOLESCENT SUBSTANCE USE

The extant literature on religiosity has focused on two main areas including individual-level religiosity and community-level religiosity. Individual-level religiosity is often measured by six dimensions including (1) Church attendance; (2) Salience (the influence and importance of religiosity); (3) Denomination affiliation (e.g., Catholic, Baptist, Jewish, etc.); (4) Prayer; (5) Bible study; and (6) Religious activities both inside and outside of typical church settings (Johnson, De Li, Larson, and McCullough, 2000). Community-level religiosity is measured by the church membership of the individuals in that community (Regnerus, 2003; Wallace et al., 2007). The effects of individual religiosity on adolescent substance use are inconsistent among the extant research. Many have confirmed that individual religiosity has an inverse or negative relationship with adolescent substance use (Sloane & Potvin, 1986; Stark, 1996; Wallace, Brown, Bachman, & LaVeist, 2003; Wallace et al., 2007; Vaughan, de Dios, Steinfeldt, & Kratz, 2011; Bahr & Hoffmann, 2008). However, others have argued that there are no deterrent effects of individual religiosity on adolescent substance use (Bahr, Hawks, & Wang, 1993; Marcos, Bahr, & Johnson, 1986). To clarify this controversy, Johnson, De Li, Larson, and McCullough (2000) conducted a systematic review of 40 studies on the effects of religiosity and revealed that 86% of the studies reported negative effects, or religiosity decreased substance use; One study found positive effect, or religiosity increased substance use; and the remaining studies found either non-significant or inconclusive effects. The relationship between individual religiosity and adolescent substance use depends on numerous factors such as type of substances, communities that adolescents belong to, religious measures, race, gender, and age of adolescents.

2.1.1 Type of substances

The effects of individual religiosity on adolescent substance use vary significantly and depend on type of substances. Individual religiosity has more deterrent effects on alcohol and marijuana use than other hard illicit drugs such as cocaine, heroin, and amphetamine. Most of the existing studies have confirmed that individual religiosity increases abstinence and decreases alcohol and marijuana use among adolescents (Jang & Johnson, 2001; Vaughan, de Dios, Steinfeldt, and Kratz, 2011; Johnson, Larson, and McCullough, 2000; Stark, 1996; Kelly, Pagano, Stout, and Johnson, 2011). Only a few studies have contended that there is no deterrent effect of individual religiosity on the use of marijuana and alcohol among youth (Bahr, Hawks, & Wang, 1993; Marcos, Bahr, & Johnson, 1986). For other hard illicit drugs, only one study has confirmed that individual religiosity has a negative effect on hard illicit drug use, or religious youth are less likely to use hard illicit drugs (Jang & Johnson, 2001). Meanwhile, more others have confirmed that individual religiosity fails to prevent adolescents from using hard illicit drugs (Bahr & Hoffmann, 2008; Bahr, Hawks, & Wang, 1993; Marcos, Bahr, & Johnson, 1986).

2.1.2 Communities

Communities refer to moral or secular communities (regions, schools or neighborhoods) that adolescents belong to. The extant literature reveals inconsistent findings about the effects of individual religiosity on adolescent substance use in moral sectarian (those with high rates of religious participation) and secular community (those with low rates of religious participation). Some studies have concluded that frequency of church attendance and the importance of religion are protective factors to decrease substance use for adolescents living in religious communities, but not for those who live in secular communities (Stark, 1996; Wallace et al., 2007; Baier & Wright, 2001). In contrast, Tittle & Welch (1983) argued that individual religiosity as measured

by frequency of church attendance had greater impact on marijuana use in secular community than in moral community. According to Tittle & Welch (1983), religious adolescents in a secular community are less likely to use marijuana than religious counterparts who live in a religious community. Meanwhile, there is also a neutral trend that individual religiosity has equal effects on adolescent substance use in both of religious and secular communities, in other words, there is no significant difference in the effects of individual religiosity on substance use in these two communities (Chadwick & Top, 1993).

The impact of individual religiosity on substance use is not similar among religious communities. Stark (1996) found that individual religiosity (church attendance) had a strong negative correlation with alcohol use among Protestants, but it had no impact on Catholics. According to this finding, Protestants who frequently attend church are less likely to drink alcohol; however, frequently attending church does not prevent Catholics from using alcohol. This study also addressed that individual religiosity protects both Protestants and Catholics from using marijuana, but the strength of protection is a bit weak among Catholics (Stark, 1996).

2.1.3 Religious measures

As reviewed by Johnson, De Li, Larson, and McCullough (2000), the two most commonly used religious measures in the existing studies are church attendance and salience. The effects of these religious measures are inconsistent among studies. Some studies have found that church attendance and the importance of religiosity have no deterrent effects on adolescent substance use (Bahr, Hawks, & Wang, 1993; Marcos, Bahr, & Johnson, 1986). Conversely, many others have confirmed that these religious measures can deter adolescents from using alcohol and marijuana (Sloane & Potvin, 1986; Jang & Johnson, 2001; Stark, 1996; Hirschi & Stark, 1969; Wallace et al., 2007; Wallace et al., 2007; Wallace, Brown, Bachman & LaVeist, 2003; Rote &

Starks, 2010; Bahr & Hoffmann, 2008; Vaughan, de Dios, Steinfeldt & Kratz, 2011). Comparing the strength of church attendance and salience, the current literature reveals inconclusive findings. Two studies found that salience as indicated by influence of religiosity and the importance of religiosity had a stronger effect than church attendance (Sloane & Potvin, 1986; Regnerus & Elder, 2003). Inversely, Rote & Starks (2010) argued that church attendance had larger deterrent effects than the importance of religion. However, combination of church attendance and the importance of religiosity are effective to decrease alcohol use and increase abstinence among adolescents (Regnerus & Elder, 2003). Unlike church attendance and salience, denominational affiliation is not as effective as these two measures. Two studies have concluded that denominational affiliation had relatively small deterrent effects on adolescent substance use (Wallace et al., 2007; Wallace, Brown, Bachman, & LaVeist, 2003). Among religious denominations, Protestants are less likely to drink than Catholics as historically Protestant doctrine strongly opposes drinking (Stark, 1996).

2.1.4 Race

Studies on racial differences in substance use have found that Black youth are more religious than White youth; Black youth are more likely than White youth to abstain from using substances; the strength of the inverse relationship between religiosity and substance use is stronger for White youth than Black youth; and Hispanic youth are in between White and African American youth in terms of abstention from substance use (Brown, Parks, Zimmerman, & Phillips, 2001; Rote & Starks, 2010; Wallace, Brown, Bachman, & LaVeist, 2003).

Religious measures make a significant contribution to the racial effects of religiosity. Studies have concluded that church attendance and the importance of religion have equal deterrent effects on substance use for White, Black, and Hispanic adolescents (Wallace et al.,

2007; Vaughan, de Dios, Steinfeldt, & Kratz, 2011; Rote & Starks, 2010). However, findings are not similar to denominational affiliation. Wallace, Brown, Bachman, & LaVeist (2003) found that Black adolescents were more likely than White counterparts who are affiliated with similar denominations to abstain from alcohol use. So far, there is a dearth of studies on the impact of religiosity on substance use among Asian American adolescents. One study found that individual religiosity had no deterrent effect on substance use behavior of Asian Americans (Chung, 1997).

2.1.5 Age

The effects of religiosity on substance use vary across ages, depending on type of substances. Jang and Johnson (2001) concluded that the effects of individual religiosity on hard illicit drug use increased with the development of adolescents; however, this is not the case for marijuana. The researchers found that the religious effects on marijuana use were stronger between early and later adolescence, peaked at ages of later adolescence, and then slowly declined thereafter (Jang and Johnson, 2001). The effects of religiosity on alcohol use have not been reported so far.

2.1.6 Gender

Numerous studies have confirmed that girls are more religious than boys (Hoffmann & Johnson, 1998; Donahue & Benson, 1995; Hood, Spilka, Hunsberger, & Gorsuch, 1996; Wallace, Forman, Caldwell, and Willis, 2003; Salas-Wright, Vaughn, Hodge, & Perron, 2012). Regarding the strength of the impact of religiosity on adolescent substance use, studies have concluded that religiosity is stronger among girls than among boys, indicating that religious girls are less likely to use or more likely to abstain from using alcohol and marijuana than religious boys (Wills, Yaeger, & Sandy, 2003; Pitel et al., 2012)

2.1.7   Summary and evaluation

In general, religiosity has more deterrent effect on alcohol and marijuana use than other hard illicit drugs. The effects of individual religiosity on adolescent substance use vary a lot in different communities, depending on numerous factors such as type of religions, religious measures, and type of substances. The existing studies mainly focus on White, Black, and Hispanic adolescents, whereas there is a dearth of studies on Asian American population. The impact of religiosity on adolescent substance use also depends on age, race, gender, and type of substances.

The inconsistent findings among studies could be explained by three main factors including methodological limitations, dimension of religious measures, and sampling. Regarding methodological limitations, the majority of the existing studies were based on cross-sectional data, and half of them did not test the reliability of the religious measures (Johnson, De Li, Larson, and McCullough, 2000). Additionally, validity of the previous findings is of concern. Ordinary Least Squares (OLS) regression - the most commonly-used statistical technique for data analysis erroneously assumes that students' responses are independent and it does not take into account the school context. In fact, 85% of the current studies were drawn from school students whose behaviors are significantly influenced by the school context (norms, culture, and social environments). Therefore, the relationship between individual religiosity and substance use could have been erroneously interpreted (Baier & Wright, 2001). Dimension of religious measures is another issue. Johnson, De Li, Larson, and McCullough (2000) confirmed that only studies that used four or more religious measures consistently yielded negative or beneficial effects of individual religiosity on substance use; studies that used three or less dimensions reported mixed or inconclusive findings. Meanwhile, 60% the existing studies used only one or

two dimensions of religious measures (Johnson, De Li, Larson, and McCullough, 2000). With regards to sampling, Baier & Wright (2001) concluded that religiosity had stronger deterrent effects on adolescent substance use in studies using small sample sizes, more racially diverse samples, and data collected later in time.

These findings shed light on critical information for future studies. When examining the relationship between religiosity and adolescent substance use, it is essential to test reliability of religious measures and use statistical techniques that can ensure validity of findings. Additionally, it is strongly encouraged to use four or more dimensions of religious measures, recently collected data, and racially diverse samples for accuracy of research findings.

2.2 SCHOOL-BASED PREVENTION PROGRAMS

Since the outbreak of adolescent substance use problems in 1960s, numerous school-based prevention programs have been implemented in the United States. However, the effectiveness of these school-based programs is still inconclusive. Two longitudinal studies evaluating the effectiveness of school-based drug prevention programs concluded that there were no significant differences between treatment and control groups, or between pretest and posttest results, indicating that these programs failed to have positive impact on adolescents' knowledge, attitudes, and the use of substances (Webster, Hunter, & Keats, 2002; Bonaguro, Rhonehouse, & Bonaguro, 1988). Whereas, others found that school-based prevention programs increased knowledge, attitudes, and interpersonal skills, and decreased the use of tobacco and marijuana, but not alcohol use among adolescents (Hansen, Malotte, & Fielding, 1988; Botvin, Baker, Dusenbury, Tortu, & Botvin, 1990). The effectiveness of school-based prevention programs largely depends on types of program. In a meta-analysis of 207 universal school-based drug prevention programs, Tobler et al. (2000) concluded that interactive programs, which foster the

development of interpersonal skills (refusal, communication, assertive, decision-making, and coping skills), had stronger effects than non-interactive programs, which focus on drug knowledge and affective development (self-esteem, self-awareness, attitudes, beliefs, and values).

Created by Los Angeles police Chief Darryl Gates in 1983, Drug Abuse Resistance Education (D.A.R.E) is a widely-known drug prevention program for school-age students in the United States. The program was initially designed to educate fifth and sixth graders about drugs and provide them with decision making skills to say no to drugs. Presently, the program is expanded to older students. D.A.R.E training curriculum focused on (1) understanding the effects and consequences of drug use; (2) recognizing and coping with interpersonal pressures to drug use; (3) promoting self-esteem and assertiveness; (4) providing positive alternatives; and (5) increasing students' interpersonal communication and decision-making skills. D.A.R.E lectures are given by uniformed police officers who have undergone an intensive 80-hour training course on various skills such as public speaking, teaching methods, and classroom management in addition to the core curriculum. Although D.A.R.E is widely applied to 80% of schools in the United States and 40 other countries (Mahon-Halt & Mosher, 2011) the effectiveness of this program is still controversial. Ennett, Tobler, Ringwalt, & Flewelling (1994), who conducted meta-analysis review of eight D.A.R.E evaluations, concluded that short-term effects of D.A.R.E on reducing or preventing drug use behavior was small; and the program was even less effective than other interactive prevention programs. In another review of D.A.R.E outcomes, Dukes, Ullman, & Stein (1996) revealed that immediately after completion, D.A.R.E increased self-esteem and institutional bonds (with family, police, and teachers) and decreased risky behaviors, but there were no significant differences between D.A.R.E. and comparison groups. Whereas

Dukes, Ullman, & Stein (1995) found that participants in two D.A.R.E groups had greater self-esteem, stronger institutional bonds, and fewer risky behaviors than participants in two control groups when controlling for maturation effects. Critics addressed several reasons which led to the ineffectiveness of D.A.R.E such as questionable delivery methods by the police, lack of scientific knowledge on the effects of drugs, exaggeration of risks, strong prohibition of risk, and lack of social support (Mahon-Halt & Mosher, 2011). Since the year of 2000, training curriculum and teaching methods of D.A.R.E have been improved over time. The most recent D.A.R.E curriculum, which was revised in 2009, is D.A.R.E REAL (Refuse, Explain, Avoid, and Leave). The new curriculum is purportedly based on scientific findings about drugs, cognitive behavioral therapy, and motivational enhancement therapy techniques (Mahon-Halt & Mosher, 2011). However, the long-term effectiveness of this program is still pending.

2.3   PARENTAL INFLUENCE AND ADOLESCENT SUBSTANCE USE

Hirschi (1969) posited that social and cultural constrains, which are strongly associated with parental influence, are critical factors that prevent adolescents from committing acts of deviance. Inept parenting leads to socially unskilled adolescents, who are consequently more likely to join deviant peer groups in which substance use occurs (Hawkins & Weis, 1985; Patterson, DeBaryshe, & Ramsey, 1989). Conversely, conventional bonds such as parental involvement and monitoring can deter or lower levels of substance use during adolescence (Erickson, Crosnoe, & Dornbusch, 2000). The scope of this section will focus on parental factors that may prevent adolescents from using substances or reduce their problems, including parental involvement, parental support, parental monitoring, and parental disapproval. Other demographic factors such as age, gender, and race will be also discussed in the relationship with parental factors.

2.3.1 Parental involvement

This is a broad term and it is categorized by different components such as shared communication, shared activities, and emotional closeness in some studies. In general, parental involvement has an inverse relationship with adolescent substance use, indicating that parental involvement deters or prevents adolescents from using alcohol and marijuana (Wills, Resko, Ainette, & Mendoza, 2004; Barnes, Reifman, Farrell, & Dintcheff, 2000; Whitney, Kelly, Myers, and Brown, 2002; Pilgrim, Schulenberg, O'Malley, Bachman, & Johnston, 2006). For example, in their study, in which parental involvement was measured by helping adolescents do homework, requiring them to do chores, and setting limit for TV watching, Pilgrim, Schulenberg, O'Malley, Bachman, & Johnston (2006) found that parental involvement had both direct and indirect impact on adolescent alcohol and marijuana use. Specifically, parental involvement significantly decreased the frequency of alcohol and marijuana use among both 8th and 10th graders in the study, and this relationship was mediated by school success and time with friends (Schulenberg, O'Malley, Bachman, & Johnston, 2006). However, parental over-involvement and control can be as risk factors for excessive alcohol use among adolescents (Dishion & Loeber, 1985).

With regard to the components of parental involvement, their effects on adolescent substance use vary significantly. Cross-sectional and longitudinal studies found that adolescents who feel close to their parents were less likely to drink alcohol or get drunk than those who do not; and shared activities such as sports, religious services, social outings, shopping, and school projects with their parents can protect adolescents from using substances (Goncy & Van Dulmen, 2010; Lewis & Jordan, 2005). Conversely, these researchers also revealed that shared communication was positively associated with adolescent substance use, indicating that the

greater shared communication with their parents the more likely adolescents drink alcohol or use marijuana (Goncy & Van Dulmen, 2010; Lewis & Jordan, 2005). One possible explanation of this counter-intuitive relationship is that the shared communication could have invoked the child's negative feelings such as hostility or wariness, which consequently promote their substance use (Pleck & Masciadrelli, 2004).

2.3.2   Parental support

Similar to parental involvement, studies have confirmed that parental support has a direct and inverse relationship with adolescent substance use, meaning that parental support can deter or decrease substance use among adolescents (Barnes, Reifman, Farrell, & Dintcheff, 2000; Chaplin et al., 2012; Wills & Cleary, 1996; Wills, Resko, Ainette, & Mendoza, 2004). Parental support also has an indirect relationship with adolescent substance use via mediator variables. One study found that the effects of parental support on adolescent alcohol and marijuana use were mediated by self-control and risk-taking tendency (Wills, Resko, Ainette, & Mendoza, 2004). The researchers explained that parental support increased good self-control and decreased risk-taking behaviors, which ultimately led to a decreased alcohol and marijuana use among adolescents in the study. Another study found that parental support increased behavioral coping skill, academic competence and decreased deviant-prone attitudes, which finally deterred or decreased adolescent substance use (Wills & Cleary, 1996). Lack of parental support may decrease close parent-child relationship, which consequently result in an initiation or an increase in substance use (Chaplin et al., 2012).

Regarding components of parental support, Wills & Cleary (1996) concluded that emotional support (e.g., adolescents share feelings with parents and parents listen to their feelings) had stronger effects on adolescent substance use than instrumental support (e.g., parents

help with homework or help adolescents go somewhere). In tandem with its preventive effects, parent support also has positive impact on substance abuse treatment outcomes. In a longitudinal study with adolescents undergoing substance abuse treatment, Whitney, Kelly, Myers, and Brown (2002) found that higher parental support was associated with lower levels of adolescent drug and alcohol use during three and six-month follow-ups. In the relationship with parental monitoring, parental support has indirect impact on adolescent substance use through parental monitoring. Barnes, Reifman, Farrell, and Dintcheff (2000) concluded that children who are reared in supportive and nurturing families were more likely to be receptive with parental monitoring, which consequently drank less and had fewer times drunk.

2.3.3   Parental monitoring

Parental monitoring refers to the extent to which parents are aware of their children's activities and whom they are with when not at home or in school, and the ultimate goal of parental monitoring is to promote adolescents' self-regulatory behaviors (DiClemente et al., 2001). Numerous studies have confirmed that parental monitoring prevents adolescents from initiating alcohol and marijuana use and is associated with their lower levels of substance use (Bahr, Hawks, & Wang, 1993; Barnes, Reifman, Farrell, and Dintcheff, 2000; Van der Vorst, Engels, Meeus, and Dekovic, 2006; DiClemente et al., 2001; Steinberg & Fletcher, 1994). Adolescents who have high level of parental monitoring are less likely to initiate to use substances (Steinberg & Fletcher, 1994; Barnes, Reifman, Farrell, and Dintcheff, 2000). Conversely, youth with little or lack of parental monitoring are more likely to drink heavily and abuse drugs than those who are closely monitored by their parents (Jessor, 1976; Fraser, 1984). In addition, parental monitoring has an indirect impact on adolescent substance use through choices of peers. Teens

are much less likely to choose friends who use drugs when their parental monitoring is high (Bahr, Hawks, & Wang, 1993).

2.3.4 Parental disapproval

Parental disapproval is measured by how parents would feel if their children drink or use drugs as reported by their adolescent children (Johnston, O'Malley, & Bachman, 2001). Studies have confirmed that parental disapproval is a protective factor for adolescent substance use, indicating that higher levels of parental disapproval are associated with lower frequency of substance use and greater likelihood of abstinence among adolescents (Sawyer & Stevenson, 2008; Donovan, 2004; Mrug & McCay, 2013; Martino, Ellickson, & McCaffrey, 2009). The effects of parental disapproval on adolescent substance use are strongly correlated with peer disapproval. In a recent study examining the effects of parental and peer disapproval on adolescent alcohol use, Mrug & McCay (2013) found that although youth often received higher parental disapproval than peer disapproval throughout adolescence, peer disapproval was stronger than parental disapproval; and the combination of strong parental and peer disapproval was associated with the greatest likelihood of abstinence and lowest level of alcohol use. According to this study, parental disapproval is not enough, and thus, it needs to incorporate with peers to ensure the effectiveness of substance use prevention among adolescents. In addition to direct impact, parental disapproval also has indirect effects on adolescent substance use. Nash, McQueen, & Bray (2005) revealed, in their longitudinal study, that students with more parental disapproval reported having greater self-efficacy for avoiding alcohol use, fewer friends that drank alcohol, less approval for alcohol use among close friends, and less alcohol use than those who reported some parental disapproval.

2.3.5 Race

In a cross-sectional study with White, Hispanic, and African American adolescents, Pilgrim, Schulenberg, O'Malley, Bachman, and Johnston (2006) found that direct effects of parental involvement on adolescent substance use was significant across all races, but the strength of the effects was lower among African Americans than White and Hispanic counterparts. Similarly, the strength of indirect effects, which were mediated by school success and time with friends, was also lower among African Americans than White and Hispanic teens. With regard to parental disapproval, racial differences are inconsistent among studies. Two studies found that White adolescents received higher parental disapproval than Black counterparts (Mrug & McCay, 2012; Catalano et al., 1992). Poverty, single parenthood, and community disadvantage may be the main factors that result in lower perceptions of parental disapproval among Black adolescents (Mrug & McCay, 2013). Contrary to the findings of the previous researchers, Foley, Altman, Durant, & Wolfson (2004) did not find a significant difference in parental disapproval among Black, White, and Hispanic adolescents. These inconsistent findings require further investigation from researchers.

2.3.6 Age

Studies have found that parental involvement is more effective to deter or decrease substance use among younger adolescents than older ones (Goncy & Van Dulmen, 2010; Pilgrim, Schulenberg, O'Malley, Bachman, and Johnston, 2006). However, shared communication even makes older adolescents drink more than younger ones (Goncy & Van Dulmen, 2010). Regarding parental disapproval, its effects on adolescent substance use significantly vary among studies. Some researchers found that parental disapproval had a stronger effect on alcohol use in earlier versus later adolescence (Reifman, Barnes, Dintcheff, Farrell, & Uhteg, 1998). Others concluded that

parental disapproval was stronger for abstinence, but not for frequency of alcohol use among older adolescents than younger ones (Mrug & McCay, 2013). Meanwhile, Sawyer & Stevenson (2008) did not find any significant differences in the influence of parental disapproval on drug use intentions between sixth and eighth graders in their study.

2.3.7 Gender

Cross-sectional and longitudinal studies have found that parental monitoring is associated with lower level of substance use and is more effective in preventing adolescent substance use for both boys and girls (Van der Vorst, Engels, Meeus, and Dekovic, 2006; Steinberg & Fletcher, 1994). However, the effects of parental monitoring is stronger for boys than girls, which means that boys drink less than girls do when their parents monitor their drinking behavior (Van der Vorst, Engels, Meeus, and Dekovic, 2006). Parental monitoring is less effective for male substance users when peer influence is involved. Steinberg & Fletcher (1994) concluded that for drug-using boys, their pattern of use was not influenced by levels of parental monitoring, but the pattern of peer use. Concerning the effects of parental disapproval on adolescent substance use, girls receive higher level of parental disapproval than boys throughout adolescence (Mrug & McCay, 2013). But the protective effect of parental disapproval on early adolescents' alcohol use was stronger in boys than in girls (Kelly et al., 2011).

2.3.8 Summary and evaluation

Parental influence makes a significant contribution to deterring or decreasing levels of adolescent substance use. The existing studies have confirmed the deterrent effects of parental involvement, parental monitoring, parental support, and parental disapproval on substance use. However, shared communication between parents and their children instigates adolescent substance use. When examining the effects of these parental variables, researchers need to take into

consideration the impact of other variables such as school performance, self-control, and especially peer influence. Future research should further examine racial differences in the effects of parental variables on adolescent substance use as well as the impact of shared communication between adolescents and their parents.

2.4   PEER INFLUENCE AND ADOLESCENT SUBSTANCE USE

A large body of research has revealed that peers have a strong influence on the development of adolescent substance use; adolescents who have substance-using friends are more likely to use substances (Branstetter, Low, & Furman, 2011; Epstein, Botvin, Baker, & Diaz, 1999; Maxwell, 2002; Marshal & Chassin, 2000; Wills & Cleary, 1999). Youth are more likely to increase their frequency and levels of substance use commensuration with that of their peers (Ali & Dwyer, 2010; Branstetter, Low, & Furman, 2011). Friends do not only provide immediate access to substances but also model substance-using behavior and shape positive attitudes toward the use of substances (Farrell & White, 1998; Bray, Adams, Getz, & McQueen, 2003). Getting involved with substance-using friends is a risk factor for the development of adolescent substance use. Studies have shown that the more involved with substance-using friends the more likely youth are to use substances or to increase their levels of substance use (Bahr & Hoffmann, 2008; Moon, Blakey, Boyas, Horton, & Kim, 2014). In line with initiating and increasing levels of substance use, the number of substance-using friends that youth have is also strongly related to treatment outcomes. In their longitudinal study, Ramirez, Hinman, Sterling, Weisner, & Campbell (2012) concluded that youth with less than four friends who use alcohol and drugs were more likely to be abstinent than those with four or more friends who use the substances. Whereas having peers who are less involved in substance use makes non-substance using adolescents less likely to become a substance user (Steinberg & Fletcher, 1994). Adolescents are

more likely to be influenced by friends who are popular among their peers and those who are significantly more popular than themselves (Tucker, de la Haye, Kennedy, Green, & Pollard, 2014). Nowadays, in addition to face-to-face interaction – the most influential way (Branstetter, Low, & Furman, 2011), the prevalence of internet also makes a significant contribution to peer influence on adolescent substance use. In a recent longitudinal study, Huang et al. (2014) found that adolescents with a greater number of friends who posted partying and drinking pictures of themselves online were significantly more likely to use alcohol. However, studies have found that adolescents who have good self-control and high levels of discipline are more resilient to peer influence as they are less likely to adopt the values of substance-using peers or model their substance use behaviors (Marshal & Chassin, 2000; Wills & Cleary, 1999).

The quality of peer friendships is one of the determinants leading to substance use among adolescents. Investigators have found that conflict, hostility, and negative interactions in friendships are associated with greater substance use among youth (Branstetter, Low, & Furman, 2011; Windle, 1994; Branstetter, Low, & Furman, 2011). Other determinants which prospectively predict initiation of adolescent substance use include peer approval and the use of substance (Trucco, Colder, & Wieczorek, 2011). In contrast, peer disapproval is a protective factor for adolescent substance use (Mason, Mennis, Linker, Bares, & Zaharakis, 2014). Studies have concluded that peer disapproval is significantly associated with a decreased substance use among adolescents (Mrug & McCay, 2013; Mason, Mennis, Linker, Bares, & Zaharakis, 2014; Sawyer & Stevenson, 2008). When examining the effects of peer disapproval on adolescent substance use, it is important to take parental disapproval into account because parental disapproval increases peer disapproval and creates greater self-efficacy for avoiding substance use (Nash, McQueen, & Bray, 2005). Since parental disapproval amplifies the protective effect

of peer disapproval, the combination of parental disapproval and peer disapproval is strongly associated with an increased likelihood of abstinence and a decreased likelihood of frequent substance use (Mrug & McCay, 2013). In tandem with parental disapproval, individual religiosity is also a significant contributor to the impact of peer disapproval on adolescent substance use. Bahr & Hoffmann (2008) revealed that a highly religious adolescent whose friends used marijuana was less likely to use marijuana than an unreligious adolescent whose friends used marijuana.

Studies on peer support reveal inconsistent findings. Some found that peer support was associated with lower levels of substance use (Scholte, van Lieshout, & van Aken, 2001; Windle, 1994). Whereas others argued that peer support was associated with greater substance use among adolescents (Averna & Hesselbrock, 2001; Wills, Resko, Ainette, & Mendoza, 2004). One possible explanation for this counter-intuitive finding is that adolescents tend to select friends with similar interests, values, beliefs, and attitudes (Youniss & Smoller, 1985), and thus, support from substance-using friends may result in greater substance use among adolescents (Averna & Hesselbrock, 2001).

The direction of the relationship between peer influence and adolescent substance use is complex and varies significantly among studies. Two studies have found that the relationship between peer influence and adolescent substance use is bidirectional, indicating that levels of peer substance use are strongly associated with that of adolescent substance use and vice versa (Curran, Stice, & Chassin, 1997; Bray, Adams, Getz, & McQueen, 2003). However, these two longitudinal studies, which used similar analytical method - Latent Growth Analysis, revealed two opposite directions of this relationship. In their study with White and Hispanic samples, Curran, Stice, & Chassin (1997) found that higher levels of initial peer alcohol use was related to

larger increases in adolescent drinking. In contrast, Bray, Adams, Getz, & McQueen (2003), who conducted the study with African American, Mexican American, and non-Hispanic White adolescents, concluded that higher levels of initial peer drinking were related to smaller increases in youth drinking. Whereas other researchers found that the relationship between peer influence and adolescent substance use was unidirectional, meaning that adolescent alcohol use predicted peer alcohol use rather than vice versa (Farrell, 1994; Farrell & Danish, 1993). However, this finding from Farrell and Danish (1993) and Farrell (1994) exposes some limitations. First, sample in their studies was exclusively African Americans whose peer influences have been reported to be weaker than other ethnic groups (Mrug & McCay, 2013; Mason, Mennis, Linker, Bares, & Zaharakis, 2014; Farrell & White, 1998). Second, the analyses of the studies consisted of traditional fixed-effects autoregressive (AR) structural equation models, which do not take into account growth or individual differences in growth over time (Rogosa, 1987).

2.4.1 Race

The extant studies on peer influence and adolescent substance use mainly focus on racial differences between white and non-white (African American and Hispanic) populations. Researchers have shared a common finding that peer influence is more strongly related to both abstinence and frequency of substance use among White adolescents and less strongly related among African American and Hispanic counterparts (Mrug & McCay, 2013; Mason, Mennis, Linker, Bares, & Zaharakis, 2014; Farrell & White, 1998). However, this racial difference disappears by late adolescence (Mrug & McCay, 2013). The strength of peer influence on Asian American adolescents is still unknown in the existing literature, which needs more attention from researchers.

2.4.2 Age

The effects of peer influence on adolescent substance use largely depend on their age. It is commonly established that peer influence on substance use is predominant and stronger among older adolescents than the younger ones (Mrug & McCay, 2013; Sawyer & Stevenson, 2008; Ali & Dwyer, 2010; Branstetter, Low, & Furman, 2011).

2.4.3 Gender

Investigators have posited that having many substance-using friends makes it more likely for boys to begin using substances or move from experimenters to heavy users than girls; and low substance use by friends makes girls more likely to stop experimenting with substance use and maintain their sobriety (Steinberg & Fletcher, 1994). Peers' attitudes have stronger effects on adolescent girls than adolescent boys, indicating that adolescent girls are less likely to use substances if they receive unfavorable attitudes toward substance use from friends than boys (Mason, Mennis, Linker, Bares, & Zaharakis, 2014). Adolescent girls receive more peer support than boys (Wills, Resko, Ainette, & Mendoza, 2004) and peer disapproval is more influential for them than boys (Mrug & McCay, 2013).

2.4.4 Summary and evaluation

Similar to parental influence, peer influence has strong effects on adolescent substance use and its effects are even stronger than parental influence (Mrug & McCay, 2013). The number of substance-using friends, friends' favorable attitudes toward substance use, and negative friendships are key determinants leading to adolescent substance use. When examining the effects of peer influence on adolescent substance use, it is critical to take into account such factors as individuals' self-control, discipline, parental disapproval, peer disapproval, and individual religiosity as they are correlated with peer influence and can protect adolescents from

using substances. Controversial findings about the effects of peer support suggest further research on the nature of friendships and how adolescents select friends. It appears that there is a reciprocal relationship between peer influence and adolescent substance use, and peer influence is stronger for older adolescents. It is clear that peer influence is stronger among White adolescents than non-white ethnic groups. Further research needs to examine racial differences among other ethnic groups. Findings from the current studies address an important point that prevention programs need to seek parental involvement, minimize their interactions with substance-using friends, and maximize their peers' unfavorable attitudes towards using substances.

3.0   THEORETICAL FRAMEWORKS

3.1   SOCIAL LEARNING THEORY

3.1.1   Key concepts and assumptions

Social learning theory (Bandura, 1977) suggests continuous and reciprocal interaction between the individuals' cognition and behavior exist within the ecological environment where human behavior is developed. According to Bandura (1977), human behavior is not inborn. Rather it is learned through our socialization process. SLT utilizes key concepts such as observational learning, imitation, modeling, and self-efficacy to explain the development of behavior. Individual observational learning is acquired by attention to and retention of activities. Such activities are determined by interpersonal interactions and behaviors of people with whom individuals regularly associate. Imitation occurs when individuals want to convert their symbolic behaviors into actions. Modeling is the stage where individuals have strong motivation to deliberately shape their behaviors in accordance with symbolic behaviors of others. Self-efficacy reflects the individuals' ability to understand, evaluate, and alter their thinking, which allows for differential responses to what is observed. According to the SLT, adolescents are vulnerable to alcohol and drug use through regular observation and interaction with family and peers who use substances. Regular observation and interaction enables adolescents attend to, memorize, and want to imitate the substance use behavior.

3.1.2   Analysis of conceptual frameworks

Studies examining the relationship between parental substance use and their children's substance use reveal children whose parents frequently use drugs are more likely to use the substances than children of parents who do not use drugs (Windle 2000; Drapela & Mosher, 2007; Miller, Jennings, Alvarez-Rivera, & Miller, 2008). A similar relationship exists between sibling and peer

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substance use. Adolescents who perceive benefits of alcohol and drug use from their elder siblings are more likely to use the substances (Windle, 2000; Low, Shortt, & Snyder, 2012); and, those who perceive greater peer approval of substance use are more likely to report lifetime alcohol and marijuana use regardless of their own personal definitions (Miller, Jennings, Alvarez-Rivera, & Miller, 2008). Previous research confirms both peer and family substance use has direct effects on adolescent substance use (Windle, 2000; Bahr, Hoffmann, and Yang, 2005; HeavyRunner-Rioux & Hollist, 2010).

One of the most effective applications of SLT is the use of peer educators as positive role models for adolescents. According to Wodarski (2010), the Teams, Games, and Tournaments treatment programs, combined with family therapy, anger management, and alcohol and drug abuse education, have been effective in helping adolescents reduce their level of alcohol use. This theory-driven treatment method gave participants an opportunity to learn positive behaviors from their peers which subsequently reduced their substance use (Wodarski, 2010).

3.2   PROBLEM BEHAVIOR THEORY

3.2.1   Key concepts and assumptions

According to Jessor and Jessor (1977), the Problem Behavior theory is formulated by three systems including (1) the personality system, (2) the perceived environment system, and (3) the behavior system. Each of these systems is composed of variables that serve either as instigation for engaging in problem behavior or controls against involvement in problem behavior (See Figure 1).

3.2.1.1 The personality system

The personality system consists of three component structures – the motivational instigation structure, the personal belief structure, and the personal control structure. The motivational

instigation structure is about the directional orientation of action, which is associated with both value placed on goals and the expectation of attaining goals. Achievement of a goal largely depends on value placed on the goal as value determines the direction of action to achieve the goal. There are three central and salient goals for school-age adolescents including academic achievement, independence, and peer affection. These goals comprise seven variables in the motivational instigation structure – value on academic achievement, value on independence, value on affection, expectation for academic achievement, expectation for independence, expectation for affection, and the independence-achievement value discrepancy. The independence-achievement value discrepancy refers to the degree to which the goal of independence is valued more highly than the goal of academic achievement. The next component of personality system is the personal belief structure, which refers to cognitive-control variables exerted against the occurrence of problem behavior. These variables include social criticism, alienation, self-esteem, and internal-external locus of control. Social criticism refers to the degree of acceptance or rejection of the values, norms, and practices of the large society. Alienation refers to a sense of uncertainty about self, a concern about one's roles, and a belief about isolation from involvement with others. High self-esteem can protect one from engaging in problem behaviors. Internal locus of control reflects one's commitment to the ideology of the larger society. External locus control is a function to safeguard conventional behavior and protect against nonconformity. Similar to the personal belief structure, the personal control structure also refers to controls against non-normative behaviors. However, the difference between the personal belief structure and the personal control structure is that variables in the personal belief structure do not directly relate to behavior. Whereas variables in the personal control directly link to or refer to behaviors. The personal control structure consists of three variables –

attitudinal tolerance of deviance, religiosity, and the discrepancy between positive and negative functions of behaviors. High attitudinal intolerance of deviance is a direct control against problem behaviors. Involvement with religious beliefs, ideology, and activities leads to moral sanctioning and general concern with transgression. Control over engaging problem behaviors is attenuated when positive functions outweigh negative functions. In the personality system, problem behavior proneness includes lower value on academic achievement, higher value on independence, greater social criticism, higher alienation, lower self-esteem, greater attitudinal tolerance of deviance, and lower religiosity.

3.2.1.2 The perceived environment system

The perceived environment system consists of a distal structure and a proximal structure. The distal structure is comprised of variables that do not directly or necessarily implicate problem behaviors. In contrast, the proximal structure refers to variables that are directly or obviously related to the occurrence of problem behaviors. The distal structure includes six variables – perceived support from parents, perceived support from friends, perceived control from parents, perceived control from friends, compatibility between parents and friends in their expectations about a given adolescent, and the perceived influence on the adolescent from parents relative to that from friends. High support and controls would protect adolescents from problem behaviors. Compatibility refers to consensus between parents and friends' expectations about the adolescent. Low compatibility would result in a greater likelihood of the occurrence of problem behaviors. The relative parent versus friends' influence refers to the perception of greater past and present influence from parents or friends. Parental influence is expected to be more conventional than peer influence. Therefore, if adolescents receive less conventional standards and have greater involvement of friends, both of these factors increase the likelihood of engaging

in problem behavior. The proximal structure refers to the prevalence of models and social support for problem behavior. The prevalence of models implicates the opportunity to engage in problem behaviors, and access to the problem behaviors (e.g., drug supply). Social support for problem behaviors implies positive approval for involving in the behavior, social pressure from others, and lack of disapproval from others. The proximal structure includes three main variables – friends' approval-disapproval of problem behavior, parental approval-disapproval of problem behavior, and friends' models for problem behavior. In summary, the perceived environment system deals with both the perception of social controls against problem behavior and the perception of models and support for problem behavior. Social controls are largely located with the distal structure. Whereas models and support for problem behavior are located in proximal structure. Theoretically, problem behavior proneness in the distal structure includes low parental support and controls, low peer controls, low compatibility between parent and peer expectations, and low parental influence and high peers influence. In the proximal structure, problem behavior proneness is characterized by low parental disapproval of problem behavior, and high peers models and approval for engaging in problem behavior.

3.2.1.3 The behavior system

The behavior system implicates to the structure of problem behavior and the structure of conventional behavior. The problem structure refers to adolescents' inappropriate or undesirable actions as considered by the larger society. Whereas the conventional behavior structure refers to socially approved and normatively expected behaviors. The problem behavior structure includes marijuana use, sexual intercourse, activism or social protest behavior, drinking, drinking problem, general deviant behavior, and multiple problem behavior. The conventional behavior structure is comprised of two variables – religious involvement as measured by frequency of

church attendance and religious activities, and involvement with academic course work and achievement as measured by grade-point average. Problem behavior proneness in the behavior system includes high involvement in other problem behaviors and low involvement in conventional behaviors.

3.2.2 Analysis of conceptual frameworks

Jessor and Jessor (1977) tested their theoretical frameworks with over 400 high school students and 200 college students in a four-year longitudinal study from 1969 to 1972. With regard to the personality system, Jessor and Jessor (1977) found that personal controls had the most direct and substantial relationship with problem behavior; motivational instigation was the next important structure; personal beliefs, however, were least connected with problem behavior as only social criticism variable was statistically significant with problem behavior. Results of the study also revealed that in the perceived environment system, the proximal structure had the strongest influence on problem behavior, especially peers approval variable and peers models of problem behavior. Additionally, parental approval and lack of parental disapproval were also significantly associated with problem behavior. For distal structure, both parental support and parental controls deterred problem behaviors; specifically, the strength of parent support was stronger than parent controls. Similarly, peers controls also had deterrent effects on problem behavior, indicating that adolescents are less likely to get involved in problem behavior when they perceive sanctions and criticism from friends. However, friends support was irrelevant to problem behavior as the relationship was not statistically significant. Moreover, adolescents were at greater risk of engaging in problem behavior when there was greater incompatibility between parents and friends' expectations and greater influence of friends.

Jessor and Jessor (1977) also concluded that adolescents who have higher attitudinal intolerance about transgression and those who are more religious were less likely to engage in problem behavior; those who have positive perceptions about drinking and using marijuana were more likely to use the substances than those who have negative perceptions; adolescents who place more value on academic achievement and have higher expectations on academic achievement were less likely to get involved in problem behavior; those who have more value on independence and more expectation to attain independence goal were at higher risk of problem behavior proneness.

Conceptual frameworks of the Problem Behavior theory (Jessor and Jessor, 1977) have been tested with adolescent alcohol and marijuana use and results have shown significant correlations with the problems. Cross-sectional (Jessor, Chase, & Donovan, 1980) and longitudinal (Jessor, 1987) studies have concluded that adolescent alcohol and marijuana use are associated with lower value on academic achievement, higher value on independence, greater attitudinal tolerance of deviance, lesser religiosity, less compatibility between parents and friends, greater perceived influence from friends than parents, greater friends approval for problem behavior, greater friends models for problem behavior, greater involvement in other problem behavior, and less involvement with conventional behavior such as attending church. The researchers have also found that adolescent drinking problem is predictive of adolescent marijuana use and vice versa (Jessor, Chase, & Donovan, 1980; Jessor, 1987). So far, the Problem Behavior theory has been tested in numerous studies in both the United States (De Leo & Wulfert, 2013; Mobley & Chun, 2013) and oversea countries (Ndugwa et al, 2011; Jessor, Turbi, Costa, Dong, Zhang, and Wang, 2003). Results of these studies have confirmed the conceptual frameworks of the theory that protective factors (support, control, and models) and

risk factors (models, vulnerability, and opportunity) significantly prevent/ decrease or predict the development of problem behaviors (alcohol problems, marijuana use, cigarette smoking, and risky sexual intercourses) among adolescents (Ndugwa et al, 2011; Jessor, Turbi, Costa, Dong, Zhang, and Wang, 2003); those who have greater attitudinal tolerance of deviance and have less value on academic achievement are more likely to use drugs, smoke cigarette, and have risky sexual behaviors (De Leo & Wulfert, 2013).
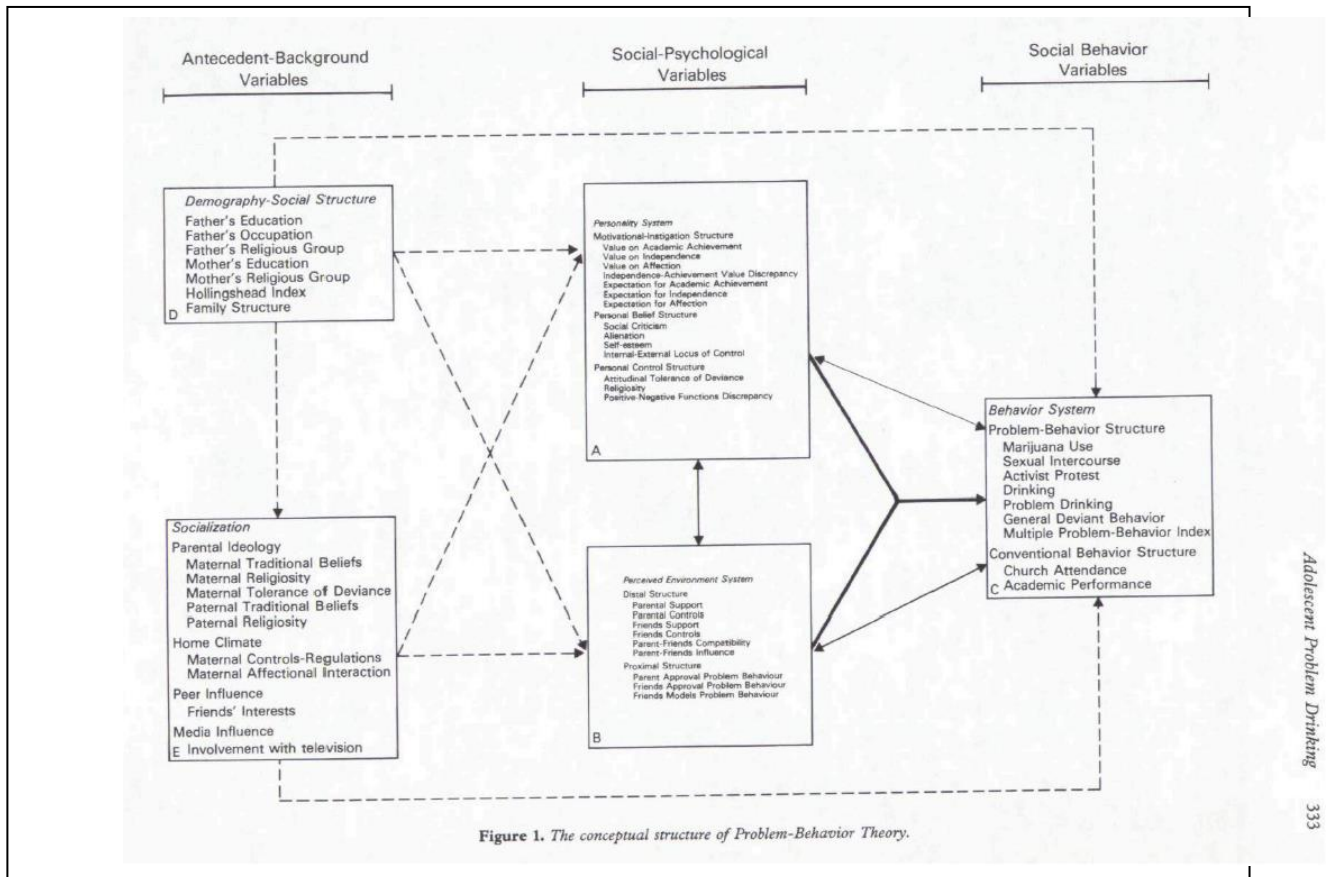
Figure 1. *The conceptual structure of Problem Behavior Theory*

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4.0   METHODOLOGY

4.1   STUDY DESIGN AND PROCEDURE

The 2013 National Survey on Drug Use and Health (NSDUH) is the 33rd in a series of survey conducted by the Federal Government since 1971 and is sponsored by SAMHSA, U.S. Department of Health and Human Services. The primary purpose of this survey is to measure the prevalence and correlates of drug use in the United States. This survey series provide information about the use of tobacco, alcohol, marijuana, cocaine, crack cocaine, heroin, hallucinogens, inhalants, pain relievers, tranquilizers, stimulants, and sedatives among the non-institutionalized United States civilian population aged 12 and older in 50 States and the District of Columbia. This is the best way to estimate different types of drug use virtually in the entire the United States. The 2013 NSDUH is a cross-sectional study because participants' interview were only conducted one time. Therefore, the survey only provides an overview of the prevalence of drug use at in 2013 rather than a view of how drug use changes over time for specific individuals.

The 2013 NSDUH used computer-assisted interviewing (CAI) methods, which combined computer-assisted personal interviewing (CAPI) conducted by an interviewer and audio computer-assisted self-interviewing (ACASI) for data collection. Usage of ACASI is to provide respondents with a highly private and confidential means of responding to questions and to increase the level of honest reporting of illicit drug use and other sensitive behaviors. To collect information, field interviewers visited each sample address to determine dwelling unit eligibility, to select participants, and to conduct interviews. The interviewers also identified and immediately followed any new housing units or any dwelling units missed during the advance listing process. The interviewers used a portable computer to do screening process, select

participants, and conduct interviews with eligible participants at their homes. A total of 67,838 CAI interviews was obtained in 2013, and 83.93% of them responded to the questionnaires. The data was weighted to obtain unbiased estimates for survey outcomes. Throughout the course of the study, participants' anonymity and privacy of responses were protected by hiding identifying information from survey responses in compliance with Federal laws. In addition, questionnaires of the survey and the interviewing procedures were designed to enhance the privacy of responses. ACASI was used to gather answers to sensitive questions. Each participant who completed a full interview was given a $30 cash payment as a token of appreciation for his or her time.

4.2   PARTICIPANTS FOR THE CURRENT STUDY

The scope of this study aims at White, African American, and Asian American adolescents aged 12 to 17 years old. A total of 12,984 adolescents was computed from the 2013 NSDUH data. The majority of the total samples are White adolescents, N= 9,920 (76.4%), which is followed by African American youth, N= 2,420 (18.6%). Meanwhile, Asian American counterparts take the smallest proportion of the samples, N= 644 (5.0%). In this study, male adolescents are 51.0% (N= 6,618). Participants aged 12, 13, 14, 15, 16, and 17 accounted for 1,952 (15%), 2,111 (16.3%), 2,215 (17.1), 2,232 (17.2%), 2,248 (17.3%), and 2,226 (17.1%) respectively.

4.3   MEASURES

4.3.1   Dependent variables

4.3.1.1 Marijuana use.

The participants were asked if they had ever used marijuana. Their answers were coded as 0= "No" and 1= "Yes or used".

4.3.1.2 Alcohol use.

The participants were asked if they had ever used alcohol. Their answers were coded as 0= "No" and 1= "Yes or used".

4.3.2   Predictors

4.3.2.1 Religiosity.

This latent construct examines how religious the participants are. This score variable was created by summing Z scores of 5 individual religiosity items: (1) Number of religious services you attended in the past 12 months (2) Number of church or faith-based activities you attended in the past 12 months, (3) My religious beliefs are very important (4), My religious beliefs influence my decisions, and (5) It is important that my friends share religious beliefs. The Cronbach alpha of these items yielded at 0.83, and the higher scores indicate higher levels of religiosity. The distributions of this variable are as follows: M (.0019), SD (.77278), Skewness (.006), and Kurtosis (-.841).

4.3.2.2 School-based prevention programs.

This variable examines if the participants have attended a special class about drugs and alcohol in school during the past 12 months. The participants' answers were recoded as 0= "No" and 1= "Yes".

4.3.2.3 Parental support.

This variable examines the participants' perceptions about emotional support and help in study that they received from their parents. It combines four specific items: (1) How often did your parents check if you have done your homework? (2) How often did your parents provide help with your homework when you needed it? (3) How often did your parents let you know you have done a good job? and (4) How often did your parents tell you they were proud of you for

something you had done? The standardized Cronbach's alpha of these items was .77. In the original data set, the answers of these items were coded as 1= "Always", 2= "Seldom", 3= "Sometimes", and 4= "Never". In this study, these items were reversely recoded as 0= "Never", 1= "Seldom", 2= "Sometimes", and 3= "Always" so that they have the same direction with other variables. The distribution of the Parental support variable ranges from 0 to 12, indicating that the higher scores the more parental support the participants received. Due to high skewness of the distribution, Parental support was dichotomized as "low parental support" for scores from 0 to 9) versus "high parental support" for scores from 10 to 12.

4.3.2.4 Parental monitoring.

Parental monitoring measures the participants' perceptions about their parents' monitoring on their activities in the past 12 months. It is a combination of three continuous variables: (1) How often parents limited the amount of time adolescents watched TV, and (2) How often parents limited the amount of time adolescents went out with friends on school nights; and (3) How often your parents made you do chores around the house. The standardized Cronbach's alpha of these items was .50. Similar to the measurements of Parental support variable, these two variables were recoded as 0= "Never", 1= "Seldom", 2= "Sometimes", and 3= "Always". The distribution of Parental monitoring ranges from 0 to 9, indicating that the higher scores the higher parental monitoring the participants receive. Due to its high skewness, Parental monitoring was dichotomized as "low parental monitoring" for scores from 0 to 5 versus "high parental monitoring" for scores from 4 to 6.

4.3.2.5 Parental disapproval.

Parental disapproval measures how adolescents feel about their parents' attitudes towards their drinking and marijuana use. It consists of three specific items: (1) How do you think your parents

would feel about you trying marijuana or hashish once or twice? (2) How do you think your parents would feel about you using marijuana or hashish once a month or more? and (3) How do you think your parents would feel about you having one or two drinks of an alcoholic beverage nearly every day? The scales of these items include: 1= "Neither disapprove nor approve", 2= "Somewhat disapprove", and 3= "Strongly disapprove". The standardized Cronbach's alpha of these items yielded at .84. The distribution of Parental disapproval ranges from 3 to 9, meaning that the higher scores the more parental disapproval the participants received. Due to the issue of normality distribution, Parental disapproval was dichotomized as 2= "Strong parental disapproval" for score of 9, and 1= "Everyone else" for scores from 3 to 8.

4.3.2.6 Peer substance use.

Peer substance use examines the proportion of alcohol and marijuana use among the participants' class mates. It was created by summing up three specific items: (1) How many of the students in your grade at school would you say use marijuana or hashish? (2) How many of the students in your grade at school would you say drink alcoholic beverages? and (3) How many of the students in your grade at school would you say get drunk at least once a week? The measurements of these items include: 1= "None of them", 2= "A few of them", 3= "Most of them", and 4= "All of them". The standardized Cronbach's alpha of these items was .87. The distribution of Peer substance use ranges from 3 to 12, indicating that the higher scores the more substance- using friends that the participants had. The distributions of this variable are as follows: M (5.85), SD (2.07), Skewness (.176), and Kurtosis (-.809).

4.3.2.7 Peer disapproval.

Peer disapproval examines the participants' perceptions about their close friends' attitudes towards their drinking and marijuana use. It was created by adding up three items: (1) How do

you think your close friends would feel about you trying marijuana or hashish once or twice? (2) How do you think your close friends would feel about you using marijuana or hashish once a month or more? and (3) How do you think your close friends would feel about you having one or two drinks of an alcoholic beverage nearly every day? The scales of these items have three levels: 1= "Neither disapprove nor approve", 2= "Disapprove", and 3= "Strongly disapprove". Their standardized Cronbach's alpha yielded at .89. The distribution of Peer disapproval ranges from 3 to 9, indicating that the higher score, the more peer disapproval participants received. Due to its high skewness, Peer disapproval was dichotomized as 2= "Strong peer disapproval" for score of 9, and 1= "Everyone else" for scores of 3 to 8.

4.3.2.8 Race.

In the 2011 NSDUH data set, this categorical variable consisted of seven categorizations. In this study, only three of them were used including White, African American, and Asian adolescents, which were recoded as 1= "Whites", 2= "African Americans", and 3= "Asian Americans".

4.3.2.9 Age.

Originally, this continuous variable included all participants aged 12 to 65 or older. However, only adolescents aged 12 to 17 were selected for this study.

4.3.2.10   Gender.

This categorical variable was recoded as 1= "Male" and 2= "Female".

4.4   DATA ANALYSES

Preliminary analyses were conducted to check normality distributions, and bivariate relationships of all predictors and dependent variables. The purpose of preliminary analyses aimed to check

assumptions of this study. Specifically, preliminary analyses checked skewness, kurtosis, means, medians, modes, standard deviations, and Chi square or F tests.

Since predictors are either categorical or continuous variables, while alcohol and marijuana use are dichotomous, binary logistic regression analyses were computed to examine the odds of marijuana and alcohol use occurring as the values of religiosity, school-based prevention programs, parental support, parental monitoring, parental disapproval, peer use, and peer disapproval variables change, controlling for demographic variables (age, race, and gender). Then, these analyses were followed by moderation and mediation analyses to explore (1) if the relationship between religiosity and alcohol and marijuana use among these adolescents is moderated by age, race, and gender; and (2) if religiosity acts as a mediator of the presumed tendency for younger, Black, and female youth to use marijuana and alcohol.

5.0   RESULTS

5.1   DESCRIPTIVE ANALYSES OF THE STUDY VARIABLES

Descriptive statistics (see Tables 1 and 2) show that the percentages of those who did not use marijuana and alcohol were much higher than that of those who used the substances; the majority of participants in the study were whites followed by African Americans and then Asian Americans; the percentages of male and female participants were almost equal; similarly, the percentage of those who received low parental monitoring was almost the same as the percentage of those who received high parental monitoring; those who received high parental support outnumbered those who received low parental support; the majority of participants received parental disapproval for their substance use; the majority of participants received peer disapproval for their substance use; the percentage of those who attended a special class on drugs and alcohol use were less than those who did not attend the class; the participants' number of substance-using friends ranged from three to 12; and the participants' religiosity scored from - 1.61 to 1.54. (For more details regarding distributions of variables in the study see Table 1 and 2).

Table 1. Descriptive Analysis of Marijuana Use, Alcohol Use, Race, Gender, Parental Monitoring, Parental Support,

Parental Disapproval, Peer Disapproval, and School-Based Prevention Programs Variables (N= 12,984)

Variables	n	%
Marijuana use		
No	10790	83.1
Yes	2184	16.8
Alcohol use		
No	8887	68.4
Yes	4088	31.5
Race		
White	9920	76.4
African American	2420	18.6
Asian American	644	5.0
Gender		
Male	6618	51.0
Female	6366	49.0
Parental monitoring		
Low parental monitoring	5959	45.9
High parental monitoring	6062	46.7
Parental support		
Low parental support	4937	38.0
High parental support	7196	55.4
Parental disapproval		
Everyone else	2276	17.5
Parental disapproval	10522	81.1
Peer disapproval		
Everyone else	5568	42.9
Peer disapproval	7181	55.3
Special class on drugs and alcohol use		
No	6939	53.4
Yes	5204	40.1

Table 2. Descriptive Analysis of Age, Number of Substance-Using Friends, and Religiosity Variables (N=12,984)

Variables	M (SD)	Min/Max	Potential Scores
Age	14.5692 (1.68747)	12.00 – 17.00	12.00 – 17.00
Number of substance-using friends	5.8506 (2.06855)	3.00 – 12.00	3.00 – 12.00
Religiosity	.0019 (.77278)	-1.61 – 1.54	-1.61 – 1.54

5.2 BIVARIATE ANALYSES

5.2.1 Bivariate analysis of all variables

Results of bivariate correlations analysis (Table 3) revealed that individual religiosity was statistically significant with both alcohol and marijuana use, indicating higher religiosity is associated with less alcohol and marijuana use among youth. With regards to the relationships between demographic variables and religiosity, the findings show that African American youth are more religious than white counterparts; there is no significant difference in religious beliefs between white and Asian American adolescents; younger youth are more religious than older ones; and female gender are more religious than male gender.

Table 3. Bivariate Analysis of all Predictors and Outcome Variables (N=12,984)

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13
1. AA	--	-.109**	.028**	.000	.085**	-.002	.038**	.003	.071**	-.035**	-.035**	-.013	.044**
2. Asian	-.109**	--	.002	.007	-.002	-.047**	.005	.040**	-.041**	.038**	.027**	-.064**	-.046**
3. Age	.028**	.002	--	.008	-.123**	-.223**	-.127**	-.209**	.605**	-.350**	-.157**	.413**	.336**
4. Gender	.000	.007	.008	--	.085**	-.046**	.028**	.046**	.107**	.078**	.027**	.007	-.026**
5. Religiosity	.085**	-.002	-.123**	.085**	--	.173**	.176**	.240**	-.154**	.242**	.025**	-.195**	-.213**
6. Parent Sup	-.002	-.047**	-.223**	-.046**	.173**	--	.209**	.147**	-.215**	.232**	.071**	-.214**	-.178**
7. Parent Mo	.038**	.005	-.127**	.028**	.176**	.209**	--	.141**	-.127**	.150**	.068**	-.139**	-.110**
8. Parent Dis	.003	.040**	-.209**	.046**	.240**	.147**	.141**	--	-.233**	.407**	.056**	-.317**	-.361**
9. Peer Use	.071**	-.041**	.605**	.107**	-.154**	-.215**	-.127**	-.233**	--	-.414**	-.079**	.449**	.387**
10. Peer Dis	-.035**	.038**	-.350**	.078**	.242**	.232**	.150**	.407**	-.414**	--	.065**	-.413**	-.400**
11. Program	-.035**	.027**	-.157**	.027**	.025**	.071**	.068**	.056**	-.079**	.065**	--	-.105**	-.091**
12. Al Use	-.013	-.064**	.413**	.007	-.195**	-.214**	-.139**	-.317**	.449**	-.413**	-.105**	--	.531**
13. Mari Use	.044**	-.046**	.336**	-.026**	-.213**	-.178**	-.110**	-.361**	.387**	-.400**	-.091**	.531**	--

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

5.2.2 Bivariate analysis predicting marijuana use by all predictors

Table 4 represents a bivariate analysis of the variables race, gender, parental monitoring, parental support, parental disapproval, peer attitudes, and school-based prevention programs by the dependent variable – marijuana use. Chi-square analysis indicated that race statistically predicted marijuana use among white, African American, and Asian American adolescents, $\chi 2(2)=48.361$, p<.001. Specially, the percentages of white, African American, and Asian American adolescents who used marijuana were 16.5% (N=1634), 20.3% (n=491), and 9.2% (N=59) respectively. Chi-square analyses also indicated that more male adolescents (17.8%; n=1177) used marijuana than

female counterparts (15.8%; N=1007), $\chi^2(1)=9.059$, p<.01; a significantly higher percentage of those who received low parental monitoring used marijuana (21.7%; N=1290) in comparison with the percentage of those who received high parental monitoring (13.3%; N=808), $\chi^2(1)=144.582$, p<.001; those who received low parental support used marijuana (25.3%; N=1249) two times more than those who received high parental support (11.6%; N=837), $\chi^2(1)=384.637$, p<.001; those who received strong parental disapproval used marijuana (10.5%; N=1109) much less than everyone else (45.8%; N=1043), $\chi^2(1)=1665.296$, p<.001; similarly, a significantly lower percentage of those who received strong peer disapproval used marijuana (3.7%; N=265) relative to the percentage of everyone else (33.9%; N=1885), $\chi^2(1)=2035.493$, p<.001; and those who did not attended a special class on drugs and alcohol used marijuana (20.3%; N=1406) more than those who attended the drug and alcohol class (13.3%; N=691), $\chi^2(1)=101.539$, p<.001.

Table 4. Bivariate Analysis Predicting Marijuana Use by Race, Gender, Parental Monitoring, Parental Support,

Parental Disapproval, Peer Disapproval, and School-Based Prevention Programs Variables (N=12,984)

Variables	Have You Used Marijuana?					
	Yes		No			
	n	%	n	%	X^2(df)	Cramer'sV
Race					48.361(2)***	.061***
White	1634	(16.5)	8281	(83.5)		
African American	491	(20.3)	19275	(79.7)		
Asian American	59	(9.2)	82	(90.8)		
Gender					9.059(1)**	.026**
Male	11771	(17.8)	54345	(82.2)		
Female	007	(15.8)	356	(84.2)		
Parental monitoring					144.582(1)***	.110***
Low parental monitoring	12908	(21.7)	46645	(78.3)		
High parental monitoring	08	(13.3)	251	(86.7)		
Parental support					384.637(1)***	.178***
Low parental support	12498	(25.3)	36846	(74.7)		
High parental support	37	(11.6)	356	(88.4)		
Parental disapproval					1665.296(1)***	.361***
Everyone else	10431	(45.8)	12329	(54.2)		
Parental disapproval	109	(10.5)	406	(89.5)		
Peer disapproval					2035.493(1)***	.400***
Everyone else	18852	(33.9)	36806	(66.1)		
Peer disapproval	65	(3.7)	912	(96.3)		
Special class on drugs and alcohol use					101.539(1)***	.091***
No	14066	(20.3)	55294	(79.7)		
Yes	91	(13.3)	510	(86.7)		

**p<.01, ***p<.001

Table 5 represents a bivariate analysis of the variables substance-using friends, age, and religiosity by the dependent variable - marijuana use. Independent-sample t-tests indicated that the mean score reflecting number of substance-using friends was higher among adolescents who used marijuana (M=7.57, SD=1.64) relative to the mean score of those who did not use marijuana (M=5.48, SD=1.96), t(3426.6)=-50.289, p<.001; the mean score of age was higher among those who used marijuana (M=15.83, SD=1.20) than the mean score of those who did not use the substance (M=14.31, SD=1.66), t(4082.8)=-50.282, p<.001; and the mean sore of religiosity was much lower among those who used marijuana (M=-0.36, SD=0.70) than the mean score of those who did not use the substance (M=0.08, SD=0.77), t(3289.1)=26.188, p<.001.

Table 5. Bivariate Analysis Predicting Marijuana Use by Substance-Using Friends, Age, and Religiosity

(N=12,984)

Variables	M (SD)	t (df)	p	Pt. biserial
Have you used marijuana? (Peer Use)		-50.289 (3426.6)	<.001	.387**
Yes				
No	7.57 (1.64)			
	5.48 (1.96)			
Have you used marijuana? (Age)				
Yes		-50.282 (4082.8)	<.001	.336**
No	15.83 (1.20)			
	14.31 (1.66)			
Have you used marijuana? (Religiosity)				
Yes	-.36 (.70)	26.188 (3289.1)	<.001	-.213**
No	.08 (.77)			

5.2.3 Bivariate analysis predicting alcohol use by all predictors

Table 6 represents a bivariate analysis of the variables race, gender, parental monitoring, parental support, parental disapproval, peer disapproval, and school-based prevention programs by the dependent variable – alcohol use. Chi-square analysis indicated that race statistically predicted alcohol use among white, African American, and Asian American adolescents, $\chi2(2)=58.224$, p<.001. Specially, the percentages of white, African American, and Asian American adolescents who used alcohol were 32.7% (N=3238), 30.2% (n=731), and 18.5% (N=119) respectively. Chi-square analyses also indicated that gender did not statistically predict alcohol use among the study participants, $\chi2(1)=0.726$, p>.05; those who received low parental monitoring used alcohol (39.1%; N=2327) almost three times more than those who received high parental monitoring (13.3%; N=808), $\chi2(1)=232.282$, p<.001; a significantly higher percentage of those who received low parental support used alcohol (44.2%; N=2128) relative to the percentage of those who received high parental support (23.8%; N=2715), $\chi2(1)=557.029$, p<.001; those received strong parental disapproval used alcohol (24.7%; N=2601) much less than everyone else (63.2%; N=1438), $\chi2(1)=1281.718$, p<.001; similarly, those who received strong peer disapproval used

alcohol (14.7%; N=1054) almost four time less than everyone else (53.4%; N=2975), χ2(1)=2178.682, p<.001; and those who attended a special class on drugs and alcohol used alcohol (32.2%; N=3912) less than those who did not attend the drug and alcohol class (36.5%; N=2531), χ2(1)=134.555, p<.001.

Table 6. Bivariate Analysis Predicting Alcohol Use by Race, Gender, Parental Monitoring, Parental Support, Parental Disapproval, Peer Disapproval, and School-Based Prevention Programs Variables (N=12,984)

Variables	Have You Used Alcohol?				X^2(df)	Cramer's V
	Yes		No			
	n	%	n	%		
Race					58.224(2)***	.067***
White	32387	(32.7)	66771	(67.3)		
African American	31	(30.2)	68652	(69.8)		
Asian American	119	(18.5)	4	(81.5)		
Gender					.726(1)	.007
Male	20612	(31.2)	45524	(68.8)		
Female	027	(31.9)	335	(68.1)		
Parental monitoring					232.282(1)***	.139***
Low parental monitoring	23278	(39.1)	36304	(60.9)		
High parental monitoring	08	(13.3)	482	(74.0)		
Parental support					557.029(1)***	.214***
Low parental support	21821	(44.2)	27535	(55.8)		
High parental support	715	(23.8)	478	(76.2)		
Parental disapproval					1281.718(1)***	.317***
Everyone else	14382	(63.2)	837	(36.8)		
Parental disapproval	601	(24.7)	7916	(75.3)		
Peer disapproval					2178.682(1)***	.413***
Everyone else	29751	(53.4)	25916	(46.6)		
Peer disapproval	054	(14.7)	123	(85.3)		
Special class on drugs and alcohol use					134.555(1)***	.105***
No	25313	(36.5)	44058	(63.5)		
Yes	912	(32.2)	226	(67.8)		

**p<.01, ***p<.001

Table 7 represents a bivariate analysis of the variables substance-using friends, age, and religiosity by the dependent variable – alcohol use. Independent-sample t-tests indicated that the mean score reflecting number of substance-using friends was higher among adolescents who used alcohol (M=7.17, SD=1.74) relative to the mean score of those who did not use alcohol (M=5.19, SD=1.90), t(8228.1)=-55.461, p<.001; the mean score of age was higher among those who used alcohol (M=15.60, SD=1.20) than the mean score of those who did not use the

substance (M=14.10, SD=1.61), t(9303.6)=-54.937, p<.001; and the mean sore of religiosity was much lower among those who used alcohol (M=-0.22, SD=0.74) than the mean score of those who did not use the substance (M=0.10, SD=0.77), t(8124.5)=22.770, p<.001.

Table 7. Bivariate Analysis Predicting Alcohol Use by Substance-Using Friends, Age, and Religiosity (N=12,984)

Variables	M (SD)	t (df)	p	Pt. biserial
Have you used alcohol? (Peer Use)		-55.461 (8228.1)	<.001	.449**
Yes				
No	7.17 (1.74)			
	5.19 (1.90)			
Have you used alcohol? (Age)		-54.937 (9303.6)	<.001	.413**
Yes				
No	15.60 (1.20)			
	14.10 (1.61)			
Have you used alcohol? (Religiosity)		22.770 (8124.5)	<.001	-.195**
Yes				
No	-.22 (.74)			
	.10 (.77)			

Since binary logistic regression does not assume linearity, normal distribution of scores, or homoscedasticity, there is not a need to test for these assumptions. I have tested multicollinearity assumption, which aims to check if there is a strong correlation among predictors in regression models. The test result revealed that this assumption was met because its VIP value was less than 10.

5.3 BINARY LOGISTIC REGRESSION ANALYSIS PREDICTING MARIJUANA USE BY RELIGIOSITY, SCHOOL-BASED PREVENTION PROGRAMS, PARENTAL INFLUENCE, PEER INFLUENCE, AND DEMOGRAPHIC VARIABLES

To investigate how well religiosity and school-based prevention program influence marijuana use among white, African American and Asian American adolescents, a binary logistic regression analysis was conducted, employing marijuana use as an outcome variable. Demographic variables including age, race, and gender were entered into the first block. The second block included parental monitoring, parental support and parental disapproval. Parental

variables were followed by peer substance use and peer disapproval in the third block. The independent variable – religiosity was entered in the fourth block, controlling for demographic, parental, and peer variables. Finally, school-based prevention programs variable was added to the fifth block to see if school-based prevention programs had deterrent effects on marijuana use among the study participants, controlling for demographic variables, parental influence, peer influence, and individual religiosity. The logic of entering variables into separate blocks is to test the whole model and the separate sets of variables.

Table 8 represents a binary logistic regression analysis examining the relationships between the predictors and marijuana use (No/Yes). Data indicated that the overall model was statistically significant, $\chi2(11, N=12,984) = 3460.909$, p<.001. Furthermore, data indicated that 85.4% of cases were categorized correctly. In terms of individual predictors, results of demographic variables, $\chi2(4, N=12,984)= 1461.618$, p<.001, showed that older adolescents were almost 1.4 times (OR=1.366, 95% CI=1.300-1.435) more likely to use marijuana than younger ones; African American adolescents were 1.45 times (OR=1.451, 95% CI=1.247-1.689) more likely to use marijuana than white youths; Asian American adolescents were 1.4 times (OR=.710, 95% CI=.511-.987) less likely to use marijuana than white counterparts; female participants were 1.2 times (OR=.859, 95% CI=.761-.970) less likely to use marijuana than males. Findings of parental set of variables, $\chi2(3, N=12,984) = 949.630$, p<.001, indicated that these who received high parental support in study was 1.3 times (OR=.758, 95% CI=.671-.857) less likely to use marijuana than those who received low parental support; similarly, those who received strong parental disapproval were almost 2.9 times (OR=.350, 95% CI=.308-.399) less likely to use marijuana than everybody else; however, there was no significant difference between "low parental monitoring" and "high parental monitoring" participants on marijuana

use. The third block, χ2(2, N=12,984) = 950.999, p<.001, reported that the more substance-using friends the more likely the participants used marijuana (OR=1.404, 95% CI=1.350-1.460); those who received strong peer disapproval were 4.6 times (OR= .219, 95% CI=.187-.256) less likely to use marijuana than everyone else. Result of the independent variable - religiosity, χ2(1) = 86.318, p<.001, revealed that the more religious the less likely the adolescents used marijuana (OR=.671, 95% CI=.617-.730). Result of the school-based prevention program model indicated that those who attended a special class on drugs or alcohol were 1.2 times (OR=.814, 95% CI=.718-.921) less likely to use marijuana than those who did not attend the prevention training programs, χ2(1, N=12,984) = 10.595, p<.01.

Table 8. Binary Logistic Regression Analysis Examining Marijuana Use (N=12,984)

Variables	B (SE)	Wald (X^2)	OR (95% CI)
Block 1			
Age	.312 (.025)	154.925***	1.366 (1.300-1.435)
African American	.372 (.077)	23.157***	1.451 (1.247-1.689)
Asian American	-.342 (.168)	4.150**	.710 (.511-.987)
Gender (1)	-.152 (.062)	6.022**	.859 (.761-.970)
Block 2			
Parental monitoring (1)	.058 (.063)	.829	1.059 (.936-1.200)
Parental support (1)	-.277 (.062)	19.615***	.758 (.671-.857)
Parental disapproval (1)	-1.049 (.066)	250.027***	.350 (.308-.399)
Block 3			
Peer substance use	.339 (.020)	291.985***	1.404 (1.350-1.460)
Peer disapproval (1)	-1.518 (.080)	359.153***	.219 (.187-.256)
Block 4			
Religiosity	-.399 (.043)	86.318***	.671 (.617-.730)
Block 5			
Prevention programs	-.206 (.064)	10.543**	.814 (.718-.921)

Note: White is the reference group for race
For Model: R^2= .269 (Cox & Snell), R^2= .440 (Nagelkerke), χ2(11) = 3460.909, *p*<.001
Block 1: R^2= .124 (Cox & Snell), R^2= .203 (Nagelkerke), χ2(4)= 1461.618, *p*<.001
Block 2: R^2= .196 (Cox & Snell), R^2= .321 (Nagelkerke), χ2(3) = 949.630, *p*<.001
Block 3: R^2= .262 (Cox & Snell), R^2= .429 (Nagelkerke), χ2(2) = 950.999, *p*<.001
Block 4: R^2= .268 (Cox & Snell), R^2= .439 (Nagelkerke), χ2(1) = 88.067, *p*<.001
Block 5: R^2= .269 (Cox & Snell), R^2= .440 (Nagelkerke), χ2(1) = 10.595, *p*<.01
*p<.05, **p<.01, ***p<.001.

5.4 BINARY LOGISTIC REGRESSION ANALYSIS PREDICTING ALCOHOL USE BY RELIGIOSITY, SCHOOL-BASED PREVENTION PROGRAMS, PARENTAL INFLUENCE, PEER INFLUENCE, AND DEMOGRAPHIC VARIABLES

Table 9 represents a binary logistic regression analysis examining the relationships between the predictors and alcohol use (No/Yes). Data indicated that the overall model was statistically significant, $\chi2(11, N=12,984) = 3985.495$, $p<.001$. Furthermore, data indicated that 77.8% of cases were categorized correctly. In terms of individual predictors, results of demographic variables, $\chi2(4, N=12,984)= 2173.265$, $p<.001$, showed that older adolescents were almost 1.4 times (OR=1.390, 95% CI=1.339-1.443) more likely to use alcohol than younger ones; African American adolescents were 1.36 times (OR=.736, 95% CI=.647-.837) less likely to drink than white youths; Asian American adolescents were 2 times (OR=.500, 95% CI=.388-.644) less likely to use alcohol than white counterparts; there was no significant difference in alcohol use between female and male adolescents in the study. Findings of parental set of variables, $\chi2(3, N=12,984) = 825.401$, $p<.001$, indicated that these who received high parental support in study was 1.39 times (OR=.719, 95% CI=.651-.795) less likely to use alcohol than those who received low parental support; similarly, those who received strong parental disapproval were almost 2.3 times (OR=.436, 95% CI=.385-.495) less likely to drink alcohol than everybody else; however, there was no significant difference in alcohol drinking between "low parental monitoring" and "high parental monitoring" participants. The third block, $\chi2(2, N=12,984) = 938.619$, $p<.001$, reported that the more substance-using friends the more likely the participants used alcohol (OR=1.355, 95% CI=1.314-1.397); those who received strong peer disapproval were 2.65 times (OR=.387, 95% CI=.348-.431) less likely to drink alcohol than everyone else. The independent variable - religiosity, $\chi2(1) = 35.172$, $p<.001$, revealed that the more religious the less likely

(1.22 times) the adolescents use alcohol (OR=.819, 95% CI=.767-.875). Result of the school-based prevention program model indicated that those who attended a special class on drugs or alcohol were 1.2 times (OR=.831, 95% CI=.752-.919) less likely to use alcohol than those who did not attend the prevention training programs, $\chi2(1, N=12,984) = 13.136, p<.001$.

Table 9. Binary Logistic Regression Analysis Examining Alcohol Use (N=12,984)

Variables	B (SE)	Wald (X^2)	OR (95% CI)
Block 1			
Age	.329 (.019)	299.206***	1.390 (1.339-1.443)
African American	-.307 (.066)	21.634***	.736 (.647-.837)
Asian American	-.693 (.129)	28.876***	.500 (.388-.644)
Gender (1)	.064 (.051)	1.628	1.067 (.966-1.178)
Block 2			
Parental monitoring (1)	-.092 (.051)	3.249	.912 (.826-1.008)
Parental support (1)	-.329 (.051)	41.644***	.719 (.651-.795)
Parental disapproval (1)	-.829 (.064)	165.765***	.436 (.385-.495)
Block 3			
Peer substance use	.304 (.016)	378.148***	1.355 (1.314-1.397)
Peer disapproval (1)	-.948 (.054)	304.597***	.387 (.348-.431)
Block 4			
Religiosity	-.200 (.034)	35.172***	.819 (.767-.875)
Block 5			
Prevention programs	-.185 (.051)	13.125***	.831 (.752-.919)

Note: White is the reference group for race.
For Model: R^2 = .303 (Cox & Snell), R^2 = .420 (Nagelkerke), $\chi2(11) = 3985.495, p<.001$
Block 1: R^2 = .178 (Cox & Snell), R^2 = .247 (Nagelkerke), $\chi2(4)= 2173.265, p<.001$
Block 2: R^2 = .238 (Cox & Snell), R^2 = .329 (Nagelkerke), $\chi2(3) = 825.401, p<.001$
Block 3: R^2 = .300 (Cox & Snell), R^2 = .416 (Nagelkerke), $\chi2(2) = 938.619, p<.001$
Block 4: R^2 = .302 (Cox & Snell), R^2 = .419 (Nagelkerke), $\chi2(1) = 35.073, p<.001$
Block 5: R^2 = .303 (Cox & Snell), R^2 = .420 (Nagelkerke), $\chi2(1) = 13.136, p<.001$
*$p<.05$, **$p<.01$, ***$p<.001$.

Summary: Results of bivariate and multivariate analyses support hypotheses of the study. The inconsistent findings about Parental monitoring in bivariate and multivariate analyses would be due to redundancy of the variable, presumably, with other parenting measures. Specifically, parental monitoring wasn't significant in multivariate analyses because of shared variance with all those other parenting variables.

5.5   MODERATION AND MEDIATION TESTS ON THE IMPACTS OF RACE, AGE, GENDER, AND RELIGIOSITY ON MARIJUANA AND ALCOHOL USE.

To further investigate past research findings about the relationships among demographic variables, religiosity, and adolescent substance use, this section focuses on moderation and mediation analyses to explore (1) if the relationships between religiosity and adolescent alcohol and marijuana use are moderated by age, race, and gender (Figure 2) , and (2) if religiosity acts as a mediator in the relationships between background variables and adolescent substance use variables as addressed by research questions 2 and 3 as well as purposes 4 and 5 in this study (Figure 3).
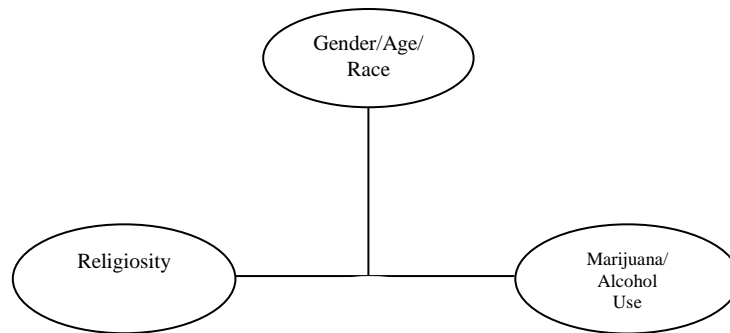
Figure 2. *Gender as a moderator for the impact of religiosity on alcohol and marijuana use*
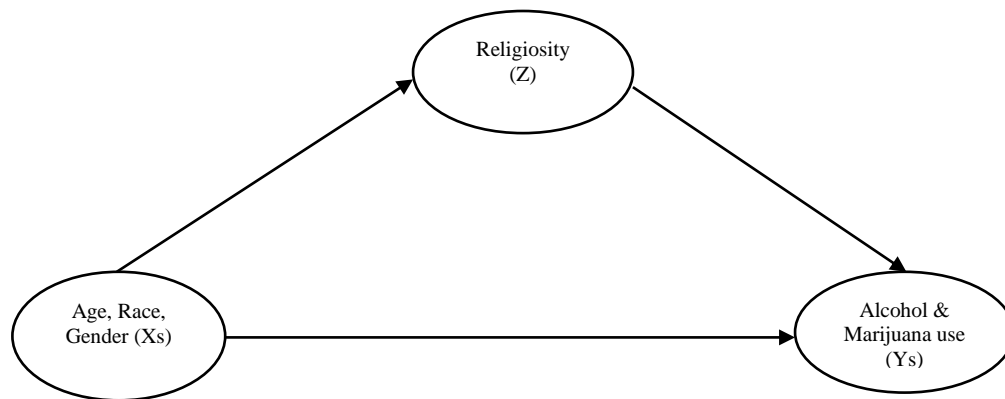
Figure 3. *Religiosity as a mediator for the impact of age, race, and gender on alcohol and marijuana use*

5.5.1 Race, age, and gender as moderators for the relationships between religiosity and alcohol and marijuana use

Results of moderation tests revealed that there were no moderation effects of age and race in the relationship between religiosity and alcohol use; similarly race and age did not serve as moderators of the impact of religiosity on marijuana use among the study participants. However, gender did serve as a moderator for the relationship between religiosity and marijuana use among the adolescents. The moderation effect of gender on the impact of religiosity on marijuana was evaluated by the interaction term which indicated that the lower likelihood of marijuana use by religious youth was especially apparent for girls (B= -.17, Wald chi square= 4.31, p< .05). The same pattern was found for alcohol use but the effect was not statistically significant (p< .15). Whereas age and race did not qualify the religiosity→use relationship, female gender did contribute to a stronger impact of religiosity on lower usage.

5.5.2 Religiosity as a mediator of race, age, and gender predicting marijuana and alcohol use

Findings from previous research and the bivariate correlations in this study revealed a potential mediation effect of religiosity (Z) on the relationships of age, race, and gender (Xs) with marijuana and alcohol use (Ys) among the study participants. Thus, this section will check: (1) the relationship between independent variables of race, age, and gender (Xs) and religiosity (Z), controlling for the parenting and peer variables, and (2) the relationships between religiosity and the Ys. Specifically, I will run an OLS regression analysis predicting religiosity (Z) from age, race, gender, parenting, and peer variables (Xs). Then, I will also check the relationships between Xs and Ys in binary logistic regression analyses with and without the presence of religiosity in the models. These latter analyses provide the estimates for the effect of religiosity

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(Z$\rightarrow$Y) and show possible differences in the X--Y prediction when religiosity is absent versus present in the analysis (B$_{absent}$/B$_{present}$). In the mediation figures presented later, the predictors of religiosity are non-standardized Bs from the OLS regression, and the estimates of the Ys are logistic regression coefficients from the binary logistic regression analyses.

5.5.2.1 Tests of the Mediating Role of Religiosity in the Age, Gender and Race effects on alcohol and marijuana use

Figure 4 shows the ordinary regression B and logistic regression coefficients from the analyses predicting religiosity and marijuana use, respectively. Religiosity was a strong predictor of less marijuana use (B= -.398, p< .001). This figure also provides the X$\rightarrow$Z coefficients, revealing that Black race (B= .187) and female gender (B=.106) significantly predicted religiosity (Z). These results informally supported an indirect path in which black race and female gender enhance religiosity, which, in turn, reduces the likelihood of marijuana use. The direct logistic B coefficients for the background predictors showed that younger age, Asian ethnicity and female gender were associated with lower likelihood of marijuana use, but Black race was associated with higher likelihood. Only Black race and female gender are interesting in the mediation context, since they are significantly related to religiosity. The logistic coefficients became more positive (for Black race) and less negative (for gender) when religiosity was in the model as a mediator that reflects the indirect impact that contributes to lower usage.

Figure 5 shows the same mediation model using alcohol use as the outcome (Y) variable. Once again religiosity is a strong direct predictor of Y, alcohol use (B= -.197). So the mediation paths from Black race and female gender to greater religiosity and from religiosity to lower use, were supported. Regarding alcohol use, Black race, younger age and Asian ethnicity were associated with *lower* usage, but gender was unrelated to likelihood of alcohol use (although

female gender indirectly reduced alcohol). Once again the logistic coefficients for the background predictors of Black race and gender were more positive when religiosity was controlled due to the inclusion of the negatively signed indirect effect through religiosity. Part of the initial Black race and female gender effect is due to drug use diminishing influence of religiosity. When that part is removed from Y by entering/controlling religiosity, the relationships of the predictors to Y are more positive (or less negative). In the absence of the control for religiosity, Black race and female gender were over-estimated as explainers of alcohol and marijuana usage and marijuana use diminishing contribution of religiosity was lost.

In general the mediation effects found and reported here are examples of *partial* mediation since they occur in the presence of significant direct effects of the background variables on the outcome usage variables.
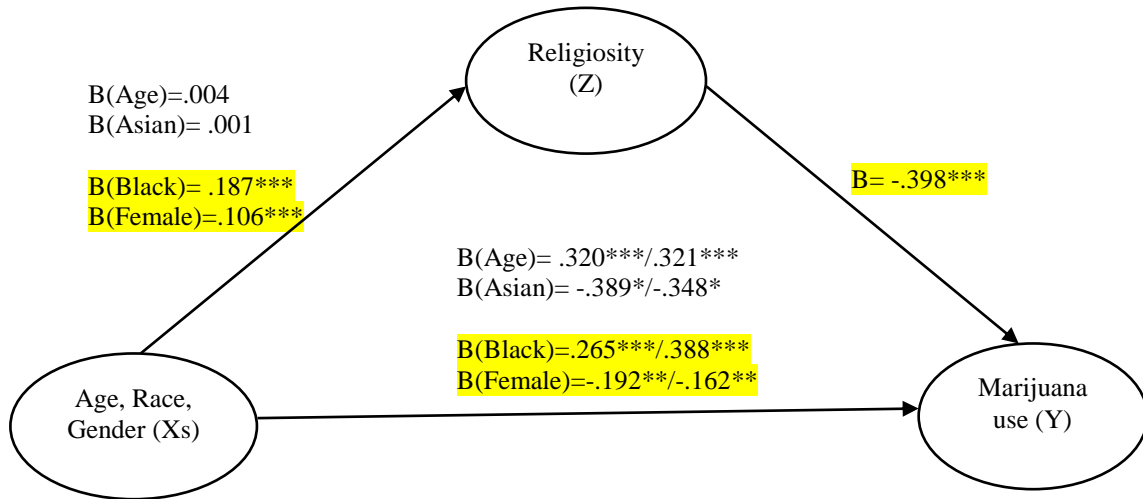
Figure 4. *Religiosity as a partial mediator for African Americans and females in marijuana use (N=12,984)*
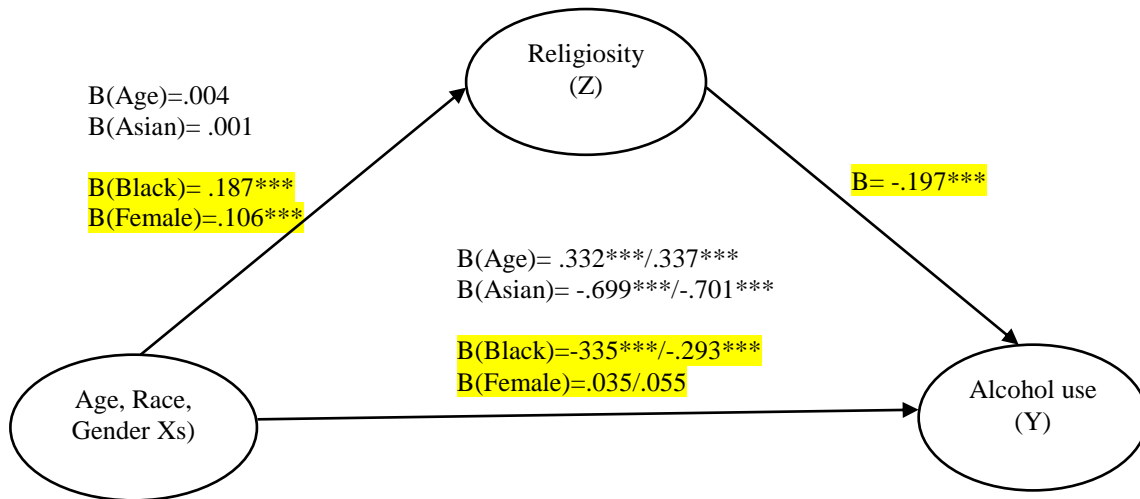
Figure 5. *Religiosity as a partial mediator for African Americans and females in alcohol use (N=12,984)*

6.0   DISCUSSION

6.1   DISCUSSION OF SIGNIFICANT FINDINGS

6.1.1   Findings of main analyses predicting marijuana and alcohol use

Findings of this study confirm the proposed hypotheses that religiosity, school-based prevention programs, parental support, parental monitoring, parental disapproval, peer use, and peer disapproval all together significantly predict alcohol and marijuana use among the study participants. Additionally, higher religiosity, attending alcohol and drug training programs, higher parental support, parental disapproval, peer disapproval, and less peer use are related to lower likelihood of marijuana and alcohol use, controlling for background factors.

This study overcomes shortcoming of previous studies on religiosity by using the most recent national data set, five items of individual religiosity, sum of Z scores of religiosity measures, and importantly checking reliability of the religious measures. Therefore, these findings do provide additional evidence of the association between religiosity and marijuana and alcohol use, thus reinforcing the extant research on religiosity. These findings suggest that religiosity can be used as a protective factor to help adolescents deal with alcohol and marijuana problems. Social workers are trained to empower disadvantaged and vulnerable population. They are also equipped with knowledge and skills to work with individuals and families. Therefore, social workers are the right people who can effectively help adolescents avoid using alcohol and marijuana or maintain their sobriety by using individual religiosity as a prevention and treatment method. Using religiosity as a prevention and treatment method for adolescents is needed and appropriate for adolescents since they are still in developmental stages. Thus, rehabilitation works better than punishment for them. Punishment such as incarceration may result in more problem behaviors among adolescents, because they are isolated from society and they can easily

have bad influences from other peers in incarceration settings. Besides, using religiosity as a rehabilitation approach reflects humanity in drug policy and social work practice. Findings about religiosity in this study are also consistent with results of the review by Johnson, De Li, Larson, and McCullough (2000) who concluded that studies that used four or more religious measures consistently reported beneficial effects of religiosity on substance use.

Given the effectiveness of school-based prevention programs and their cost-efficiency in comparison with incarceration, these findings suggest that implementation of prevention programs for adolescents at schools is necessary. With their core values such as collaboration and therapeutic alliance, social workers can work with schools and families and take the lead in implementing school-based prevention programs for adolescents. These programs can help adolescents avoid using substances or change their problem behaviors, meanwhile, adolescents can still receive support from their families and friends. Using prevention programs for adolescents to replace incarceration can also help Federal and States governments save their annual budgets for law enforcement, which is much more costly than prevention and treatment methods. Since there are still controversial findings about the effectiveness of school-based prevention programs, these findings do provide additional discoveries in the extant research in several perspectives. The finding of beneficial effects of school-based prevention programs on marijuana use in this study supports and is consistent with previous finding in a longitudinal study by Botvin, Baker, Dusenbury, Tortu, & Botvin (1990). With regards to alcohol use, results of two previous longitudinal studies by Hansen, Malotte, & Fielding (1988) and Botvin, Baker, Dusenbury, Tortu, & Botvin (1990) indicated that school-based prevention programs failed to prevent adolescents from drinking alcohol. Conversely, this study does confirm the beneficial effects of school-based prevention programs on alcohol use among the study participants.

Furthermore, literature review shows that none of the extant studies have, so far, examined the impact of school-based prevention programs together with a variety of demographic, personal and environmental variables like in this study. Therefore, this finding can make a significant contribution to the current research on the impacts of school-based prevention programs on adolescent substance use.

6.1.2 Findings of moderation and mediation tests

Similar to previous findings (Wills, Yaeger, & Sandy, 2003; Pitel et al., 2012), this study also confirms that the moderation effects on lower use of alcohol and marijuana are stronger among female gender, which make an added contribution the extant research.

Results from Tables 3, 8, 9, and the OLS regression analyses demonstrated that religiosity was not impactful among Asian American adolescents; and Asian American youths were much less likely to drink alcohol and use marijuana than white and African American counterparts irrespective of their religious beliefs. The later confirms the previous finding by Barnes, Welte, and Hoffman (2002) that Asian American adolescents have the lowest level of alcohol and drug use in comparison with Whites, Blacks, Hispanics, and other races in the U.S. However, the former needs further examination in the future studies since religious measures in this study strongly focused on church and church activities, which leave out common religions among Asian population such as Buddhism and Hinduism.

Results of exploratory tests (Figures 4 and 5) indicated that African American youth and female adolescents have greater religiosity, which supports the current research findings (Brown, Parks, Zimmerman, & Phillips, 2001; and Rote & Starks, 2010; Wallace, Brown, Bachman, & LaVeist, 2003). Similarly, religiosity significantly predicted alcohol and marijuana use among the study participants, which supports the existing studies by Jang & Johnson (2001); Vaughan,

de Dios, Steinfeldt, and Kratz (2011); Johnson, Larson, and McCullough (2000). Besides, the unstandardized coefficients of African American youth and female gender predicting alcohol and marijuana use significantly changed with the presence of religiosity in the model. These three elements confirm the *partial* mediation effects of religiosity on alcohol and marijuana use among African American youth and female adolescents. Specifically, greater religiosity among African American youth and female adolescents indirectly reduces their likelihood of drinking and using marijuana. Based on this critical finding, social workers can focus on increasing individual religiosity among African American youth and female adolescents and use it to protect them from using the substances. This can be done in numerous ways. For instance, social workers can work with families and churches to get African American youth and female adolescents involved in church activities such as religious singing and dancing, or encourage them to regularly attend church services, or establish bible-study groups for them. These strategies can help African American youth and female adolescents increase their individual religiosity, which consequently reduce their substance use.

6.2   LIMITATION OF THE STUDY

This study certainly has several limitations. Because it is cross-sectional, the current study could not take into account change in marijuana and alcohol use over time among the study participants. Additionally, measures of dependent variables and school-based prevention programs variable in this study were binary and crude that I did not have or use a more refined use measure. Besides, religious measures in this study are not strongly related to religions of Asian population, which consequently affects the study findings about Asian American adolescents. Moreover, types of religions were not specified in the study, which limits our understanding of the potentially differential impact of specific religions. Furthermore, types and

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methods of school-based prevention programs were not clearly addressed in this study, which also limits our understanding of the impact of the prevention programs.

6.3 IMPLICATIONS

Despite its limitations, this study provides several implications for social work practice, future research on adolescent substance use, and drug policy. For social work practice, results of this study suggest that religious beliefs, parental support, parental disapproval, peer disapproval, and substance-using friends are influential factors to alcohol and marijuana use among the study participants. Besides, implementation of school-based prevention programs for these adolescents is extremely needed to prevent them from using alcohol and marijuana. Given their numerous strengths in working with individuals and families, social workers can effectively combine these personal and environmental factors to help white, African American, and Asian American adolescents and their families deal with alcohol and marijuana problems. Specifically, these findings suggest that social workers should implement school-based prevention programs which provide the adolescents with skills and knowledge to deal with alcohol and marijuana problems. For instance, the programs should provide white, African American and Asian American adolescents with skills to deal with substance-using friends such as how to refuse or avoid using substances when they are offered by their peers; and how to wisely confront their peers' substance use when needed. In addition, social workers should collaborate with families, schools and churches to design programs or training sessions to increase and strengthen individual religiosity among the adolescents. These programs need to make the adolescents recognize the importance of religiosity in dealing with substance use. In tandem with that, they need to encourage the adolescents to act in accordance with their religious beliefs and link negative consequences of alcohol and marijuana use with their individual religiosity. It is recommended

that contents and activities of the programs should be designed to strongly focus on factors related to cultures and religions of white, African Americans and Asian Americans. For example, programs for Asian American adolescents should be based on Buddhism or Hinduism's philosophy and beliefs, depending on their religions. In line with increasing and strengthening individual religiosity for the adolescents, social workers should closely work with parents and peers to encourage their strong support, monitoring, and disapproval towards substance-using behaviors among the adolescents. To help parents and peers effectively fulfill their supportive role, social workers should provide them with skills to (1) establish close and intimate relationships with the adolescents, which helps them identify substance-using behaviors and to (2) effectively deal with substance-using behaviors among the adolescents. It is uneasy to get families and adolescents involved in such training programs sometimes due to numerous barriers such as transportation and child care. Therefore, social workers should use different strategies to stimulate active participation of families and adolescents in the training programs such as providing transportation tickets, child care, gift vouchers, and raffle tickets. Combining these methods, social workers could potentially make a significant contribution to lessening marijuana and alcohol use problems among white, African American, and Asian American youths.

With regards to contribution to future research, findings of the exploratory analyses suggest some potentially important discoveries which require more extensive research in the future. One of the important discoveries is the partial mediation effect of religiosity on substance use among African American adolescents. These finding indicates that their strong religious beliefs partially ameliorate substance use among African American youth. The partial mediation effect of religiosity on alcohol use among female adolescents also needs further investigations;

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their likelihood of drinking significantly increased with the presence of religiosity in the model despite the fact that they have greater religiosity which should reduce their drinking likelihood.

Findings of this study also suggest some implications for policy makers. Under social work perspective, using prevention and treatment methods to help adolescents deal with alcohol and marijuana problems is strongly encouraged to replace current law enforcement strategy because of humanity and effectiveness of these methods. Incarcerating adolescents who have alcohol and marijuana problems is unnecessary since it is not effective, and importantly it does not reflect humanity in drug policy. These adolescents can change their problem behaviors with active support from social workers, schools, families, and friends through implementation of combined programs for the adolescents, their families, and friends. At a macro level, drug policy plays a very important role in ensuring effectiveness of these programs. Presently, lack of funding, workforce development, and inadequate compensation for service workers are major barriers for the implementation of substance use programs for adolescents (Cavanaugh, Kraft, Muck, & Merrigan, 2011). Therefore, it is suggested that drug policy should cut down budget for incarceration and allocate adequate funds to substance use programs for adolescents. These efforts will help expand and improve current services in substance use programs for adolescents, giving them more opportunities to access to services they need. Besides, drug policy should facilitate professional development and capacity building for social workers who work with substance-using adolescents. For example, drug policy should encourage states to establish cross-training programs for social workers to strengthen their knowledge and skills to work with adolescents. Such trainings are essential for social workers since current substance use programs for adolescents are based on adults' models, and service providers are lack of expertise in working with adolescent population (Cavanaugh & White, 2003). In line with capacity building,

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it is essential to hire qualified social workers who can ensure effectiveness of substance use programs for adolescents. Currently, low-paid job and stressful working environment are major bariers for recruiting and retaining qualified social workers in substance use programs. Thus, drug policy should have adequate compensation for social workers who work with substance-using clients. These changes in drug policy will make a significant contribution to improving effectiveness of substane use programs for adolescents, which consequently lessen current alcohol and marijuana problems in the United States.

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