

Can Religion and Socioeconomic Status Explain Black-White Differences in Alcohol Abuse?

by

Yusuf Ransome

Dissertation Committee:

Dr. Peter A. Messeri, Sponsor

Dr. Theodorus G. Sandfort, Committee Chair

Dr. Robert E. Fullilove

Dr. Mark L. Hatzenbuehler

Dr. James S. Jackson

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## **ABSTRACT**

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### **Background**

Drinking to a level that causes harm to oneself or others is characterized by several terms in the alcohol literature. Terms include: alcohol abuse, alcoholism, excessive drinking, heavy drinking, and problem drinking. The latter term is used throughout the dissertation. Findings across various alcohol measures, across time, show that Blacks have lower prevalence rates of problem drinking than Whites. These results appear paradoxical. First Blacks have poorer health status than Whites for many health outcomes such as diabetes, hypertension, and cirrhosis of the liver—a chronic condition attributed to heavy alcohol use. Blacks lower problem drinking than Whites seem contrary to the way social determinants and tension-reduction theories are thought to influence health. According those theories and frameworks, exposure to poor economic and social circumstances are considered socioeconomic status-related stressors, which are risk factors for problem drinking. Blacks therefore would be expected to have higher prevalence rates of problem drinking because they are exposed to a greater number and frequency of poor socioeconomic status conditions, and greater frequency of stressors relative to Whites. Quite often, the typical investigation of Black-White differences in health aims to understand why Blacks have poorer health than Whites. I investigated problem drinking for my dissertation because I thought it was equally important to understand health and behavioral outcomes for which Blacks do better than Whites and to learn about what contributes to that better health.

Religion is one such factor thought to buffer against poor health and delinquent behavior, which problem drinking can be thought of as. First, if problem drinking is considered a behavior, religion can protect against problem drinking through doctrine and theology that discourage heavy alcohol use and encourage healthier active lifestyle. One way theology and doctrines operates on problem drinking is through social control, which can influence individual and group behavior. Second, if problem drinking is viewed as a mental health outcome, religion can also buffer problem drinking through psycho-social

mechanisms, which include religious coping. Religious institutions provide a place of social support, which includes a physical space and network of people. Other aspects of religious environment (for example sermons and other subjective experiences) can enhance one's psychological well-being and cognitive function and theoretically enables them to access positive coping mechanisms that are conducive to better mental health. The first perspective about how religion is thought to protect against problem drinking is discussed within a social control framework, and the latter within the psychological coping framework. Given the potential for religion to protect against problem drinking through those various perspectives, my first hypothesis is that religious involvement (currently attending religious services, frequency of service attendance, social interaction and spirituality) will have statistically significant and negative relationship to problem drinking.

Levels of religious involvement, the salience of religion among groups, and the potential strength of religion to regulate the lives of individuals differ across social statuses such as race/ethnicity and socioeconomic status (SES). That rationale is discussed through historical evolution of religion among Blacks, beginning slavery, through theories attributed to Max Weber and Karl Marx, and through analysis of text from the Holy Bible. Religious involvement differs across social status (i.e. race/ethnicity and SES), therefore it is plausible that religion's protective effect on health would vary across social statuses. My second hypothesis is that the protective benefits of religion on problem drinking will be stronger among Blacks than Whites. My third hypothesis is that lower SES is associated with higher levels of religious involvement. My fourth hypothesis is that the protective benefits of religion on problem drinking are stronger among persons with low compared to high SES.

Finally, I argue that the dual social location of low SES and Black race creates an opportunity where the protective effects of religious involvement on problem drinking become compounded. My fifth hypothesis is that the protective effects of religious involvement on problem drinking among Black low SES would explain their lower prevalence rates of drinking compared to Whites.

## Methods

A secondary data analysis was conducted using Wave 2 of the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) among a sample of Non-Hispanic Blacks (n=6, 587) and Non-Hispanic Whites (n=20,161). The main dependent variable was DSM-IV alcohol abuse. A second variable, heavy drinking, which was used for sensitivity analyses, was derived from two variables (1) frequency of consuming 5+ drinks in a single day and (2) largest number of drinks in a single day. The exposure variables were four measures of religious involvement: (1) currently attending religious services, (2) frequency of religious service attendance, (3) count of the number of religious members one interacted with on a social basis, and (4) importance of spirituality in one's daily life. Education and income were the socioeconomic status (SES) variables. Race/ethnicity was a binary variable indicating Non-Hispanic Blacks versus Non-Hispanic Whites.

Preliminary analyses began with race-specific models estimated with multivariable logistic and linear regression controlling for covariates: age, gender, stress, marital status and nicotine dependence. The models assessed: (1) whether religion involvement measures were associated with DSM-IV alcohol abuse, (2) whether SES measures were associated with the religion variables, and (3) whether the effect religious involvement on DSM-IV alcohol abuse was different across persons with low versus high SES. Black-White differences were tested through three approaches. First, the odds ratios from race-specific (i.e. Black vs. White) analyses were compared using the Adjusted Wald test procedure. Second analyses were performed using pooled data and including two-way interaction terms for the analyses testing race and religion, and three-way interaction terms for analyses testing the interaction between race SES and religion. The coefficients from these interactions were examined directly for statistical significance. Third, the marginal adjusted predicted probabilities for DSM-IV alcohol abuse were estimated across high/low categories of religion and SES variables. This resulted in a four dimensional distribution for each religion and SES combination (e.g. high education, low spirituality, low education, low spirituality, high education, high spirituality, and low education, high spirituality). The predicted probabilities from these categories among Blacks were compared to the probabilities among Whites using Adjusted Wald tests. Sensitivity analyses were conducted through logistic regressions with the religion and socioeconomic status measures predicting heavy drinking. Marginal predicted probabilities were also estimated. The

coefficients from the different problem drinking measures were visually inspected to see whether the effect size was similar and the direction of effect was the same.

## Results

The prevalence of DSM-IV alcohol abuse (4% vs. 6%,  $p < .0001$ ) and heavy drinking (13% vs. 19%,  $p < .0001$ ) was lower among Blacks compared to Whites. Blacks had higher proportions of those currently attending religious services (69% vs. 53%,  $p < .001$ ), those who attend services twice a week or more (25.8% vs. 17.4%), and higher mean levels of spirituality (3.8% vs. 3.3,  $p < .001$ ). Whites had a higher number of religious members with whom they interacted with socially (8 vs. 7,  $p < .01$ ). Persons with DSM-IV alcohol abuse have lower mean levels of service attendance (3.1 vs. 3.7,  $p < .0001$ ), mean levels of social interaction (4.6 vs. 7.7,  $p < .0001$ ), and spirituality (3.5 vs. 3.7,  $p < .0001$ ).

For both Blacks (aOR=0.67; 95%CI=0.53-0.83;  $p < .001$ ) and Whites (aOR=0.58; 95%CI=0.51-0.68;  $p < .0001$ ) higher frequency of service attendance was associated with lower adjusted odds of DSM-IV alcohol abuse. None of the religion measures, in independent or multivariable models, explained Black-White differences in DSM-IV alcohol abuse. Instead, for Blacks, a model with a statistical interaction between spirituality and service attendance predicted DSM-IV alcohol abuse (aOR=0.65; 95%CI=0.43-0.97;  $p < .05$ ). That model was statistically significant and fit the data well compared to a model where religion variables were estimated together in one block. For Whites, a model with a statistical interaction between spirituality and social interaction (aOR=0.96; 95%CI=0.94-0.98;  $p < .0001$ ) predicted DSM-IV alcohol abuse and fit the data better than a model where religion variables were estimated together in one block.

For Blacks, multivariable regression adjusted for age, gender, stress, marital status and nicotine dependence showed that education was positively associated with service attendance and social interaction, while income was negatively associated with service attendance. For Whites, only social interaction was positively associated with education, while income was negatively associated with service attendance, social interaction and spirituality, controlling for covariates.

Only income (and not education) moderated the effect of religion on DSM-IV alcohol abuse. In the full sample, persons with \$19,000 or less with mean levels of service attendance had lower odds of

DSM-IV alcohol abuse compared to the odds among persons with \$70,000 or more with mean levels of service attendance (aOR=0.62; 95%CI=0.44-0.89;  $p < .05$ ). That income effect appeared to be driven by Whites because the adjusted odds ratio between income and service attendance on DSM-IV alcohol abuse was the same. For Blacks, no SES measure moderated the relationship between any of the religion variables on DSM-IV alcohol abuse. In terms of Black-White differences, Blacks with less than a high school education with mean levels of service attendance had lower odds of DSM-IV alcohol abuse compared to Whites with some college or higher education with mean levels of service attendance (aOR=0.59; 95%CI=0.44-0.85;  $p < .01$ ). No other Black-White differences on the other interactions were found.

Multiple comparisons of Black-White differences on adjusted marginal predicted probabilities for DSM-IV alcohol abuse was corrected against alpha inflation. Results showed that Blacks with high education (some college or higher) and low social interaction (8 < members) had a lower probability of DSM-IV alcohol abuse (0.02 vs. 0.04;  $\chi^2 (1) = 7.47$ ;  $p < .001$ ) compared to Whites with similar levels of education and religion. Blacks with high education (some college or higher) and high spirituality (rating as very important) had a lower probability of DSM-IV alcohol abuse (0.03 vs. 0.04;  $\chi^2 (1) = 10.52$ ;  $p < .001$ ) than Whites with similar levels of education and religion. No other Black-White differences were found for the other religion and SES combinations on DSM-IV alcohol abuse, but some were found when heavy drinking measure of problem drinking was used.

Blacks with low income and low levels of service attendance had twice lower probability of heavy drinking (0.12 vs. 0.30;  $\chi^2 (1) = 12.23$ ;  $p < .001$ ) compared to Whites with similar levels of income and religion. Blacks with high income and high levels of service attendance had an almost three times a lower probability of heavy drinking (0.03 vs. 0.08;  $\chi^2 (1) = 8.66$ ;  $p < .01$ ) compared to Whites with similar levels of income and religion. Blacks with low income and low levels of spirituality had an almost three times a lower probability of heavy drinking (0.10 vs. 0.29;  $\chi^2 (1) = 29.5$ ;  $p < .001$ ) compared to Whites with similar levels of income and religion. Blacks with high income and high levels of spirituality had an almost twice a lower probability of heavy drinking (0.08 vs. 0.14;  $\chi^2 (1) = 15.15$ ;  $p < .001$ ) compared to Whites with similar levels of income and religion.

## Conclusions

This dissertation used an interdisciplinary theoretical framework on religion and socioeconomic status to quantitatively investigate why Blacks have lower prevalence rates of problem drinking than Whites. Overall, religion measures had a protective effect on problem drinking, but service attendance had the most robust association. It appears that religion and socioeconomic status are not competing factors that potentially explain race-differences, in fact, they work together. Race-differences were still statistically significant when adjusting for socioeconomic status and religion measures. There appears to be support for the perspective that Black-White differences in problem drinking are understood better using the interaction of socioeconomic status and religion as a predictor. For example, I found Black-White differences across some domains of the interaction between religion-and socioeconomic status categories, although the omnibus models were non-statistically significant. These findings also underscore the importance of investigating the role of socioeconomic status within race/ethnicity. It was not possible to generalize to an overall hypothesis because (1) Black-White differences were not found across all combinations of religion and socioeconomic status, and (2) those differences varied according to the measure of problem drinking that was used (i.e. DSM-IV alcohol abuse or heavy drinking).

There are some noteworthy contributions this dissertation that advances the state of knowledge on this topic. It appears that the effect of religion on DSM-IV alcohol abuse for Blacks operates under different model assumptions than for Whites. For example the interaction of spirituality and service attendance was an important predictor for Blacks while the interaction between spirituality and social interaction was for Whites. Quantitative statistical only show a partial view of Black-White differences in how religion shapes problem drinking. Qualitatively there is something different about how these factors operate between the groups and should be investigated with qualitative research methods. While comparing racial groups may be the traditional approach in health disparities research, I recommend a focus on race-specific analyses to better understand Black-White differences in problem drinking.

Two main theoretical contributions emerge from this study. First, these findings suggest that individual religiosity (using spirituality as a proxy) plays an important protective role on problem drinking equally for Blacks and Whites. However, the social group/integration aspect of religious involvement on problem drinking differs by race. The study adds more evidence as to which dimensions of religious



involvement are most salient for protecting against problem drinking, which has not been adequately researched and documented. All dimensions of religious involvement were significant, but service attendance had the most robust association. Second, sensitivity analyses showed that the type of alcohol measure one uses to characterize problem drinking has implications racial disparities in alcohol research.

One limitation of this study is that the data did not allow for identification of religious tradition or denominational affiliation, which perhaps can tell us more about social integration and the probable effect on problem drinking through different theology. A second potential limitation is that the effects of service attendance on problem drinking may have been underestimated as it did not include the category of persons who did not attend (i.e. it was only among persons currently attending). While this analysis used this restricted population, compared to other studies, I had the advantage of estimating separately, the effects of non-attendance through another independent variable. Several studies that included non-attendees as a level of service attendance did not have or use a variable that separately assessed the impact of attending vs. not currently attending religious services. A third potential limitation is that there could have been a greater number of instances Black-White differences in problem drinking had demographic groups across age and gender not been masked by a pooled analyses. My epidemiological analysis testing for stratification found no evidence to suggest that stratification by age or gender was necessary. Furthermore, in multivariable analyses, across subpopulations by gender, and age (before 60 and after 60 years) did not show appreciably different estimates of race-differences on the outcomes.

A fourth potential limitation is that the dissertation examined a relatively narrow set of religious dimensions to tap theoretical constructs of social control. The limitation was not possible to address because of the few religion measures in the dataset, however, the theoretical rationale for each variable was specified upfront and the indicators all reasonably tap the construct of social control. A fifth potential limitation was not investigating pathways from religion and health behaviors. The decision was deliberate to examine the basic pathway from religion to DSM-IV alcohol abuse without trying to identify mediating pathways. However, an exploratory analysis with social support as a mediator was conducted. That variable did not significantly mediate any association, nor was it a significant predictor of problem drinking in multivariable models. A sixth potential limitation of the dissertation was treating socioeconomic status as a correlate of stress, and subsequently the moderating variable, but not directly examining

stress. That limitation was addressed by exploratory analyses investigating the interaction of perceived stress and religion on problem drinking and comparing the coefficient estimates from those results to the estimates with interaction between SES and religion on drinking. Adjusted marginal predicted probabilities were much lower for the perceived stress model (compared to the SES model), and there were no additional Black-White differences identified.

Given the findings and address of the potential limitations, this dissertation stimulates several other questions. First, while the analyses did not find overwhelming support that individual-level socioeconomic status and religion variables explained Black-White differences in problem drinking, future research should expand beyond these religious and socioeconomic status measures. Second, service attendance, social interaction and spirituality are only a handful of religious dimensions through which religion potentially protects against problem drinking. The role of clergy, private prayer, religious intensity and religious beliefs and values are other indicators of religious involvement still yet to be evaluated. Third, less is known whether the protective effects of religious involvement vary across a continuum of borderline to serious problem drinking (i.e. moderate drinking vs. heavy drinking vs. alcohol dependence), and whether those results are different between Blacks and Whites. Fourth, research involving multilevel analyses of data suggests that area-based socioeconomic and religion measures are determinants of health and alcohol outcomes. Therefore, whether area-level exposures of religion and SES are associated (directly and indirectly through cross-level interactions) with Black-White differences in problem drinking should also be explored to the extent that they are theoretically driven.

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# CHAPTER I

## Introduction

### 1.1 Problem Drinking and Racial/Ethnic Disparities

Drinking alcohol to a level that causes distress or harm to oneself and others is described in the alcohol literature by terms such as alcohol abuse, alcoholism, heavy drinking, and problem drinking. There is no consensus in the academic literature or rules that determine what term a researcher decides to use. The latter term is what I choose to use throughout this dissertation, although in the subsequent literature review one or more of those terms are used.

Problem drinking is one health/behavioral outcome for which racial, specifically Black-White, disparities are not in the typical direction: Blacks have lower prevalence rates of problem drinking than Whites. That finding seems paradoxical for two reasons. First, Blacks have poorer health than Whites for many outcomes such as hypertension, diabetes, and cirrhosis of the liver—a chronic condition associated with heavy alcohol use (Centers for Disease Control and Prevention 2011a). Second, Blacks are thought to be at greater exposure to several risk factors for problem drinking. These include: low socioeconomic status (SES), residence in socioeconomically deprived neighborhoods, and higher SES-related stress. The epidemiology of problem drinking consistently shows, however, that despite being exposed to higher risk factors for problem drinking, Blacks have lower rates of problem drinking than Whites. The goal of this dissertation is to understand that paradox through investigating the potential role of religious involvement as a protective factor.

### 1.2 Epidemiology of Problem Drinking by Race/Ethnicity

Several national household surveys consistently show that Blacks have significantly lower prevalence rates of problem drinking than Whites. The National Epidemiological Survey on Alcohol and Related Conditions (NESARC)—one of the largest household probability surveys on substance use showed that 12-month prevalence of alcohol abuse was 3.3% among Blacks and 5.1% among Whites.

The lifetime prevalence of alcohol abuse was 12.3% among Blacks and 20.3% among Whites (Hasin, Stinson et al. 2007). The National Survey of Drug Use and Health—another large household probability survey on substance use showed that among a subsample of persons with substance use disorders aged 18 years and older, alcohol use disorders (alcohol abuse and dependence) were more likely to occur among Whites than Blacks  $\chi^2(1, N = 11,867) = 1,062.90, p <.0001$ . In that study, the 12-month prevalence of alcohol abuse, among those with a substance use disorder, was 38.9% for Blacks compared to 52.4%, among Whites and that difference was statistically significant at  $p <.05$  (Pacek, Malcolm et al. 2012).

Studies using consumption-based measures of problem drinking reveal similar patterns by race/ethnicity. Among adult current drinkers, Blacks compared to Whites have lower percentages (30.7% vs. 38.8%) of moderate alcohol use defined as 2 to <30 drinks per month. Blacks also have lower prevalence (7.8% vs. 10.7%) of heavy alcohol use, defined as 30 to <120 drinks per month (Kerr, Greenfield et al. 2011). Data from the Behavioral Risk Factor Surveillance System (BRFSS), among individuals aged 18 years and older, showed that binge drinking<sup>1</sup> prevalence was 10.4% among Blacks compared to 17.5% among Whites (Kanny, Liu et al. 2011). A Centers for Disease Control (CDC) report showed that, among a sample of persons 12 years and older; 4.5% of Blacks compared to 7.9% of Whites engaged in heavy alcohol use<sup>2</sup> (Centers for Disease Control and Prevention 2012). The most recent Youth Risk Behavior Surveillance Survey System (YRBSS) showed that, among youth 9<sup>th</sup> through 12<sup>th</sup> grades, Black students (12.4%) were less likely to have five or more drinks of alcohol in a row within a couple of hours on at least one day, than White students (24.2%) and statistically significant at  $p <.05$  (Centers for Disease Control and Prevention 2011b).

Data over the past two decades consistently show that Blacks have lower prevalence rates of problem drinking compared to Whites (Caetano, Baruah et al. 2011). Lastly, multivariable analyses that include covariates related to problem drinking such as co-occurring substance abuse generally show findings consistent with prevalence data. That is, Blacks report lower odds of problem drinking measures than Whites (Caetano 1984; Hasin, Stinson et al. 2007; Caetano, Baruah et al. 2011).

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<sup>1</sup> Defined in that study as consuming 4 + and 5+ drinks (women and men, respectively) on one or more occasions.

<sup>2</sup> Defined in that study as 5+ drinks on same occasion on each of 5 or more days in the past 30 days, which also includes binge drinking.

The Black-White pattern in the prevalence of problem drinking holds among gender, across age, and across ethnicity. For example, data based on Wave 1 (years 2001-2002) of the NESARC showed the 12-month prevalence of DSM-IV alcohol abuse was (5.71%) for Blacks males compared to (7.45%) White males and (1.46%) among Black women compared to (3.33%) among White women (Grant, Dawson et al. 2004). Women are expected to have lower prevalence rates of problem drinking than men because they are thought to have fewer risk factors for problem drinking (Wilsnack, Vogeltanz et al. 2000; Nolen-Hoeksema 2004). Researchers conclude that problem drinking and risk factors for problem drinking varies more along race/ethnicity than by gender (Griffin, Scheier et al. 2000; Eigenbrodt, Mosley et al. 2001).

In terms of age, Blacks have lower prevalence of problem drinking than Whites but that gap narrows across the life course (i.e. increasing age). Black-White gaps in problem drinking are widest in young adulthood, (age 18 to 29 years old), narrows throughout the middle (age 30 to 39 years old) and later ages (40+). Beginning roughly around 60 years of age and older, Black-White differences in problem drinking narrows to a negligible difference and even crosses over after age 60 (Grant, Vergés et al. 2011; Chen and Jacobson 2012c). The age effect of overall lower prevalence of problem drinking is driven by the fact that Blacks start drinking at later ages than Whites, and develop problem drinking at lower rates than Whites (Muthén and Muthén 2000). Other data indicate that Black men and women have lower ages of initiation and onset to alcohol dependence than Whites (Alvanzo, Storr et al. 2011). For example, in the aforementioned study, analyses adjusting for age, family history of alcohol use and typical drinks per day during heaviest drinking period showed that Black men (compared to White men) had lower hazard ratios for age of onset of drinking (HR=0.70; 95% CI: 0.65-0.75), age of onset to dependence (HR=0.66; 95% CI: 0.56-0.79), and years from initiation to dependence (HR=0.69; 95% CI: 0.58-0.82) (Ibid, table 2).

Finally, while there is ethnic variation among Blacks, data on two of the largest Black populations in United States show that lifetime month prevalence rates of alcohol abuse were similar for African Americans (9.7%) and Caribbean Blacks (9.1%) (Broman, Neighbors et al. 2008). Furthermore, Blacks, even across ethnic sub-groups such as Black Caribbeans, have lower prevalence of problem drinking than Whites. For instance, Gibbs and colleagues (2013) found that the lifetime prevalence of

alcohol abuse disorder was 5.6% for Caribbean Blacks, 12.5% for African Americans, and 20.1% for non-Hispanic Whites, respectively. That study also reported that the adjusted odds of alcohol abuse was lower and statistically significant among Caribbean Blacks (aOR=0.47) and African Americans (aOR=0.64) compared to non-Hispanic Whites.

### **1.3 Possible Explanations for Blacks' Low Prevalence Rates**

Sampling bias that can occur with household probability surveys is one factor thought to explain why Blacks have lower prevalence of problem drinking than Whites. First, household surveys, which prevalence data are usually based on, are thought to contain non-representative samples of the Black population, especially among elderly Blacks and young Black men and with low education. Second, the older age groups and young men who are thought to be overrepresented in non-institutionalized settings are thought to be the populations with higher prevalence of problem drinking. Indeed, a significant proportion of Blacks across those demographic subgroups are not adequately captured by household surveys. Some reasons those subgroups of Blacks are thought to be inadequately represented in surveys are: residential instability, non-maintenance of tangential connections to households, and that they are located in institutional settings such as prisons and hospitals, which epidemiologic community surveys are less likely to cover (Das, Olsson et al. 2006; Pettit 2012). In a study about the invisibility of Black men in America, Pettit (2012), estimates that as much as 16% of Black men are invisible in conventional accounts of the population.

Empirical support for the sampling bias perspective has not adequately explained Black-White differences in problem drinking. Findings are mixed and found to be dependent on the institutionalized setting from which samples are drawn. For instance, two studies drawn from hospital/medical institutional settings show that alcohol use disorder prevalence was higher among Blacks than Whites (Smothers, Yahr et al. 2003; Williams, Lapham et al. 2012). Yet, a study among drawn from a military population showed the opposite. The prevalence of DSM-IV alcohol abuse among Blacks (9.1%) was lower than Whites (13.7%) and statistically significant at  $p < .05$  (Riddle, Smith et al. 2007). Another study drawn from a sample of the prison population showed that Blacks (24.9%) had lower prevalence for DSM-IV alcohol

use disorders than Whites (40.8%) and statistically significant at  $p < .05$  (Peters, Greenbaum et al. 1998).

A second reason put forth to explain Blacks lower prevalence of problem drinking is measurement error, specifically misdiagnoses. Blacks are thought to be misdiagnosed with other disorders such as schizophrenia or depression instead of alcohol abuse syndromes possibly because some clinicians fail to adequately check for history of substance abuse (Bell, Thompson et al. 1985; Griffith, Baker et al. 1993). This explanation does not also adequately explain Black-White differences in problem drinking. First, surveys that have employed standardized diagnostic interviews have consistently shown that Blacks have lower rates of problem drinking than Whites. Second, although there is some degree of variation across race/ethnicity in diagnoses of mental health disorders using standardized metrics (Neighbors, Trierweiler et al. 2003); standardized metrics such as Alcohol Use Identification Test (AUDIT) are thought to work equally well across racial/ethnic in diagnosing at risk drinking<sup>3</sup> (Volk 1997).

#### **1.4 Social Determinants and Racial/Ethnic Disparities in Problem Drinking**

The typical ways in which social and environmental determinants are purported to explain racial disparities do not adequately explain racial disparities in problem drinking. First, social determinants, specifically focusing on socioeconomic indicators (education and income) and cultural indicator (religion), have been posited as factors that explain health and racial disparities in health (Williams 1997; George, Ellison et al. 2002; Betancourt, Green et al. 2003; Marmot 2005; Gerend and Pai 2008). For instance, a world commission on social determinants report documented that alcohol abuse is associated with poor socioeconomic conditions at the population level. The authors argued that, “people turn to alcohol... to numb the pain of harsh economic and social conditions” (Wilkinson and Marmot 2003, p24). The study noted also that “the causal pathway runs both ways”, which means that alcohol abuse can also causally lead to poorer socioeconomic conditions as well.

At the individual level, low education and income are found to be associated with poor health and behaviors deleterious to health, which are pronounced among Blacks. First, leading scholars on

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<sup>3</sup> Defined in that study with two groups of at risk drinkers: those meeting on negative social consequence (and not meeting criteria for hazardous use or dependence) and a second group defined using consumption at 40grams of alcohol per say for males and 20 for females or 5+ drinks on a single occasion at least four times in the past month.

socioeconomic determinants of health argue that, “the groups more advantaged with respect to knowledge, money, power, prestige and social connections will, whatever the current profile of risk factors and diseases, come out ahead with respect to health” (Link and Phelan 1996, p472). Second, Black race is thought to be negatively correlated with SES. For instance, Blacks often possess limited opportunities for socioeconomic mobility due to racism, racial discrimination and residential segregation. Those factors are thought to expose Blacks to a greater number of and higher frequency of risk factors while providing them with fewer health promoting resources. Third, Blacks often lack adequate financial resources to afford healthy lifestyles or medical treatment compared to Whites (Krieger and Sidney 1996; Polednak 1997; Williams and Collins 2001; Chow, Jaffee et al. 2003; Nazroo 2003; Smedley, Stith et al. 2003; Shi and Stevens 2005). All these risk factors taken together would indicate that Blacks should have higher rates of problem drinking than Whites, but that is not the case.

### **1.5 Rethinking Racial Disparities in Problem Drinking**

Social disorganization theory and tension-reduction theories, which posit that aggregate- and individual-level indicators of distress and poverty affect health, have frequently been invoked to explain drinking patterns among Blacks (Dawkins and Harper 1976; Harper 1976; Sterne and Pittman 1976; Martin, Tuch et al. 2003; Martin, Tuch et al. 2004). If those theories were used as the explanatory framework, one would expect that Blacks to have higher rates of problem drinking to cope with economic and other related strains caused by living in stressful environments (Pearlin and Radabaugh 1976; Wills and Shiffman 1985). Furthermore, since Blacks experience greater persistence of and number of sources of socioeconomic related-strain than Whites, such as unemployment and economic deprivation; one would predict that Blacks are more likely to "resort to alcohol abuse to cope with strain as legitimate coping options are less available to them as compared to Whites" (Akins, Smith et al. 2010, p325). Despite the strong plausibility, those theories have failed to account for Blacks lower prevalence of problem drinking than Whites.

Leading experts in alcohol research have concluded that Black-White differences in problem drinking have “contradicted many of the stereotypes of alcohol consumption patterns. Most likely, Blacks’

drinking... results from a complex interplay of individual attributes... and cultural factors that shape the life history of Blacks in the United States” (Caetano, Clark et al. 1998, p235).

## **1.6 Alternate Explanations for Racial Disparities in Problem Drinking**

Contrary to the social determinants, social disorganization, and tension-reduction perspectives that describe how low SES affects health behavior among Blacks, other researchers argue that low SES can promote good health behaviors and outcomes as well. This is because low SES persons are more likely to draw on cultural resources such as religion (Chen and Miller 2012a). This theoretical position is known as the “shift-and-persist” hypothesis. The theory posits that the reason why some low SES persons avoid the biological cascades to poor health and risk behaviors despite persistent adversity and stress is because they accept and adapt to stress by “adjusting oneself to stressors through reappraisals and emotion regulation, while at the same time, persisting in life by enduring adversity with strength by finding meaning and maintaining optimism” (Chen and Miller 2012a, p3). There is also empirical support for that theory. Two studies found that shift and persist approach was protective of allostatic load and cardiovascular risk among low SES but not high SES persons (Chen, Miller et al. 2012b; Chen, Lee et al. 2013).

The shift-and-persist hypothesis is not examined in this dissertation but it was relevant to discuss. First, the mechanisms through which it is hypothesized to operate on health—stress (Chen and Miller 2012a) was cited by Akins and Smith et al (2010) as plausible reasons why persons, especially Blacks, engaged in problem drinking. Second, the main protective mechanism of coping and adjustment in the study (finding meaning in life) is associated with religious involvement and spirituality (Mattis 2002; Park 2005), which are religion variables used in this dissertation as a protective factor. Third, specific to problem drinking measures, studies show that finding meaning in life is correlated with spiritual aspects of recovery from alcohol abuse (Carroll 1993) and lower alcohol dependence symptoms (Laudet, Morgen et al. 2006).



### **1.7 Implications for Research on Racial Disparities in Problem Drinking**

The challenge of explaining lower problem drinking prevalence rates among Blacks compared to Whites despite their low SES position exposes one inadequacy of using simple additive models that only control for socioeconomic indicators. In fact, the author of one of the earliest studies that investigated racial/ethnic differences in problem drinking argued that the relationship between race/ethnicity and problem drinking is not best understood through simple additive models but by models that allow for variables that interact with race (Herd 1994). That study showed when models where race/ethnicity was allowed to vary across socio-demographic and cultural variables, the variance explained for alcohol dependence symptoms increased by 3% over a simple additive model. Stratified analyses by race further supported the interaction model. In that study, education and religious tradition were protective of alcohol dependence symptoms. Moreover, the protective effects of those variables were stronger for Black men than White men (Herd 1994, table 7).

### **1.8 Motivations for New Research on Racial Disparities in Problem Drinking**

Research on racial disparities in problem drinking is not new. Prior studies, although not always their main focus to explain Black-White differences, have examined racial/ethnic differences in alcohol problems (Herd 1994; Jones-Webb, Hsiao et al. 1995; Amey, Albrecht et al. 1996; Jones-Webb, Hsiao et al. 1997). These studies provided major contributions to the state of knowledge, but significant gaps still remain, which largely stem from methodological and theoretical limitations. For example, one of the first limitation found in some of those studies is that simple additive models were often the dominant approach for investigating racial/ethnic differences in alcohol problems (Caetano and Clark 1998; Caetano and Clark 1999).

A second limitation is that independent effects of race/ethnicity on alcohol problems was rarely first assessed. Therefore, when models that included socioeconomic status (SES) as explanatory factors did not fully explain race/ethnic differences, it was difficult to interpret the crude, unadjusted effects of race and SES. Statistical approaches investigating Black-White differences in health that begin with models that control for SES have been argued as problematic because of the complex relationship

between SES and race (Kawachi, Daniels et al. 2005; Williams, Mohammed et al. 2010). According to leading experts on race, SES and health; an exclusive focus on SES as predictor of racial/ethnic disparities is not sufficient because SES measures are non-equivalent across race, and SES is part of the causal pathway from race to health (Williams, Yu et al. 1997; Shapiro 2004; LaVeist, Thorpe et al. 2007).

A third limitation of those studies is that they seldom specified upfront theoretical frameworks for how explanatory variables such as religious involvement and socioeconomic status would work (Jones-Webb, Hsiao et al. 1995). The aforementioned limitations in theoretical specification often hindered the methodological rigor of the research. For example, in the absence of a religion theoretical framework, some studies focused on one religion variable such as spirituality without controlling for other religion variables. Studies also rarely took advantage of specifying interactions between religion variables to explain Black-White differences in problem drinking.

A fourth limitation with prior research on racial disparities in problem drinking is that there still no consensus on a best way to define and measure problem drinking. Therefore, one cannot yet conclude with confidence about the relationship between religion and racial disparities in problem drinking. For example, some studies use cut scores from frequency measures of alcohol consumption to define problem drinking but use continuous scores of alcohol dependence symptoms to define social and physical consequences of problem drinking. DSM-IV alcohol abuse and dependence symptoms are more commonly examined as a binary variable. Therefore, when those outcomes are specified continuously, the findings cannot necessarily be compared to studies that used the binary or categorical versions of the measure. Chapter two, section 2.1 discusses further the complexity of specifying different forms of DSM-IV alcohol abuse.

Related, measures like DSM-IV alcohol abuse and dependence are based on clinical diagnoses using a standardized instrument, while heavy drinking is typically assessed based on reporting of frequency and duration of alcohol consumption. Both measures of problem drinking may be sensitive to race/ethnicity and socioeconomic predictors, yet the extent to this sensitivity is not well understood. The conclusion from these theoretical and methodological limitations is that the role of religion and SES in explaining racial/ethnic differences across different measures of problem drinking is not well understood.

## **1.9 How Religion, SES, and Race/Ethnicity Motivated this Research**

Religion and SES are both independently associated with race/ethnicity and problem drinking. Blacks report higher levels of religious involvement and subjective religiosity than Whites (Taylor, Chatters et al. 1996; Taylor, Mattis et al. 1999). Blacks are more likely to have lower education and income than Whites (Barton and Coley 2010; Taylor, Kochhar et al. 2011). SES is associated with problem drinking although the direction and magnitude of the effect vary across measures (Ross 1995; Stinson, Grant et al. 2005). Religious involvement is generally protective of problem drinking in the general population. Those findings have also been found within sub-population groups across race, gender and religious denomination (Darrow, Russell et al. 1992; Stewart 2001; Luczak, Shea et al. 2002; Ghandour, Karam et al. 2009).

The interaction of religious and economic indicators of social determinants (Mueller and Johnson 1975; Lehrer 1999) is less analyzed with respect to racial/ethnic disparities in health, including problem drinking. While some data show that religious involvement is negatively related to SES (Darnell and Sherkat 1997; Paul 2010) other data show a positive association (Beeghley 1981). These findings were also found among Blacks (Brown and Gary 1991). Next, SES is thought to interact with religion to shape health. For example Banthia (2007) showed that for the poorest persons and lower educated groups, relative to higher SES groups; higher levels of religiosity was associated with fewer health symptoms and higher quality of life (Banthia 2007, see figures 2 and 4).

Given the previous discussion of the relationships between religion, SES and health, it seems reasonable to assume that the protective effects of religion on problem drinking may vary across levels of SES. Furthermore, it is plausible that the magnitude of effect for religion on health across levels of SES will differ between Blacks and Whites. Yet, to my knowledge, no published study has tested those hypotheses with reference to Black-White differences in problem drinking. That the protective effects of religion on health are stronger for Blacks than Whites is established with some exceptions (Amey, Albrecht et al. 1996; Wallace Jr, Brown et al. 2003). Additional evidence therefore is needed, especially at the population level, which this dissertation contributes to.

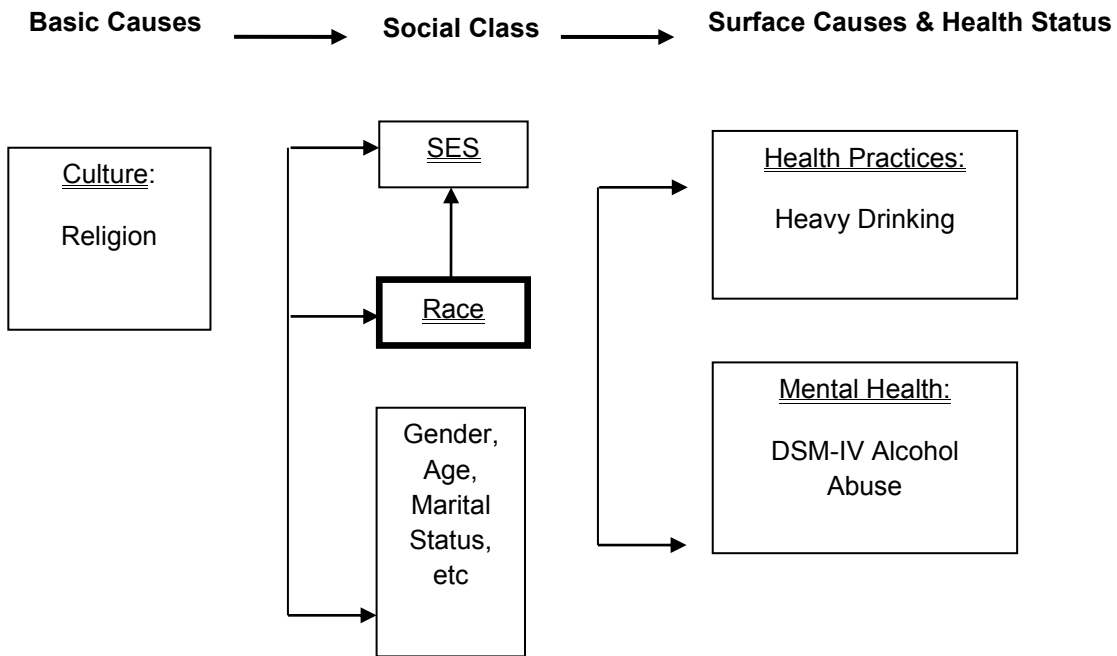
### **1.10 The Current Study: Overall Aim and Research Questions**

The primary objective of this dissertation is to investigate whether the relationship between religious involvement and socioeconomic status can explain Black-White differences in problem drinking. More specifically, I hope to at least understand, if not explain, Blacks lower prevalence rates of problem drinking than Whites. That objective is pursued with two research questions: 1) to what extent does SES moderate the protective effect of religious involvement on problem drinking? And, 2) to what extent does the conditional effect of SES on religion predicting problem drinking differ for Blacks compared to Whites?

### **1.11 Conceptual Models**

The two subsequent figures represent the theoretical and statistical models that drive the dissertation hypotheses testing. Figure 1 shows that cultural forces such as religion are basic causes that shape groups' location within social classes of race and socioeconomic status. Groups' location within these social classes can then influence their health behaviors and health outcomes. Both race/ethnicity and socioeconomic status are thought to be independent social classes, but also that race is associated with the socioeconomic location (interaction effect). My departure from the original theoretical model, which was discussed in Williams (1997), is that I view health practices (i.e. heavy alcohol use) and mental health (DSM-IV alcohol abuse) as potentially equivalent outcomes and not that health practices is exogenous to mental health.

Figure 2 is a conceptual illustration of one of the ways I plan to statistically evaluate Black-White differences in the effect of SES on religion predicting problem drinking. First, I conduct analyses with a 3-way interaction of race by SES by religion predicting health. Second, I examine Black-White differences on the marginal predicted probabilities of DSM-IV alcohol abuse adjusted for covariates which that figure illustrates. Black-White differences are concluded, for example, if the coefficient in cell  $A_4$  is smaller and statistically different than the coefficient in  $W_4$ .



**Figure 1.** Conceptual model guiding analytical approach.  
 Model adapted and modified from Figure 1. A framework for the study of the role of race in health. Williams (1997) *Race and Health: Basic Questions, Emerging Directions*. *Annals of Epidemiology* 7(5): p328

Cells corresponding to the interaction of SES and Religion, Non-Hispanic Blacks

	Low Religion	High Religion
High SES	A <sub>2</sub>	A <sub>3</sub>
Low SES	A <sub>1</sub>	A <sub>4</sub>

Cells corresponding to the interaction of SES and Religion, Non-Hispanic Whites

	Low Religion	High Religion
High SES	W <sub>2</sub>	W <sub>3</sub>
Low SES	W <sub>1</sub>	W <sub>4</sub>

**Figure 2.** Schematic model to identify domains across religion and socioeconomic status where Black-White differences DSM-IV alcohol abuse occur

### **1.12 Contributions of the Dissertation**

The dissertation addresses the theoretical and methodological limitations mentioned in section 1.8. First, I specify theory up front theoretical underpinnings from religion and health (Ellison and Levin 1998; Chatters 2000; George, Ellison et al. 2002) to establish the framework for how religion will predict alcohol abuse. Second, I specify a theoretical framework for the relationship between religion and SES, and why I expect that those relationships should be different between Blacks and Whites. Third, I use an established theoretical framework on race/ethnicity and health (Williams 1997) to inform my statistical analytic approach. For instance, I specify race-specific models that examine SES as a within group predictor of problem drinking. Then, I combine the Black and White sample and estimate the race effect first, and then specify second order (i.e. race x SES and SES x religion) and third order interactions (race x SES x religion) predicting problem drinking. Fourth, I use two related but conceptually distinct measures of problem drinking: DSM-IV alcohol abuse, and heavy drinking.

### **1.13 Public Health Significance of the Dissertation**

Studying racial/ethnic differences in problem drinking is important for several reasons. First, alcohol abuse is the third leading preventable cause of death in the United States and responsible for an average of 79,000 deaths annually (Centers for Disease Control and Prevention 2011c). Excessive alcohol use accounted for 3.5% of all cancer deaths in 2009 (Nelson, Jarman et al. 2013). Latest estimates show that alcohol mortality accounts for 9% of total deaths among persons 15 to 64 (Shield, Gmel et al. 2013), and the economic costs of excessive alcohol use totaled \$223 billion, of which 72% was attributed to lost productivity and 11% to increase health care expenses (Bouchery, Harwood et al. 2011).

Second, although Blacks have lower prevalence of problem drinking than Whites, they have higher rates of alcohol-attributable health consequences. This research may be a first and necessary step to understanding why Blacks have worse alcohol-related health despite their lower levels of problem drinking. More importantly, investigating why Blacks have better health on problem drinking than Whites “highlight the importance of attending to protective resources that may improve health and protect

vulnerable populations from at least some of the negative effects of environmental exposures” (Williams and Jackson 2005, p331).

Third, religious involvement is one socio-cultural determinant positively related to general health (Ellison and Flannelly 2009; Holt, Oster et al. 2011) and protective of problem drinking (Bowie, Ensminger et al. 2006; Ghandour, Karam et al. 2009; Borders, Curran et al. 2010). Religious involvement is a behavior that can be modified to influence health. At the institutional level, religious involvement has the potential to reach a large population with health education and other social and psychological resources that promote healthy behaviors. Therefore, public health research may benefit from understanding how religion can be used as a vehicle for prevention of poor alcohol use behaviors and mental health outcomes within the general population.

#### **1.14 Clinical and Theoretical Implications of the Dissertation**

In this dissertation, I use a clinical measure (DSM-IV alcohol abuse) and non-clinical measure (heavy drinking) of problem drinking. There is a debate in alcohol research about the etiology of problem drinking (discussed in chapter 2), therefore, it was important to investigate whether religion and SES predictors function differently depending on alcohol measure. From a clinical perspective, prevention and treatment services are influenced by how problem drinking is understood and how social determinants and race/ethnicity are related. For example, the debate on the roots of problem drinking has influenced whether problem drinking should be treated by altering the mind or behaviors or both as with cognitive-behavioral therapy (Kadden 2005; Marlatt 2005; Carroll and Kiluk 2012; Chung, Wakhlu et al. 2012). From an intervention standpoint, practitioners therefore might be interested in whether they should consider a person’s cultural resources such as religious involvement in addition to their socioeconomic status in alcohol treatment (Cohen, Feinn et al. 2007).

Even though religion and health have been well studied, there is a dearth of research on problem drinking as an outcome. The degree to which dimensions of religious involvement such as service attendance and social interaction affects problem drinking is not well known. The abundance of research to date on religious involvement and drinking has focused on the effects of spirituality with



recovery from but not prevention of problem drinking.

Finally, this dissertation may be able to provide answers about whether religion and socioeconomic status are competing or complementary factors for potentially explaining racial/ethnic differences in problem drinking. Whether these data support an interaction model with religion and socioeconomic status may also provide a critical starting point for examining racial/ethnic differences in physical and social health consequences associated with problem drinking such as cirrhosis of the liver and intimate partner violence.

## CHAPTER II

### Key Concepts, Definitions and Literature Review

The following chapter begins with explaining the conceptual differences in the two measures of problem drinking used in this dissertation (section 2.1). The subsequent section (2.2) is organized into subsections (a through d) which systematically explore the intersection of race/ethnicity, problem drinking, religious involvement, and socioeconomic status. The literature review is meant to provide the reader with a brief context for the ways I used these variables to form my study hypotheses, which I will explicate in chapter 3. The quotation below begins the section and poignantly illustrates the complexity of studying problem drinking in alcohol research.

One reasonable conclusion that can be drawn from a perusal of the alcoholism literature is that nobody knows what alcoholism is. An equally reasonable conclusion is that everybody knows what alcoholism is, but they just happen not to agree...People have argued, and still argue, whether alcoholism is a form of moral turpitude, a bad habit, or a disease. All of these positions have their defenders (Levin 1990, p61).

#### 2.1 The Field of Alcohol Research and Terms for Problem Drinking

In the field of alcohol research, there are several terms associated with drinking alcohol to a level that causes distress or harm to oneself and others. Some terms include unhealthy alcohol use, harmful drinking, problem drinking, deviant drinking, and excessive drinking (Schneider 1978; Van Oers 1999; Saitz 2005; Bouchery, Harwood et al. 2011). There are two dominant scientific definitions/measures in alcohol research used to classify a person's alcohol use as problematic. The two measures, however, are rooted different assumptions about problematic alcohol use (Mulford and Miller 1964). The definitions/measures are: "alcohol use disorders" (AUDs), and "heavy drinking". In the sections below, I describe briefly each term, the history, the model and set of assumptions underlying the conceptual nature of each term. I also discuss strengths and weaknesses of each term as highlighted in the literature. There is no consensus in the academic literature on which term should be used. Throughout this dissertation, problem drinking is the broad conceptual term I use to characterize drinking alcohol to a

level that causes distress or harm to oneself and others. The term was arbitrarily chosen. Next, when the term problem drinking is used in the literature review, it can denote the actual term used in the study as well as the aforementioned terms characterized by clinical and non-clinical measures.

A combination of social, political, and economic factors undergird the conceptual distinctions between DSM-IV alcohol abuse and heavy drinking. The classic Temperance Movement, a social movement against alcohol use, emerged in the 1820s and was concerned with the social impact of drinking levels in the population (Bacon 1967). The movement sought to distinguish between regular drinking and problem drinking, the latter which was believed to cause mental and moral incapacitating qualities (Levine 1984; Thom 2001). Prohibition in the 1920s was the second major social movement against alcohol use, and thought to be the politicized arm of the Temperance Movement (Andreae 1915). The main focus of Prohibition was to control the supply of alcohol through a ban on the sale and distribution. Alcohol—the substance, instead of the character or behaviors of the drinker was seen as evil (National Research Council, Moore et al. 1981) and thought to be the cause of chaos and social problems in American society (Bacon 1967; Levine 1984), therefore reducing access to alcohol was deemed the remedy to those problems.

The preoccupation with the alcohol—the substance, and not the person, altered the views of the consequences of drinking. Instead of viewing drunkenness as an annoying personal habit, the excessive drinker came to be seen as someone who was “ravaged and transformed by an alien substance” (Ibid, p9). Prohibition as an official government policy was repealed in 1933. After prohibition, problem drinking was reframed as an individual issue based on the disease model of alcoholism (described below). The focus was shifted to treating the alcoholic’s disease of problem drinking (Reinarman 1988) from regulating alcohol sales and distribution.

Despite the repeal of prohibition, several interest groups who supported Prohibition continued their activism against alcohol use. One result of the anti-alcohol use efforts was the post 1950’s Temperance Movement, which was driven mostly by Protestant groups who were against the normalization of alcohol. The focus of this revived movement was mainly to preserve the religious boundaries and less concerned with consequences of alcohol use within secular world, as was the

previous focus. For instance the main argument against alcohol use was that it weakened the role of religious value systems on social life (Pennock 2012). One religious scholar argued that the Protestant-led (compared to other religious groups like Catholics) religion-centered campaign against alcohol was more an attempt to promote the supremacy of their religious ideology rather than any real concern for the social problems caused by alcoholism (Andreae 1915) .

In the past two decades, a newer social movement against alcohol, called Neo-Temperance Movement, has influenced the rhetoric of problem drinking and related policy in the United States (Berridge 2006). The Neo-temperance Movement was a resurgence of the Temperance Movement focused on alcohol-related problems caused by the individual such as alcohol-attributed crime. Organizations such as Alcoholics Anonymous and Mothers Against Drunk Driving (MADD) are examples of organizations formed during the Neo-temperance Movement. Those organizations, through social media campaigns, have successfully shifted the focus away from alcohol the substance to focusing on the user of alcohol (Levine 1993).

Other less prominent perspectives of problem drinking were that of the medicalization model, which linked levels of alcohol consumption to impact on social life (Roman and Gebert 1979) while other sociological perspectives sought to link alcohol consumption to religion, ethnicity and acculturation in the United States (Gutmann 1999; Tracy 2005).

### **2.1a Alcohol Use Disorders**

Alcohol use disorders (AUDs) in the Wave 2 of the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) were assessed by AUDADIS-IV that tap criteria set forth in the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) (National Institutes of Health September 2010). Alcohol abuse, the dissertation's main outcome, is the first of two DSM-IV AUDs. An alcohol abuse diagnoses occurs when one or more of the following four criteria are met: (1) recurrent use of alcohol which leads to failure to fulfill major role obligations either at home, work, or at school, (2) continuous use of alcohol at times when it is physically hazardous, (3) recurrent legal problems related to alcohol abuse and, (4) continued use despite having persistent or recurrent social or interpersonal

problems caused or exacerbated by the effects of alcohol and never met criteria for alcohol dependence (Hasin 2003). Alcohol dependence, the second AUD is purported to be the more severe form of alcohol abuse additionally reflecting the physiologic and psychological processes of problem drinking such as withdrawal and persistent desire or unsuccessful attempts to cut down or stop drinking (Grant 1997; Hasin, Schuckit et al. 2003).

AUDs—the DSM-IV conceptualization of problem drinking, is based on the disease model of alcohol. The main assumption of the disease model of alcohol is that alcoholism is a progressive disease involving loss of control, which has physical, psychological and social consequences (Hore 1994; National Institute on Alcohol Abuse and Alcoholism 2013a). The disease model was largely attributed to the work of Morton E. Jellinek, a physiologist and alcohol researcher. He sought to distinguish between non-disease and disease forms of problem drinking. The former was to be handled within the moral and legal domains whereas the latter (i.e. alcohol abuse and dependence) would be handled in the medical domain (Schneider 1978). Jellinek (1960) explained distinctions of non-disease forms of drinking problems from diseased forms through a series of Greek-labeled terms he called “species of alcoholism”. For example, drinking for the purposes of relieving bodily or emotional pain or that leads to physiological consequences such as cirrhosis, “Alpha” and “Beta” alcoholism, respectively, are not diseases. He argued that although the drinking of those types are undisciplined, “it contravenes such rules as society tacitly agrees upon—such as amount and effect of drinking...it does not lead to loss of control or inability to abstain” (Jellinek 1960, p36).

While the conceptualization of problem drinking per DSM-IV AUDs has particular strengths, there are weaknesses that cannot be addressed in the secondary dataset used for this dissertation. The first strength is that the DSM-IV classification of problem drinking has been one of the widely used measures in the alcohol literature. It is both a reliable and valid instrument (discussed further in the section 4.3). The calculation of the variable is fairly straightforward especially for modeling statistical analysis. For example, it is usually quantified through a categorical measure with (1) indicating meeting the criteria or (0) not meeting the criteria for one or both AUDs. Some authors have argued that a categorical approach is more useful than a dimensional/continuous approach (Walters 2008).

Categorical or binary measurement, however, does not capture a continuum of severity. For example, a dichotomous assessment of alcohol abuse does not allow the researcher to distinguish persons diagnosed based on one or all four criteria. The indication of alcohol problem severity is supposed to be captured by alcohol dependence. The limitation with that approach (i.e. hierarchical nature of the AUD classification) is that there is a blurred distinction between alcohol abuse and dependence (Muthén 1996; Krueger, Nichol et al. 2004; Martin, Chung et al. 2008). That limitation is one of the proposed items editors will address in the DSM-V. For example, the new measure will combine criteria from both abuse and dependence in a unidimensional measure that abandons the distinction between the two (Agrawal, Heath et al. 2011). The DSM-V will also include a severity score based on the number of criteria met (National Institute on Alcohol Abuse and Alcoholism 2013b).

The DSM-IV classification of problem drinking is based on screening that does not explicitly include level of alcohol consumption, which alcohol research scholars argue is a weakness (Saha, Chou et al. 2006; Keyes, Geier et al. 2009). Those scholars argue instead that measurement of drinking patterns that confer risk based on consumption, such as exceeding national drinking guidelines, better taps mild ends of the alcohol use disorder continuum (Saha, Stinson et al. 2007).

In response, this dissertation incorporates an alternate measure of problem drinking measure that utilizes levels and frequency of alcohol consumption. Although the specific purpose for using this alternate measure is for conducting sensitivity analyses, the measure addresses some of the latter limitations discussed regarding the use of DSM-IV AUDs.

### **2.1b Heavy Drinking**

The term heavy drinking reflects an attempt to redefine problem drinking on assumptions other than those dominated by the disease model. According to one alcohol researcher, the self-destructiveness of alcohol abuse that leads to it being viewed as pathology. He argues that, “alcohol abuse is a compulsion with the drinker being out of control and driven by neurobiological defects to drink independently of drinking’s consequences” (Bigelow 2001, p301). According to Drew (1987), another alcohol researcher, the disease model of alcoholism “ tacitly communicates the notion that drug addicts

are incapable of helping themselves and that they need a medical expert to cure their disease” (in Epstein 2001, p59).

The two main components of heavy drinking are levels and frequency of drinking. According to the National Institute of Alcohol Abuse and Alcoholism drinking guidelines, four and five or more drinks in two hours, for women and men respectively, is considered heavy drinking (National Institute on Alcohol Abuse and Alcoholism 2013d). One way heavy drinking is conceptually distinct from the DSM-IV definition of alcohol abuse is that it is not based on assumptions such as progressive dependence and therefore validated based on other indicators. For example, the human’s body ability to process alcohol is considered when evaluating heavy drinking, and not dependence on alcohol. Therefore, a validation of heavy drinking would be functional impairments and alcohol poisoning as measured by blood alcohol concentration greater than .08g/dl (National Institute on Alcohol Abuse and Alcoholism 2013c; National Institute on Alcohol Abuse and Alcoholism 2013d).

The developers of the measure also accounted for the social nature of alcohol use assumptions guiding heavy drinking. For example, Royce (1981) argued that alcohol use disorders were subjective and difficult to define because people view normative alcohol use and alcohol abuse differently. Specifically, he viewed problem drinking as something that interferes with everyday life. Later, Heather & Robertson (1997) in (Epstein 2001) argued that problem drinking definition should be thought as (a) a complex, learned behavior, (b) a chosen behavior, (c) a learned behavior, and (d) not necessarily progressive.

Scholars also considered drinking norms in the development of the heavy drinking measure. Herbert Fingarette, a philosopher and alcohol researcher championed arguments for considering drinking norms over medical-based assumptions in creating alcohol measures. In his book (1988) on alcoholism, Fingarette (1988) argued that everything the public knows to be scientific about alcoholism is false. He further argued that society has become more concerned with the adverse consequences of drinking. In his work, he sought to rebut the argument that excessive alcohol use leads to eventual loss of control. He argued instead, that the disease model led to stigmatizing labels such as “alcoholic”, which prevented people from seeking help or fostered beliefs that seeking treatment was hopeless (p4).

Fingarette (1988) further argued that the conceptual definition afforded by the heavy drinking measure was better than disease model based ways of defining problem drinking was because heavy drinkers are diverse. Thus, “rather than seeing one’s disease (alcoholism) with one cure (abstinence), heavy drinking... serves different functions and fulfills different needs for various individuals” (p6). He believed that a heavy drinker on any occasion can stop voluntarily because it depends on choice, which depends on situational factors such as mood, and social setting. Heavy drinking was a better conceptualization according to him because it was based on norms, “heavy drinkers are people for whom drinking as become a central activity in their way of life... and central activity is any hub of activity (job, religious practice, serious hobby, family or community role) that in part defines and inspires a person’s identity, values, conduct and life choices” (p100).

One of the strengths of the heavy drinking measure is that assumptions undergirding the methodological approach of defining problem drinking are based on consumption rather than presence or absence of disease. For instance, use of consumption-based definitions of problem drinking that reflect norms rather than pathology leads to (1) assessing the level of alcohol consumption is the most important screening of future alcohol-related behavioral and medical problems, (2) associating alcohol consumption with or without alcoholism with medical and social problems, and (3) not creating a problematic distinction of alcohol as a disease without considering levels of consumption (Litten and Allen 1992).

Furthermore, the heavy drinking measure allows for identification of harmful drinking that is not based on pathology. Additionally, consumption-based classifications can directly discriminate the severity of alcohol problems or the likelihood of both physical and social problems. For example, it is well established that long-term levels of alcohol consumption among childbearing women may lead to fetal defects (Day 1992; Baer, Sampson et al. 2003). Short-term levels of alcohol consumption which are captured by blood alcohol content, inform arrest policies such as driving while intoxicated or driving under the influence (Voas and Fisher nd).

Consumption-based measures of problem drinking such as heavy drinking have been challenged for weaknesses in measurement. These concerns have mostly been resolved. For instance, researchers have been concerned that self-reports of consumption patterns (i.e. amount and frequency),



especially from persons who may be intoxicated, weakens the reliability and validity of the measure. Advances, however, in measurement of alcohol consumption have improved validity and reliability of measures such as heavy drinking (Litten and Allen 1992; Greenfield and Kerr 2008).

Scholars also questioned the use of food-frequency type strategies to measure alcohol consumption in national surveys. For example, there was little to no consensus when using the food-frequency measure to estimate drinking, because some estimates were based on frequency and quantity while others were based on frequency, quantity and type of alcohol drinks. Today, many of these methodological concerns have been addressed (Sobell and Sobell 1995; Greenfield, Nayak et al. 2006; Greenfield and Kerr 2008). In fact, the author from one early study that investigated the reliability and validity of consumption-based measures concluded that:

the gist of these findings is that the survey instruments used tend to be relatively reliable and valid for a general survey on alcohol consumption. Overall, these findings should be viewed positively because they suggest that the survey instruments and the consumption measures derived from the instruments can be used with considerable confidence (Williams, Aitken et al. 1985, p226)

### **2.1c Conclusion on Terms and Measurement of Problem Drinking**

The term problem drinking used in this dissertation reflects the definition from the National Institute on Alcohol Abuse and Alcoholism (e.g. drinking to a level that causes distress or harm to oneself and others). I use two conceptualizations of problem drinking (DSM-IV alcohol abuse) as the main outcome and (heavy drinking) for sensitivity analyses only. Both conceptualizations, although developed from different models/assumptions about drinking, are related in complicated ways. For instance, a recent seminal paper that sought to define at-risk drinking illustrated that alcohol consumption was a correlate of alcohol use disorders such that it can be both a precursor to AUDs and an outcome because the relationship is bidirectional (Dawson 2011).

## **2.2 Relationships among Race/Ethnicity, Religion, Socioeconomic Status (SES) and Problem Drinking**

### **2.2a SES and Problem Drinking**

The causal relationship between SES and AUDs is inconsistent. For instance, several studies found a positive association between education and problem drinking measures (Crum, Helzer et al. 1993; Stinson, Grant et al. 2005). In a recent study, Barnes and colleagues (2013) found that socioeconomic status measured by a weighted index of education and occupation status was not statistically associated with heavy drinking (e.g. 5 + days on 12 days or more in the past year) but was associated with higher odds of having alcohol abuse/dependence (Barnes, Welte et al. 2013). Grant and colleagues (2001) found that being a high school dropout was associated with higher odds of alcohol dependence and lower odds of alcohol abuse; this finding has been confirmed in another study (Crum, Helzer et al. 1993).

In one study, Caetano and colleagues (2011) combined data from the 1992 National Longitudinal Alcohol Epidemiologic Survey (NLAES) and the 2002 National Epidemiologic Study on Alcohol and Related Conditions (NESARC). They found that persons with a high school diploma, compared to those who graduated college, had lower odds of alcohol abuse (OR 0.70, 95% CI: 0.57-0.85), but higher odds of alcohol dependence (OR 1.22, 95% CI: 0.92-1.36). That latter effect was not statistically significant (Caetano, Baruah et al. 2011).

Most recent data from the National Survey on Drug Use and Health illustrated that adults aged 18 or older who had graduated from college were less likely than those with some college education to be heavy drinkers (5.9% vs. 7.9%,  $p < .05$ ) (Substance Abuse and Mental Health Services Administration 2013). Similarly to studies using education, other researchers found mixed results when income was used as the SES indicator: lower income was associated with higher alcohol dependence (Ross 1995; Stinson, Grant et al. 2005; Caetano, Baruah et al. 2011). Even within the same study, Ross (1995) found that higher income was associated with higher odds of alcohol abuse, which was also found in a study by Keyes and Hasin (2008b).

Other researchers argue that latter finding was an artifact that stems from the DSM-IV criterion for alcohol abuse being sensitive to the surrounding social environment rather than to the presence or absence of a psychiatric disorder. For example, Barbor and Caetano (2008) conducted a replication of the study by Keyes and Hasin (2008b). They found that 84% of the sample with alcohol abuse met a diagnosis based on hazardous use criterion and 69% of that sample met criterion for abuse based on the drinking and driving item.

Barbor and Caetano (2008) argued that the positive association between income and alcohol abuse might reflect a bias to the extent that persons with higher income are more likely to have motor vehicles. They further argued that the extent to which drinking and driving are seen as dangerous and deviant behavior depends on social context. To test their hypothesis about social contexts, they used the National Household Survey on Drug Use and Health, the Hispanic Americans Baseline Alcohol Survey based on US samples, and the Brazilian National Alcohol Survey. They conducted across tabulation between alcohol abuse and the hazardous criterion of alcohol abuse with income and found that there were no statistically significant differences (Barbor and Caetano 2008).

Regardless of the SES measure, when characterizing groups using socioeconomic status, scholars have not reached a consensus about the relationship between SES and problem drinking. Prevailing evidence suggests, however, that persons with higher SES are more likely have a higher frequency of alcohol consumption at non problematic levels (i.e. without adverse social and health consequences) than persons with lower SES (Moore, Gould et al. 2005; Huckle, You et al. 2010). This finding is thought to hold across race/ethnicity and gender (Eigenbrodt, Mosley et al. 2001). Persons with lower SES are thought to be more likely to drink heavily and abuse alcohol than persons with higher (Levin 1990; Schuckit 2000; Anderson 2006; Batty, Lewars et al. 2008). One study though, found contradictory evidence; persons with higher SES were more likely to drink and have higher likelihood of alcohol abuse/dependence (Barnes, Farrell et al. 1994).

In longitudinal studies, alcohol abuse has been shown to predict future employment (Janlert and Hammarström 1992; Terza 2002). Conversely, other longitudinal studies found that income and education predict future problem drinking (Batty, Lewars et al. 2008). For example, one longitudinal study that

investigated the effect of past year income on the odds of heavy drinking found that lower past year income was associated with higher odds (OR 2.28; 95%CI: 1.80-2.90) of heavy drinking (3+ drinks per day vs. light/moderate drinking <1-2 drinks per day) the following year (Cerdá, Johnson-Lawrence et al. 2011).

### **2.2b SES, Problem Drinking, and Race/Ethnicity**

When invoked to explain racial/ethnic differences in problem drinking, SES has been proposed to mediate the relationship between race and problem drinking, as well as moderate the effect of race on problem drinking (Barr, Farrell et al. 1993; Herd 1994). Not all studies with race/ethnicity and problem drinking have explicitly offered a theoretical framework for the analytical choice between treating SES as a mediator or moderator (Jones-Webb, Hsiao et al. 1995). Studies that have provided some theory and also examined SES as a mediator tend to emphasize stress/disadvantage coping models. These theoretical frameworks posit that lower SES would be associated with higher prevalence of problem drinking because persons in low SES groups respond to stress/disadvantage by engaging alcohol as a form of coping (Pearlin and Radabaugh 1976; Wills and Shiffman 1985), which elevates one's risk for alcohol problems (Martin, Tuch et al. 2004; Akins, Smith et al. 2010). According to that framework, Blacks are more likely than Whites to have lower SES and experience stress/disadvantage, therefore SES would mediate the effect of race/ethnicity on problem drinking. The most cited, early empirical study of this approach showed that adjusting for SES does not fully explain race/ethnic differences in problem drinking (Herd 1994).

Herd's (1994) study signaled that treating SES as a mediator was not adequate to examine race-differences in problem drinking. Data better support models where SES moderated the effect of race/ethnicity on problem drinking (Barr, Farrell et al. 1993; Gilman, Breslau et al. 2008). For example, a study with a sample of alcohol dependent persons found that race/ethnicity moderated the protective effect of education on the impact of years and frequency of problem alcohol on health consequences. Specifically, un-standardized beta coefficients from structural equation modeling showed that the relationship of education to years of heaviest drinking was stronger for Black men ( $b=-1.76$ ) and, Black

women ( $b=-0.85$ ), compared with White men ( $b=-0.56$ ) and White women ( $b=-0.15$ ). The path from education to frequency of heavy drinking was strongest for Black men and Black women compared to White men and White women (Chartier, Hesselbrock et al. 2013). Another study based on a probability sample of women from Baltimore, MD found no race/ethnic difference in heavy drinking after controlling for covariates, age, education, income, employment and marital status (Lillie-Blanton, MacKenzie et al. 1991). The study, however, reported that the odds of heavy drinking was five times lower for Black women compared to White women with 12 or more years of education.

Race/ethnic differences often are pronounced at low rather than at high levels of SES. Several studies those findings are based on have not provided theoretical rationale up front for why that was expected (Lillie-Blanton, MacKenzie et al. 1991; Jones-Webb, Snowden et al. 1997). Instead, ad hoc theoretical rationales for SES and race/ethnic patterns predicting problem drinking typically were explicated for both individual- and area-level measures of SES such as concentrated disadvantage. For example, Keyes and colleagues (2008b) provided ad hoc explanation for the findings in their study. They explained that hazardous use criterion of alcohol abuse was sensitive to resources such as vehicles, which is positively correlated with income. They contextualized those findings by theorizing that the alcohol abuse criterion might be systematically capturing people with higher income who are more likely to be Black than White. In fact, a later study by Harford and colleagues (2009) found evidence to support the hypothesis that Blacks were less likely than Whites to report the hazardous use criterion of alcohol abuse and more likely to report other criterion, such as, legal problems, which is less sensitive to SES. That study too unfortunately, did not specify a theoretical rationale up front for those findings.

One notable study that specified theoretical rationale up front was conducted by Barr, Farrell, and colleagues (1993). That study focused on individual-level SES and specified how SES would moderate the effect of race/ethnicity on problem drinking. They applied Julius Wilson's poverty thesis to argue that persons in the middle class/SES position have more benefits relative to persons in lower class/SES, and that as Blacks moved up in SES attainment, their behaviors and attitudes become similar to middle-class Whites. Therefore, differences in behavior would be pronounced at low levels of SES. Indeed, the study found that at income less than \$7000 (compared to \$25,000 or more), and at education

attainment less than a high school diploma (compared to a high school or some college degree and higher), the differences in number of alcohol problems between Blacks and Whites were largest, especially among men (see figures 2 and 5 in Barr, Farrell et al. 1993). A final limitation of prior research that begs for a more complete understanding of racial/ethnic differences in problem drinking is that the crude association of race/ethnicity on problem drinking sometimes is not assessed before controlling for SES measures (Jones-Webb, Snowden et al. 1997; Huang, Grant et al. 2006; Smith, Stinson et al. 2006).

### **2.2c Religion and Problem Drinking**

A plethora of empirical studies demonstrate that religion, in its various dimensions, among national and international subpopulations, age groups including adults and adolescents, and among institutional or population-based samples, is associated with lower problem drinking (Booth and Martin 1998; Kendler, Liu et al. 2003; Bazargan, Sherkat et al. 2004; Bowie, Ensminger et al. 2006; Piko, Kovacs et al. 2012; Tumwesigye, Atuyambe et al. 2013; Dohn, Jiménez Méndez et al. 2014). For example, Barros, Botega and colleagues (2007) found that the adjusted odds of alcohol abuse among non-religious persons was 9.16 times the odds of Evangelicals. One cross-sectional study investigated the effect of religious denomination and religious involvement on lifetime alcohol abuse and alcohol dependence (Ghandour, Karam et al. 2009). The study found that those of Christian tradition (which vary across denomination on sanctioning of alcohol use) had a higher prevalence of lifetime alcohol abuse compared to Muslim denomination (which prohibits any alcohol use) (10.9% vs. 6.1%). In multivariable analyses adjusting for age, gender, university and program of study, among Muslims, persons who did not believe in God (compared to believers), and persons who never/rarely practiced their religious faith (compared to those who practiced regularly) had three times higher odds of lifetime alcohol abuse (OR 3.1, and 3.1,  $p < .05$ , respectively).

In a study of an international sample of college students from the United Kingdom, lower ratings of importance of religious faith was associated with a 9% and 46% higher odds of frequency for heavy drinking for men and women, respectively (El Ansari, Sebena et al. 2014). The religious faith dimension is similar to the spirituality measure that will be used in this dissertation study.

Religion also buffers the effects of other predictors of problem drinking. For example, one study of college students investigated whether the harmful effect of perceived norms on drinking would be buffered by religiosity. While perceived norms had a positive association with higher drinking per week, higher drinking frequency and typical quantity; those associations were weaker among students who assigned greater importance to religious values (Neighbors, Brown et al. 2013).

There is also support for a causal ordering of religion across several domains such as attendance and spirituality predicting substance use disorders (Idler and Kasl 1997; Good and Willoughby 2011; Miller, Wickramaratne et al. 2012). For example, Borders, Curran, and colleagues (2010) conducted a prospective study of religion and alcohol use disorders (AUDs) on a population-based sample. In that study, among persons with no AUDs at baseline, higher frequency of organized religious attendance was associated with lower unadjusted odds of developing an AUD in six months (OR=0.77, 85% CI: 0.62-0.73) and this relationship held after adjusting for religion and demographic covariates such as social support, age, sex, education and other drug use. The causal ordering of religion and health is not definitive and other researchers have argued that based on the current state of evidence, at best there “maybe” a causal ordering of religion’s effect on alcohol and other substance use health disorders (Levin 1994, p1480).

Spirituality has been argued as a dimension distinct from, as well, as overlapping with religiosity (explained in detail in section 3.2a). Spirituality is associated with problem drinking and recovery from alcohol problems (Miller 1998; Hester 2002; Laudet, Morgen et al. 2006). According to Miller (1998), there is strong evidence supporting the claim that being spiritual or religious typically is associated with “decreased risk of alcohol/drug use, problems, and dependence” (Ibid, p198). Furthermore, Miller’s (1998) work showed that spiritual or religious persons are usually less likely to use alcohol and if they do, they are less likely to engage in heavy use. One study designed to examine multiple religious constructs on alcohol problems (defined as mean number of drinks) found that higher spiritual well-being, which included measures for meaning and peace and feeling connectedness to God, was statistically associated with lower mean alcohol problems, in a sample of drinkers and non-drinker (Johnson, Sheets et al. 2007).

Finally, one study that defined spirituality and religiousness as separate constructs found that persons who were (1) spiritual (OR=0.93) and (2) religious but not spiritual (OR=0.81) had lower odds of hazardous drinking compared to those who were (3) not spiritual or religious (King, Marston et al. 2013). The association, however, was only significant in the latter group (i.e. 2 vs. 3).

### **2.2d Religion, Problem Drinking, and Race/Ethnicity**

Blacks generally have higher rates of religious involvement than Whites (Taylor, Chatters et al. 1996; Hunt and Hunt 2001). Thus, they may be more likely to be exposed to the protective mechanisms that religion provides against poor health (Sternthal, Williams et al. 2012) including problem drinking. Studies that have assessed race/ethnic differences in problem drinking often hypothesize that Blacks would benefit more than Whites from the religion-health connection because religion may be more helpful to disadvantaged and minority groups (Tabak and Mickelson 2009a). Other experts have argued that religion is a fundamental aspect of some minority groups such as Blacks (Mattis and Jagers 2001; Marks, Nesteruk et al. 2005), especially given the pivotal role the church played for Blacks during slavery, through the Civil Rights era, and still today (Thomas, Quinn et al. 1994; Mitchell 2004).

Evidence that Blacks benefit more from the religion-health connection than Whites is mixed and evidence have been generated mostly from investigating mental health outcomes other than problem drinking. For example, some studies that have examined the interaction of race/ethnicity with religion predicting outcomes such as depression found that the protective effect of religion on mental health was stronger for Blacks than Whites (Musick, Koenig et al. 1998; Bierman 2006). A study of religion and physical and mental health among a population of cancer patients found that higher levels of religious behaviors (which includes reading religious materials and service attendance) was statistically associated with better mental health functioning for African Americans, but not for Whites (Holt, Oster et al. 2011).

On the other hand, although less commonly found is that the strength of religion's salutary effect on health including problem drinking is greater for Whites than Blacks. In one study, religious importance, attendance and affiliation were more strongly related to abstinence for Whites than Blacks (Wallace Jr, Brown et al. 2003). That study, however, did not model problem drinking but abstinence from alcohol use.



In another study, Whites who attended services twice or more per month were 7.4% less likely to be at risk for alcohol dependence than those who did not attend, but no such effects were found among Blacks (Ford 2002). Finally, other studies found no significant interaction effects between religion and race/ethnicity on problem drinking (Musick, House et al. 2004).

The inconsistent findings with regards to race-religion-health connections perhaps could first be explained by methodological differences, more specifically in the specification of religious involvement. For example, in a study of a sample of adolescents, religious service attendance was statistically correlated with lower levels of problem drinking for White males and females but not Blacks, whereas the importance of religion was protective against problem drinking for Blacks (specifically females), but not Whites (Brown, Parks et al. 2001). In another study, the effect of being a member of a religious denomination that objected to alcohol on the risk of alcohol dependency was greater for Whites than Blacks (Ford 2002).

Second, it is not always clear whether the findings (especially with Whites benefiting more from religion on health than Blacks) were expected since not all studies specified a theoretical rationale upfront. In fact, ad hoc explanations for race/ethnic differences have usually been in response to null findings for Blacks. For example, in the response to the findings that Whites have benefited more from religion's protective effect on problem drinking, one author argued that the church may already be providing a wide array of support to Blacks so therefore religion's impact on thwarting alcohol problems may be minimal relative to other church-based supports (Amey, Albrecht et al. 1996). Other explanations are that religion may be a cultural or group phenomena for Blacks but works at the individual level for Whites, thus conferring protection from substance use at greater levels than Blacks (Lawson, Lawson et al. 2011).

## **2.2e Conclusion**

The association between socioeconomic status (SES) and religion is complex (Mueller and Johnson 1975). General population studies have shown that religious involvement can be negatively (Darnell and Sherkat 1997; Paul 2010) or positively (Beeghley 1981) related to SES. The evidence is

mixed regarding whether Blacks benefit more from religion-health connection than Whites, which were found to be dependent on the health outcome as well as the religious dimension measured. Some evidence suggest that the SES may condition the effect of religion on problem drinking and that race-differences in SES on problem drinking will be at lower SES levels.

One final implication of the previous literature review is that there is a dearth of research on race/ethnic differences in the effect of religion on problem drinking, and there is a strong need for specifying theoretical rationales upfront. According to Brown, and colleagues (2001), “despite the robustness of racial differences in alcohol problems, relatively few compelling explanations have been offered to explain these differences. Thus, many questions regarding the extent to which subcultural systems that shape drinking behaviors ... [across race] remain unanswered... One factor that might explain racial differences... in alcohol consumption is religiosity, a cultural factor that is currently not well understood” (Ibid, p697). The aim of this dissertation therefore, is to probe systematically the role of religion and SES in explaining or at least understanding Black-White differences in problem drinking.

## CHAPTER III

### Theoretical Rationale for Hypotheses

The focus of this dissertation is Black-White differences in problem drinking. I attempt to understand, if not explain, those differences through investigating the role of religious involvement—the main focal variable and socioeconomic status. The literature review in the previous chapter illustrated the intersections of race/ethnicity, problem drinking, religious involvement, and socioeconomic status. The primary associations were between (1) race/ethnicity and religious involvement; (2) race/ethnicity and SES; (3) religious involvement and problem drinking; (4) SES and problem drinking; and (5) SES and religious involvement. This chapter advances that review by specifying the theoretical underpinnings for how those various associations are expected to work in this dissertation. This chapter only focuses on the associations mentioned in (1), (3), and (5). I do not provide a theoretical discussion of the associations in (2) and (4). First, those findings are already extensively discussed in the current literature. Second, I do not generate hypotheses from their associations. Rather, the associations in (2) and (4) are discussed only in reference to how they potentially link the dissertation's hypotheses.

This chapter is organized around the relationship between religious involvement, problem drinking and race/ethnicity, and then around religious involvement, socioeconomic status and problem drinking. Hypotheses are derived at the end of each section. Section 3.1 is a summary of what will be expanded upon on sections 3.2 through 3.4.

#### 3.1 Thesis and Summary of Logic

*The interaction of religion and socioeconomic status explain Blacks lower prevalence of problem drinking than Whites.*

The inverse relationship between religious involvement and problem drinking operates at multiple levels and through multiple dimensions. At the institutional level, religious groups specify norms and moral codes for what is considered acceptable conduct for a range of behaviors that include drinking.

Each religious institution's moral codes for conduct that include drinking alcohol are guided by a specific theological doctrine that congregants often abide by. While congregants have some agency in the decision to abide by those codes—for example through personal conviction, it is plausible that those decisions are not independent of structure. The effect that religious institutions' moral codes have on a persons' behavior often works through constrain, by which individuals and groups activate on themselves or upon each other. The religious institution then operates as a moral community, a venue for social cohesion and a place for the exchange of psycho-social support, all of which are related to problem drinking, which will be discussed later.

Another way in which religion, at the institutional level, affects people behaviors is by creating an environment for social observation and learning. For instance, a person's drinking behaviors may be a product of observing and modeling what he/she sees within the religious community, which as mentioned, is often predicated by that institution's doctrine on drinking. That reasoning is one of the underpinnings of reference group theory, which has been applied in alcohol research usually by comparing drinking behavior across religious denomination. At the individual level, one would hypothesize that mean drinking scores should be zero or low for persons in institutions that sanction alcohol use. At the group level, one would expect that congregations that prohibit alcohol use will have lower mean levels of drinking compared to congregations that do not sanction alcohol use.

The aforementioned paragraphs highlight how problem drinking is constrained through institutional-level mechanisms. Religion's ability to constrain problem drinking can also happen through individual level mechanisms such as subjective experiences. As will be discussed in the following section, religion comprises of sacred beliefs and rituals. Beliefs are individually/subjectively experienced and persons develop a sense of what is important to them. Therefore, although religious doctrine on alcohol use theoretically should apply equally to all congregants, drinking levels may be conditioned by a person's personal conviction.

Whether constraints on problem drinking happen through mechanisms at institutional or individual level, the causal direction of how religion actually functions to protect against problem drinking is debated. One thought is that religious institutions moral codes 'cause' persons to constrain their

behaviors because they desire to remain a part of that social system. Another thought is that individuals 'selectively choose' to participate in a religion based on the institution's moral codes. A full discussion of the causation versus selection debate is beyond the focus of this dissertation. The literature review in chapter 2 appears to better support the view that religion causally predicts problem drinking. A discussion of the debate is less relevant for this dissertation especially since the data used for the subsequent investigations are cross-sectional. That bottom line is that some form of regulation/constrain on behavior occurs at the individual and group level.

The level at which religion has the greatest impact on problem drinking is also debated. One thought is that the institutional level, developed through the moral community hypothesis is where greater change occurs. The second thought is that individual dimensions of religiosity, such as personal prayer and conviction has stronger salient in protecting against problem drinking than institutional dimensions of religiosity (Kendler, Gardner et al. 1997; Lambert, Fincham et al. 2010). Again, a full discussion of that debate is beyond the focus of this dissertation. Testing the moral community hypothesis requires variables such as denominational affiliation and contextual-level data on religious adherents that are not available in this data set. Rather I discuss a few empirical articles as it relates to the measures available in the dataset.

Aside from moral communities and social cohesion, religion may protect against problem drinking through its functions of providing psycho-social support. For instance, while religion's moral codes often work through promoting the constraint of certain (usually deviant) behaviors, religious institutions have increasingly become more involved—through theological doctrine and faith-based public health partnerships, with promoting healthy behaviors. Coping with stress through religious mechanisms, such as daily prayer and worship, and encouragement of a healthy lifestyle are some ways in which protection against problem drinking is thought to work at the individual level. At the group level, some religious institutions provide educational programs and health services for alcohol treatment. Congregants within those institutions would be expected to have lower rates of problem drinking than in institutions that do not provide these services.

Now that I have established that religion protects against problem drinking, in order to demonstrate that Blacks will benefit more from that protective effect than Whites, I argue beyond the well-known fact that Blacks generally have higher levels of religious involvement than Whites.

Black-White differences in problem drinking can partially be explained through differences in the religious *experience*. Both the institutional aspects of religion, such as role of clergy and worship format, as well as the subjectively experienced aspects of religion differ significantly by between predominantly Black and White institutions. By extension, it is therefore assumed that Blacks and Whites experience religion differently. Next, religion is associated differently with identity development between Blacks and Whites. One result of slavery in the United States is that Blacks (Africans<sup>4</sup>) were stripped of their religious and cultural identity. Religion, and by extension religious involvement, perhaps has been the strongest mechanism (compared to politically driven identity formation) through which Africans formed and preserved their identity within American culture (Glaude 2000; O'Toole 2002) in ways Whites<sup>5</sup> never have to experience (Painter 2010). Religion's role in shaping Black identity makes it socially embedded within them, both at the individual and group level. Therefore, whatever subjective experiences religion provides to protect against problem drinking, Blacks stronger connection to religion would net them greater buffers on health compared to Whites.

With regard to problem drinking, a higher proportion of predominantly Black religious (PBR) institutions<sup>6</sup> subscribe to theology that discourages or prohibits alcohol consumption compared to predominantly White religious institutions. This is because many PBR Christian-centered institutions, were founded out of the Methodist and Baptist traditions<sup>7</sup>, both which prohibit alcohol use (Phipps 1987; Fuller 1995). Next, the moral codes for conduct of drinking behavior within PBR institutions may be enforced (either directly or indirectly as discussed above) more strongly than in predominantly White religious institutions. I did not find specific literature to support that claim but it is plausible, and will be

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<sup>4</sup> Regardless of whether they were imported directly from Africa or via the Caribbean region, given the diversity of Blacks in the United States

<sup>5</sup> Even those such as Jews and Irish who came to the United States as immigrants and at one point were discriminated against, but were assimilated into the American mainstream because they never lost their "whiteness". The identity of Jews and Irish for example, was not stripped and economics not religion was the main factor that allowed them to maintain their identity and excel in the US and not have to manipulate their immigrant identity.

<sup>6</sup> I am aware that are variations even within PBR institutions but to focus the discussion and to better allow for comparison with predominantly White institutions, the assumption is Christian-centered institutions.

<sup>7</sup> Those institutions are part of the Protestant groups, and highlights that there is variation even within religious tradition.

empirically examined later. For instance, African American/Black-centered Methodist and Baptist churches differed fundamentally—both in terms of leadership and interpretation of the gospel—compared to their White counterparts (Mitchell 2004). Blacks therefore, by virtue of belonging to an institution that both objects to alcohol use and perhaps more strongly sanctions alcohol use, are expected to experience greater buffers from religion on problem drinking than Whites.

So far, I have argued that religion has a protective effect on problem drinking and that Blacks are expected to benefit more from this protective effect than Whites. Next, I argue the protective effect of religion on problem drinking is conditioned by socioeconomic status such that those with lower SES will benefit more from the religion-health connection than those with higher SES. Early theoretical works of Karl Marx and Max Weber inform my viewpoints. Briefly, Marx saw religion as a device of the upper class to stifle class consciousness among the poorer class. He believed that religion deludes the poor about the source of their suffering, and the mechanisms required to change their position—class revolution. Instead, the higher levels of seeking religion among the poor blinded them into accepting their social position. Weber's contribution was that religious groups—specifically Protestants, had a strong work ethic, which predicted their economic success in capitalism. Furthermore, he thought that benefits of the work ethic would be experienced more among the middle and lower classes because they had a greater motivation to succeed and acquire wealth.

While Marx and Weber spoke of the relationship between religion and SES, they did not specifically discuss alcohol use or problem drinking. However, one can theorize on the relationship between religion, SES and drinking, which I do in section 3.3. Apart from the potential contributions of Marx and Weber, the Holy Bible may provide some insight that alcohol use, and by extension problem drinking, vary across religious involvement and socioeconomic status. There is evidence to suggest that even within the religious community; persons with low socioeconomic status had less access to the quality and quantity of wine than those of higher status.

In conclusion, Blacks (compared to Whites) and low SES (compared to high SES) are expected to yield a stronger degree of the religion-health connection. Blacks are more likely to have lower SES than Whites. I expect that through that intersection of race and SES, we explain, or better understand

Blacks lower prevalence of problem drinking relative to Whites.

### **3.2. Definition of Religion, its Dimensions, and Statistical Models**

Religion is an organized system of beliefs, lifestyles, rituals, symbols, and institutions (Hemeyer 1990; Thoresen 1998) and can be further understood through *institutionalized* or *internalized* dimensions. The *institutionalized* dimensions of religion are collectively experienced and objectively observable, such as service attendance and interaction with members of the congregation (Levin, Taylor et al. 1995). The *internalized* dimensions of religion are things individually experienced and subjectively interpreted such as spirituality (Levin and Preston 1987).

Spirituality, defined as one's personal relationship with God or a higher power is considered a form of subjective religiosity (Chatters, Levin et al. 1992; Ellison and Levin 1998; Idler, Musick et al. 2003; Williams and Sternthal 2007). Other scholars argue that spirituality is a dimension separate from religiosity or the practice of religion (Coyle 2002; Holt, Clark et al. 2009). Proponents of that view argue that religion is primarily a social or group phenomenon whereas spirituality operates at the individual level (Miller and Thoresen 2003). A third view of religion and spirituality is that they are distinct but overlapping constructs (Hill, Pargament et al. 2000; Marler 2002). Another possibility is that some dimensions of religion such as service attendance are correlated with spirituality, but that high levels of service attendance may also be independent of spirituality (Zinnbauer, Pargament et al. 1997; Heintz and Baruss 2001).

A rigorous investigation of religion and health should specify theoretically how the specific dimensions relate to the outcome, and where possible, show the mechanisms/pathways that connect the dimensions to the outcome (Chatters 2000; Ellison, Boardman et al. 2001; Miller and Thoresen 2003). In this data set, there are two measures that characterize the *institutional* dimensions of religion: (1) religious service attendance and (2) interaction with other religious members. In the following section, I explicate how those dimensions of religion shape problem drinking, and the potential mechanisms that link the dimension to the outcomes.



Before I do that, I identify the three main models of how religion are expected to influence health (Ellison, Boardman et al. 2001; Nelson 2009a). The first is the mediation model, which expects that the effects of religion on health outcomes occur through another variable. For instance, religious service attendance is expected to be related to health, including alcohol abuse through psycho-social aspects, such as congregational and social support, religious coping, prayer, that occur within the religious context (Buck, Williams et al. 2009; Sternthal, Williams et al. 2010; Drerup, Johnson et al. 2011). The second is the suppressor model, which states that greater levels of problems and stress drive greater levels of religious involvement which suppresses the effects of stress on health. Alternately, some types of stressors can lead to less religious involvement thereby reducing the potential buffering effect on health (Ellison and Levin 1998). The third is the moderator model which states that effect of religion on health outcomes will become stronger at increasing levels of stress (Krause and Van Tran 1989; Ellison and Levin 1998; Longshore, Anglin et al. 2009). This model is most relevant for the dissertation because I explore SES as a moderator of the association between the race-religion and problem drinking connection. I assume that race and SES are correlated with stress. Specifically, Blacks compared to Whites and low SES compared to high SES are individually (Williams 1999; Boardman and Alexander 2011) and multiplicatively (Ulbrich, Warheit et al. 1989) associated with higher stress given that they are key stratification factors (Keith and Herring 1991; Bowman, Muhammad et al. 2004) that signify low social location.

### **3.3 Religion and Problem Drinking**

Before I proceed to the theory that connects religion with alcohol use, I reiterate that there is strong consensus that religious involvement protects against problem drinking. It is estimated that the odds of alcohol and drug abuse among religious people are 30-40% less than the odds among non-religious people (Nelson 2009b). In a review of 86 quantitative studies that examined the association between levels of religious involvement and alcohol use and abuse, 76 (88%) studies reported significantly less alcohol use or abuse among religious persons (Koenig 2001). Of the remaining 10 studies, six did not find a significant inverse relationship, two found a positive association, and two

reported mixed results. Finally, although religion has been extensively studied before in relation to recovery from alcohol, religion is more strongly related to primary than tertiary prevention of alcohol and substance use (Spika and Bridges 1992; Gorsuch 1995; Miller 1998).

Next, as discussed in chapter 2, there is a debate in alcohol research on what is the best way to conceptualize problem drinking. The assumptions that guide the heavy drinking measure are based on drinking being thought of as a behavior. On the other hand, the assumptions that guide the DSM-IV alcohol use disorders are based on problem drinking being thought of as a mental health outcome. Religion can protect against problem drinking regardless of whether it is characterized as a behavior or mental health outcome. The following sections describe how religion is expected to buffer problem drinking when it is considered a behavior (section 3.2b and 3.2c) and when it is considered a mental health outcome (section 3.2d).

Moral codes and norms, whether religious or secular based, that govern what is considered acceptable or unacceptable use of alcohol, the functions of alcohol, who may use alcohol, what sanctions and consequences should be associated with alcohol use beyond the accepted norm are based on the cultural systems of groups and societies (Patrick 1952). Some key qualifications are therefore important before I proceed with my theoretical views. The first qualification is that the moral codes and norms on alcohol use and abuse in the United States are deeply embedded within political and religious culture. For instance, at one point, the sale of alcohol was prohibited through an official legislative act known as Prohibition. Moreover, Prohibition was spearheaded by religious institutions, mainly Protestants.

The second qualification is that majority of religious traditions in the United States are based on Judeo-Christianity. These traditions include Protestants, Catholics, Mormons, and Jehovah's Witness (Pew Forum on Religion and Public Life 2008). The Holy Bible is the source that informs the theology/doctrine used by these religious traditions, and thus examples used in this dissertation are limited to Biblical text. The Holy Bible does not provide a definitive stance on alcohol<sup>8</sup> use as compared to other religious texts such as the Holy Quran, which is explicit in Islam's doctrine against alcohol use (Powell 2004). Consequently, what is considered normal and deviant (problem) drinking is highly

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<sup>8</sup> The word alcohol is not always specifically mentioned. Biblical passages often refer to wine or strong drink.

contested within Christian-centered religious traditions<sup>9</sup> (Tilson 1957; Robertson 2004). One reason for such variation in proscriptions of alcohol use, even among subgroups within the same religious tradition such as Protestantism, is whether wine, which Jesus drank, was fermented and considered intoxicating or not, and whether the quantity in which Jesus drank, especially at feasts, would be considered excessive (McGrath 2004; Oropeza 2004).

Other reasons include a debate of whether there are contexts where wine was socially acceptable, and whether levels of use is context dependent (Tilson 1957). For example, two contexts are: (1) wine used for ascetic purposes like spiritual enhancement during communion and (2) wine used during celebration where Jesus turned water into wine. Whitfield (1996) scenarios for the contexts of alcohol use in the Bible generally falls into a dichotomy of use that was seen as scriptural versus cultural. There, is however, no official position on whether context should be relevant in an institution's stance on alcohol use.

Another source of contestation about alcohol use within the Bible is whether one chooses to emphasize scriptures from the Old Testament when Jesus lived as man on earth, or scriptures from the New Testament where he left rules for living after having died for our sins. Related to the use of the Old vs. New Testament is whether declarations of alcohol use came from Jesus' actual words or the interpretation of his words by the prophets who wrote the scriptures (Dodshon 1932). For example, located in the Old Testament, (Lev 10:8-9 KJV) can be interpreted as total abstinence against wine/alcohol, "The Lord spoke unto Aaron, saying do not drink wine, nor strong drink, thou, nor thy sons with thee, when ye go into the Tabernacle of the congregation, lest ye die it shall be a statute for ever throughout your generations"(King James Bible Online 2014). In the New Testament, even within different chapters of the same book, conflicting conclusions can be drawn about alcohol use. For example, in (1<sup>st</sup> Tim 2:2-3) "a bishop then must be...not given to wine". That scripture suggests abstention while (1<sup>st</sup> Tim 2:8) "Likewise must the deacons be... not given to much wine...", (Ibid) suggests moderation. The previous chapters also spoke of alcohol use among religious persons with titles while (1<sup>st</sup> Tim 5:2) "drink no longer water, but use a little wine for thy stomach's sake and thine often infirmities" (Ibid) suggests

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<sup>9</sup> For example, Lutheran, Methodist and Baptist are all under the Protestant tradition, but vary across a spectrum of no alcohol use to moderate use.

moderation within the general population. Interpretations from (Eph 5:18) “Be not *drunk* with wine, wherein is excess...” suggest that there was some measure of what was considered unacceptable. Furthermore, it seemed that Jesus condemned the excessive drinker or when alcohol<sup>7</sup> was abused. For instance, he said in (Gal 5:21) that, “Envyings, murders, drunkenness, revellings, and such like... they which do such things shall not inherit the kingdom of God”.

The third qualification is that I limit the basis of deviant behavior to the actual use of alcohol. Three basic norms regarding drinking are (1) proscriptive, which forbids alcohol use, (2) prescriptive, which positively sanctions alcohol use, and (3) nonscriptive, which neither prohibits drinking nor provides guidelines for drinking (Preston 1969). Although the norms for drinking vary across and even within religious traditions (Linsky 1965), almost all religious institutions cohere to the immorality of alcohol use in cases where negative side effects, such as impairment and harm to one's self or others from excessive use (Miller 1998; McGrath 2004). For example, the Presbyterian Church in the US stance on alcohol use is prescriptive, however, the church considers alcohol abuse immoral [a deviant behavior] and as an illness [a mental health outcome] (Belcher 2006). The consequences of excessive use (i.e. harm to one's self and others) as defined through those religious views reflect contemporary and scientific definitions of problem drinking (Levin 1990; Rivers 1994).

The analysis of the effect of religion on problem drinking is limited specifically to drinking alcohol as the deviant behavior. This is important because there are other views on what was deviant about alcohol use. Some religious scholars suggested the social context where drinking occurred was seen as deviant behavior and not necessarily the drinking and that even the word drunk actually translated to something outside the context of alcohol. For instance, McGrath (2004) argues that the verse in (Luke 7:33-35), “For John the Baptist has come eating no bread and drinking no wine, and you say, 'He has a demon!' The Son of Man has come eating and drinking, and you say, 'Behold, a gluttonous man and a drunkard, a friend of tax collectors and sinners!'”, was not about sanctioning deviance from drinking but from associating with unrighteous people. McGrath (2004) writes “the comparison is not specifically about partaking of alcoholic beverages... but about drinking as a form of social interaction” (p. 21).

In his work on Wine in the Bible (nd), religious scholar Samuele Bacchiocchi showed, through his own translations Biblical text show that word “drunk” used in (1<sup>st</sup> Cor 11:20-21) “when you meet together, it is not the Lord’s supper that you eat... and one is hungry and another is drunk”, is not about drinking but about the behavior of the guests. Bacchiocchi (nd) argued that is the reason that Paul, the writer of Corinthians, did not rebuke drunkenness in verse 22 when he wrote, “What! Do you not have houses to eat and drink in?” Instead, Bacchiocchi (nd) argued that drunk in that context meant *filled*, which implies that the deviant behavior was being filled with something other than the Holy Spirit.

Theoretically, limiting deviant behavior to alcohol use is important because even though light to moderate drinking is expected to confer benefits for some health outcomes (Rimm, Williams et al. 1999; Mukamal, Chen et al. 2010), evidence suggests that not all groups, specifically Blacks, benefit equally (and in fact experience deleterious effects) at similar levels of consumption to Whites (Sempos, Rehm et al. 2003; Fuchs, Chambless et al. 2004; Kerr, Greenfield et al. 2011).

The following sections are therefore organized by first providing an abstract theoretical overview of how religion as an institution potentially constrains individuals and groups drinking behavior in sections 3.3a through 3.3b. I use my own personal experience as a religious member who attends services frequently, biblical text, excerpts from temperance sermons, and other data on religious traditions’ stance on alcohol use. I then report on exploratory analyses from religion-based data sets to establish some empirical basis for the social control and regulation perspective. The report attempts to describe (1) two plausible ways (punishment, and denial of opportunity) alcohol use behavior is constrained at the individual- and group-level and (2) how proscriptions of alcohol use are distributed across religious tradition according to measures of race/ethnicity. Section 3.3c offers an alternate, but not necessarily competing theoretical perspective, to the social control view. Specifically, religion may protect against problem drinking through the psycho-social resources it provides at the individual and group level.

### **3.3a Religion, Social Control and Deviant Behavior**

Religion has been considered as an institution of social control (McIntosh, Fitch et al. 1981; Stark and Bainbrige 1996; Richardson 2005). Social control here is understood from the standpoint of

Edward Alswarth Ross (1906) as a type of domination which is intended to fulfill a function in the life of society. Ross described several means of social control such as public opinion, law, social suggestion, education, illusion, belief and social religion. The latter two means of control are most relevant to the discussion. First, religious institutions can be thought of as normative organizations where social control operates mainly through internalization of norms (Wardak 2002). Second, the chief limitation of those means, according to Wardak (2002) are that the mechanisms used such as force, coercion and psychological manipulation, are external to the individual and do not account for how self-regulation or internal control happens. Social control means: control by belief and social religion provide a useful lens to understand how self-regulation—a marker of individual religion, constrains behavior, which as mentioned before is a stronger predictor against deviant behavior than institutional religion.

A religious institutions' doctrine is usually what governs moral codes and norms of deviant behaviors, which problem drinking is thought to be (Stark and Bainbrige 1996; Clinard and Meier 2011). In fact, both secular and religious institutions are in congruence that problem drinking<sup>10</sup> is a deviant behavior. According to one religious studies scholar, "religious norms simply reiterate general societal norms" (Cochran, Beeghley et al. 1988, p260). The congruence between secular and religious perspectives may reflect French sociologist Emile Durkheim's position that religion is a reflection of society (Pickering and Redding 1975). Religion, according to Durkheim (1995) is " a unified system of beliefs and practices relative to sacred things, ...which unite into one single moral community called a Church..." (p xxiv). From this perspective, religious moral communities are central to social control and deviance (Stark and Bainbrige 1996). This is because, "religion is not simply a system of beliefs and conceptions... but a system of action... and in participating in religious rites and ceremonies that the moral power is most clearly felt and where moral and social sentiments are strengthened and renewed" (Hamilton 1995, p101). When it comes to deviance and drinking behavior, however, religion has been found to exhibit stronger constraints on drugs and alcohol compared to other forms of deviance such as crime (Hoffmann and Bahr 2005). The reason for this as some scholars argue is that religious people generally disapprove of alcohol and drug use *more* so than those from secular institutions (Burkett and

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<sup>10</sup> Again, the use of the term problem drinking in qualified to mean deviance in alcohol use, whether abstinence or moderation

White 1974; Gorsuch 1995).

So how does religious social control actually work on problem drinking on a practical level? As a Christian member of an apostolic church, my alcohol use is constrained more by control via subjective religiosity rather than objective institutional means. Although I have attended services on average three times per month, I am not aware of my church's official position on alcohol use and have not heard a sermon preached on alcohol use. Ross's (1906) theory on control by belief is one way to understand why an average religious member like me plausibly constrains drinking behavior. According to the control by belief perspective, non-verifiable convictions of the supernatural being who follows the doings of men and intervenes to punish and reward, is what constrains man from engaging in deviant behavior.

Specific to alcohol use, implicit in this reasoning is that there is some general knowledge on alcohol use and deviance, but fear of punishment (for deviance in general) leads men to self-constrain drinking to either abstinence or moderation. According to Ross (1906), that means of control is powerful because there is both a high frequency of stories of God's punishment and that the horrors of hell (presumably where one ends up if he does not repent from sins and dies) are exaggerated. I am not aware of empirical proof to support such argument with reference to problem drinking beyond my own anecdotal accounts. Ross (1906) was balanced in his analysis to note, however, that there are weaknesses with the control by belief perspective. Some weaknesses he noted are that the recompense for not conforming are not immediate, deeds rely on consequences, and there is no religious penal system.

While I am not aware of the punishment, if any, for alcohol use in my church, that has not been the case among other religious institutions during certain time periods in the US. For example, during the Temperance movement, associations with alcohol use within the church had clear punishments, which congregants witnessed through frequent sermons and examples of what happened to those who deviate from those teachings. In a sermon titled *Abstinence from Evil*, delivered by Reverend Canon Farrar in 1878—the height of the Temperance Movement said to the congregation,

though I am bidden to speak to you about temperance, the point of view from which I speak is that of total abstinence...My brethren, I need not

tell you of the horrors caused by drink...drunkenness, the base and brutal vice of drunkenness, is the national sin! Consider then, my brethren, whether God calls you or no to help in removing from your country its deadliest curse; but this I say to you, that, if he does, you can only do it effectually by being an abstainer (Farrar 1878, p6-12).

While this sermon was delivered as a plea to abstinence, it was based on punishment from sin, which God is thought to administer through unverifiable means. In other cases, the punishment associated with alcohol use was something the institution administered. Although the Temperance Movement denounced alcohol consumption, the rhetoric for its campaigns was based on the sale and distribution of alcohol, which punishments were mostly designed to reflect. For example, Rev. Thomas Coke, an early forefather of the Methodist church wrote about the doctrine of the Methodist Episcopal Church America and stated, "if any member of our society retail or give spirituous liquors, and anything disorderly be transacted under his roof, on this account, the preacher who has the oversight of the circuit shall proceed against him as in the case of other immoralities" (in Wasson 1914p, 180). Here, it seemed that alcohol use was grouped with other sins and subject to whatever punishments those immoralities might face.

The control by belief, especially illustrated through punishment is one plausible explanation for regulation of drinking behavior, social religion and denial of opportunity is another. According to Ross (1906), social religion is defined as "the conviction that there is a bond of ideal relationship between the members of a society and the feelings that arise in consequence of this conviction" (p198). He argued that when the basis of social group order moved away from a natural society of tent-mates or house-mates to primitive society that is fragmented, the feelings between man and man became religious. Therefore, it seems plausible that exclusion might be sufficient to sanction deviant behavior. In the case of alcohol, I argue that denial of opportunity is one form of exclusion that is powerful enough to constrain problem drinking. As mentioned, in my church, I am not aware of specific punishments for alcohol use, but I am aware that members are disciplined<sup>11</sup> through exclusion from positions, for example removal from the choir by the pastor or removed from sitting in the deacon's pew to the general assembly.

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<sup>11</sup> Disciplined and punishment could be used interchangeably here, however, disciplined seemed more appropriate here in the Foucaudian sense of creating "docile bodies".



Besides my anecdotal accounts, I was unaware of any published study that provided an answer to my argument, therefore I conducted empirical analyses using cumulative data (1998 and 2006-2007) from the National Congregations Study (Chaves and Anderson 2008). Those data contained several questions that could best approximate a direct investigation of those anecdotal accounts. Specifically, I describe results of whether persons who drink alcohol in moderation, would or would not be permitted to become full-fledged members of a congregation<sup>12</sup>, and whether that varies by religious denomination's stance on alcohol use (i.e. that object to any alcohol use and not object)<sup>13</sup>. Second, I examine whether volunteer leadership positions would or would not be denied to persons who drank in moderation, and again whether that varies by denomination's stance on alcohol use<sup>14</sup>. All analyses were restricted to Christian congregations and that view the Bible as the literal and inerrant word of God<sup>15</sup> because of the three qualifications I set forth earlier in section 3.2.

At the congregation level, (n=248), a larger proportion of congregations in the study does not prohibit the use of alcohol (67%=does not prohibit vs. 32%=yes, prohibits). Overall, a larger proportion of congregations would still allow full-fledged membership (89%=yes) and leadership positions (69%=yes) to persons who drank alcohol in moderation.

The punishment perspective through denial of opportunity does seem to be a strategy to constrain alcohol use among religious denominations that object to alcohol use versus those that do not object. For example, objector denominations were less likely than those who do not object, to permit full-fledged membership (21% vs.79%) or leadership positions (15% vs. 84%) to persons who drink alcohol in moderation. Those findings partially support my argument that social religion is a plausible means of control for alcohol use, which I extend to problem drinking, since, as mentioned, what is considered deviant varies across religious traditions.

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<sup>12</sup> "Would the following types of people be permitted to be full-fledged members of your congregation: Someone who drinks alcohol in moderation? Response (yes, no, don't know, missing).

<sup>13</sup> Does your congregation prohibit the use of alcohol? Response (yes, no, don't know, missing). Congregations where a greater proportion said yes than no are defined as "objectors".

<sup>14</sup> Regarding leadership, if they were otherwise qualified, would the following types of people be permitted to hold all of the volunteer leadership positions open to other members: Someone who drinks alcohol in moderation? Response (yes, no, don't know, missing).

<sup>15</sup> Analyses were limited to this group, because congregations that use other texts such as Islam and Jewish traditions might confound the results. Moreover, the analyses were grounded by the previous qualifications I set forth earlier.

### **3.3b Religion, Social Control and Deviant Behavior: On Durkheim**

The church's imposition of moral sanctions is one direct influence on problem drinking that operates through service attendance and social interaction, two variables used in this dissertation. The regulating effect of moral sanctions on problem drinking may also operate through attachment and social interactions with other religious members. The effect of attachment to persons on deviant behavior was illustrated in Durkheim's ([1912] 2002) classic study *Suicide*. Here, Durkheim's perspective differed from Ross (1906) on social religion, which also made attachments a central feature of control. For Durkheim, acts of suicide, which he considered one form of deviant behavior, was not the result of individual attributes or theological differences, but rather breakdowns of societal attachments. Durkheim did believe that religion served a specific function such that it provided a "social glue in the form of common beliefs ... and legitimize society's norms and structures" (Roberts 1992, p38).

In terms of constraining behavior through attachments, it can operate in two ways. First, religious institutions specify moral demands concerning behavior of their adherents (Stark and Bainbrige 1996). Thus, at the individual level, people will conform to norms to the extent they are attached to others who accept the legitimacy of those norms. Levels of engagement in deviant behaviors also depend on the levels of religiousness [and interaction with religious members] in surrounding networks (Stark 1987; Stark and Bainbrige 1996). At the group level, deviance rates will be higher in groups with lower mean levels of [religious] attachments (Hirschi and Stark 1969; Stark and Bainbrige 1996). In fact, Durkheim found that suicide rates were inversely related to social attachments. He argued that egoistic suicide resulted when people were not well integrated in social groups. Moreover, when crises arise, those individuals are alienated (Durkheim [1912] 2002) and lack social support to deal with difficult situations (Elwell 2003).

Attachments are also related to forms of guidance people get from social interaction with others, which can also constrain deviant behavior. For instance, Durkheim ([1912] 2002) showed that higher suicide rates occurred among those with weakened or lack of regulative guidance, which he termed anomie. Without guidance and structure, individuals are not able to set realistic goals for themselves, which increases likelihood to engage in forms of deviant behavior (Stark and Bainbrige 1996).

Durkheim's theoretical contributions to understanding religion's role in constraining deviant behavior are evident in contemporary theories of social capital (Cnaan, Boddie et al. 2003; Coleman 2003). For instance, the theoretical underpinning of religious social capital is that religion can combat egoistic forms of deviance through "focusing on the socialization of individuals into collective behavior... and develop norms of reciprocity" (Smidt 2003, p7). One scholar even argued that "religion is capable of combating both alienation and anomie" (Roberts 1992, p40) though he was not specific as to type of mechanism, which could include prayer, service attendance or clergy involvement.

Three of four religion variables in this dataset are used to conceptually illustrate the connection between religion and social control on problem drinking. They are (1) currently attends religious services or not, (2) religious service attendance, and (3) interaction with members of the congregation. These three variables, in the abstract, all represent attachment to a religious social group or network (Kirkpatrick 1992; Becker and Dhingra 2001).

The effect of each variable on problem drinking is hypothesized as follows. Individuals deficient in attachments will have a higher likelihood of engaging in deviant behavior since they have either have no or few attachments to risk. Therefore, at the individual level, (a) belonging to a religion, (b) higher levels of religious service attendance, and (c) higher levels of interaction with religious members will be inversely related to problem drinking. At the group level (i.e. race/ethnicity), higher levels of interaction with religious members on problem drinking is expected to vary between Blacks and Whites. Specifically, I expect the relationship between (b) service attendance and (c) social interaction with religious members on problem drinking to be stronger among Blacks than Whites. I explain the rationale for those arguments in section 3.4 on race/ethnic differences in religion.

Although the theoretical underpinnings of religion as social control can be tested empirically, there are two fundamental limitations, both of which can be overcome. First, according to Durkheim (2002), if religion is the expression of society, then it is possible that institutions other than religion can regulate deviant behavior and render religion's effect spurious. For example, social or political institutions such as cultural clubs or governments may have unique rituals, practices or powers that create unique moral communities that regulate deviant behavior.

Another potential weakness of the religion and social control perspective is a criticism of method. For instance, in *Suicide*, Durkheim reduced Protestantism-Catholicism differences into degrees of social integration rather than to differences in theology. Some argue that this is problematic because religion's role on problem drinking depends on denomination (Laudet, Morgen et al. 2006). Therefore, ignoring the impact of differences in religious traditions/denominations obscures the effect of religion as a form of social control (Cochran, Beeghley et al. 1988).

These are two valid criticisms of the religion and social control perspective. Other religion scholars argue, however, that while other worldly aspects of can be reduced to social relations, the "doctrines of religions ... is what make them so much more effective [as an institutional force that deter deviant behavior] compared to other voluntary [or government] associations"<sup>p22</sup> (Stark 1987, p22). This is because, theology is a form of legitimation, which "represents ideas which become legitimated by being religiously attached and interpreted, so that they influence the world views of large groups of people" (Spika and Bridges 1992, p22).

The concept of legitimate forms of authority can be attributed to sociologist Max Weber. According to Weber, religious intuitions are endowed with a form of charismatic legitimacy that extends beyond or works with other forms of legitimate or legal authority as found in other types of social and political institutions (Hill 1973). Additionally, the influence of religion can be found in other types of social institutions. For instance, "[religion] is a universal phenomenon that the formation of a political association entails subordination to a tribal god...and that every permanent political association had a special god who guaranteed the success of the political action of the group" (Weber 1963, p16-17). One modern-day piece of that religion is central to other types of social institutions can be found within the 2<sup>nd</sup>, 5<sup>th</sup>, and 11<sup>th</sup> traditions of the pillars of Alcoholic Anonymous (Bill 1955; Alcoholics Anonymous World Services Inc 2013).

Some scholars counter the second critique by arguing that denominational differences, such as between Catholicism and Protestantism, confound religion with ethnicity, neighborhoods and social class (Stark and Bainbrige 1996). Latest data show that about 73% of the people in the US who report religious affiliation are Protestants (Association of Religion Data Archives 2009). There is, however, significant

diversity even within the Protestant tradition (i.e. evangelical churches, mainline churches and historically black churches). In terms of race/ethnicity, a national survey among adolescents showed that African Methodist, Jehovah's Witness, Baptist, and Muslim communities have relatively higher proportion of African Americans, while Catholic, and Adventist were predominantly persons of Hispanic ethnicity (Smith, Denton et al. 2002). Regarding place and socioeconomic status, national data indicate that 66% of Mormons are in the State of Utah (Grammich, Hadaway et al. 2012). And among traditions where the average adherent report incomes over \$100,000 and have a post graduate education, about 80% are Hindu and Jewish affiliations (Pew Forum on Religion and Public Life 2008).

Although it is plausible that the effect of religious variables on problem drinking may vary across theological doctrines (Michalak, Trocki et al. 2007), often it is not feasible to disentangle every way in which religious tradition may be confounded with selected socio-demographic variables. The only religion variables collected in this dataset, and subsequently used in the dissertation, were purposefully selected by the survey's investigators to overcome some of those methodological limitations. Specifically, the religion measures in NESARC were designed to apply to the general population such that they would not be biased towards or against certain groups (Berry, Bass et al. 2011).

### **3.3c Religion, Psychological Coping and Mental Health**

Problem drinking has been considered a mental health disease or spiritual outcome (Hore 1994; Nelson 2009a). Religion, therefore, is thought to primarily influence problem drinking through prevention (Maton and Pargament 1992). Specifically, from a psychological theoretical perspective, religion would operate as a secondary, as opposed to primary, prevention for mental and spiritual health diseases/outcomes such as problem drinking. According to Spika and Bridges (1992), from a religious standpoint, conditions such as oppression and racism, thought to be the result of sin in the world, are threats to mental health. Therefore, if those conditions can be viewed as a result of sin, religion is appropriately positioned to buffer those threats to mental health through the functions it allows individuals to experience such as salvation, or functions it provides such as social and spiritual coping support. The theoretical underpinning for this perspective is explicated by the following quote: "religion...gives man

comfort in all situations of life through theism and belief in... hope in the face of adversity...." Masaryk 1881: 84, (as cited in (Stark and Bainbrige 1996)).

Specific to problem drinking as a mental health outcome, the mechanisms by which religion is thought to have its protective influence are: (1) promoting a healthy lifestyle and discouraging destructive habits like excessive alcohol consumption, (2) providing religious resources and skills for coping (3) regulating emotions, which are facilitated by relational attachments, and (4) encouraging transcendent religious experiences such as spirituality (Nelson 2009b). Religious service attendance and social interaction are thought to provide psychological benefits for health from exposure to the religious setting. It may also be that mental distress may be driving attendance (Tabak and Mickelson 2009a). Another theoretical association between the health promoting psychological aspects religion that plausibly protects against problem drinking, especially if defined as a mental health outcome, is through spiritual coping (Martins, Ribeiro et al. 2012).

Given religion's potential role of constraining deviant drinking behavior and also providing psychological coping that could prevent problem drinking, I hypothesize that religious involvement is negatively associated with problem drinking.

### **3.4 Religion, Race Differences and Proscription vs. Prescription**

According to Weber (1965), "not all groups [race] develop religious sentiments to the same degree or with the same intensity" (in Hamilton 1995, p139). Three perspectives undergird my thesis that religion can explain Blacks lower prevalence rates of problem drinking than Whites. The first perspective is that Blacks have higher levels of religious involvement than Whites, which could accounts for their stronger benefit from religion on health. This is called the "differential involvement perspective" (Krause 2002). The second perspective is that Blacks have a greater intangible or innate connection to religion than Whites, which would explain why they are expected to net stronger gains from religion on health. That second perspective is called the "differential impact" perspective (Krause 2005). To test the "differential impact" perspective, one would evaluate, as I have done, whether the regression coefficient in the relationship between a religion variable on health for Blacks differs from the coefficient of that same

variable on health for Whites. If the coefficients are different, it suggests that “there is something qualitatively different about the nature of church-based support [or any whatever specific religion variable was analyzed] in the two racial groups” (Krause 2005, p154).

The third perspective, I made up and called the “alcohol-specific denominational-race difference”. That perspective suggests that predominantly Black denominations are more likely to proscribe alcohol use than predominantly White denominations. Finally, punishment for alcohol use through exclusion as a means of control is less likely to happen in predominantly White than Black denominations. The first two perspectives are supported through the historical, sociological and anthropological accounts of race and religion in the paragraph immediately to follow and continued in sections 3.4a and 3.4b. The third perspective is anecdotal and I am not aware of the third perspective in the literature. To investigate my perspective, I report the descriptive analyses I conducted using the National Congregation Study, described later.

It is well documented that religion is a core of identity for many Black Americans (Lincoln and Mamiya 1990; Taylor, Chatters et al. 2003). Religion was a core part of the identity of Black Africans before they arrived to America as indentured servants or slaves (Pinn 2006). Religion became increasingly salient to Black identity during the oppressive system of slavery (Fountain 2010). The salience of religion as part of Black identity continued after slavery was abolished as Blacks faced new mechanisms of oppression in racism, discrimination and denial of opportunity. In this section, I use the context of slavery to illustrate the development of religion as a core part of Black identity. Slavery is an important context because the majority of Blacks were brought to the United States as slaves, whether from Africa, the Caribbean, or other regions of the world. Consequently, the lineage of a majority of Blacks in the United States today is descendants of slaves. I also use the context of slavery to show how Blacks developed a different religion-health relationship than Whites. I argue that the importance of religion to Black identity and the relationship of religion to health for Blacks during slavery has transcended today.

To ground the discussion of the greater salience of religion in the lives of Blacks than Whites, it is necessary to note that empirical evidence showed that for as long as data have been collected on

alcohol use, Blacks had lower rates of problem drinking than Whites (Clark and Hilton 1991; Midanik and Clark 1994). The factors such as poverty and low socioeconomic status that are thought to influence drinking among Blacks today were also present throughout slavery. Blacks also had little access to alcohol during Slavery. The lower rates of problem drinking among Blacks than Whites today suggest that whatever mechanism [religion] that protected against drinking then, have transcended and remained a protective factor for Blacks today.

The theoretical perspective of transcendence of religion was developed by Clifford Geertz (1966) in his work, *Religion as a cultural system* (in, Hamilton 1995). For Geertz, religion is sentiments and meanings, which are created through two basic elements: sacred symbols and world view. The sacred symbols played an important role in creating a picture that was related to an ethos or belief, as expressed in the world. He sees religion as, “a system of symbols which acts to establish powerful, pervasive and long-lasting moods and motivations in men... the moods and motivations seem uniquely realistic” (Hamilton 1995, p158). Geertz’s definition underpins several parts of my thesis of how religion operates among Blacks. First, slaves that were brought to America from West<sup>16</sup> Africa had long practiced symbols and rituals that were powerful and established the social order in their cultures. According to one African scholar who wrote about the religion of the Yoruba tribe of southwest Nigeria, “in all things they [Africans] are religious. Religion forms the foundation and all the governing principle life for them...” (Adefila 2011, p17). Second, I believe that the powerful pervasiveness of religion is long-lasting such that whatever protective effects religion had for Blacks during slavery still operates for them today.

### **3.4a Historical Accounts and Emergence of Race-differences in the Salience of Religion**

Slavery, according to Elkin (1968) was an “institution that warped the slave’s personality and deprived him from his cultural identity” (in, Adefila 2011, p2). The first fundamental feature of difference in salience of religion between Blacks and Whites is that African slaves not only brought their religions with them, but they practiced it, whether in secret or in fusion with the religions of their slave owners (Simms

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<sup>16</sup> Although slaves came from other parts of Africa, a majority was from West Africa and much of the scholarly accounts of religion among slaves were based on samples of tribes from West African countries Guinea Ghana Zaire, etc.



1999; Fallin 2007; Adefila 2011). Most importantly, the relationship of religion in their lives was preserved.

The use of religion is the second fundamental feature thought to distinguish the salience of religion between Blacks and Whites. The slave masters, mostly whom were White, used religion as a tool to subjugate Blacks and even used biblical passages from the Old Testament such as Genesis 9:25-27. They argued that Africans were to be held in a state of bondage because of a divine curse placed on their people by God (Simms 1999, p54). Black slaves used religion in a different way. First, they used religion to understand their subjugated position within the oppressive system of slavery and also to oppose physical and mental abuse they incurred under slavery. Second, they used religion as a tool for seeking answers to personal problems such as stress and depression, at an individual level, through constant worship, singing of praise and meditation.

At the group-level, Blacks also differed in the way they used religion to organize social activity. For example, Blacks operated an “invisible church”, which meant congregating in secret because if they were caught they would be punished. This form of social cohesion was an act of defiance to Whites, but also a vehicle for social and political organizing among Blacks. That social organization, for example, led to the formation of the African-centered and African-governed churches such as the African Methodist Episcopal (AME) Church (George 1973; Adefila 2011).

So far, the discussion of differences in salience of religion between Blacks and Whites pertained to the organizational dimensions of religion discussed in section (3.3a), such as social interaction and service attendance. Black-White differences in salience of spirituality—a measure of individual religiosity, were also evident then. Several of the religious practices that slaves brought from West (and other parts) of Africa almost always had a spiritual component. The religions of many slave owners, such as Catholicism often did not have a spiritual component in the way that Black religions had.

The measurement of the spirituality variable used in this dissertation conceptually differs from the spirituality in the context of religion among the enslaved Africans. Although the meaning and measurement of spirituality in the context of slavery differs from that of the measure in NESARC, it is relevant to discuss because of its broader relation to subjective religiosity—that is something that is individually experienced. In the context of religion among enslaved Africans, spirituality was more

appropriately understood in terms of the “sacred symbols” and “rites and rituals” Durkheim, and Geertz referred to in their definitions of religion. For instance, spirituality included practices such as “voodoo” and conjuring of spirits, which for the most part only something individuals experience. The spirituality variable used in this dissertation does not measure belief in or practice of rituals, however, conceptually it taps into something that each individual experiences uniquely. The subjective experience is the common bridge between spirituality across both contexts. At some level, there is a historical link<sup>17</sup> to the definition of spirituality contextualized by rites and rituals in the enslaved African sense. Therefore, given the parallel in conceptualization of the understandings of spirituality, I expect then that Blacks would have higher levels of spirituality and stronger salience to the meanings of spirituality.

### **3.4b Salience of Religion and Implications for Black-White Differences in Health**

The differences in how religion was practiced between Black and Whites have implications for health today, as they did during slavery. During slavery, the reasons for poor health and the risk factors for poor health were viewed through a religious lens by a majority of Blacks. The view through a religious lens to understand health and seek treatment was a fundamental feature of the African slave experience. For example, Adefila (2010) notes that while enslavement altered several social and cultural aspects of the African; the salience of religion was preserved, which meant Blacks approach to problems remained religious. For example, “in African villages, diseases and misfortune are religious experiences, and it requires a religious approach to deal with them. So far as he is concerned, illness could only have occurred through the intervention of certain malevolent elements around him...even when an illness is clearly attributable to natural causes” (p.23). Indeed there are empirical accounts that today some Blacks still think religiously about health outcomes and behaviors. For example, Holt and colleagues (2005) found that some Blacks think that illness is a form of punishment from a higher power.

Mistrust is another reason why a majority of Blacks depended on religion in ways that were different from Whites. For example, Adefila (2010) notes that, “while the White medical doctor may have

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<sup>17</sup> I do not argue that individuals always think of spirituality in terms of rites and rituals such as Voodoo, but that there is a historical connection, even at the most distal level, under the empirically supported assumption that a significant proportion of Blacks in America are descendants of Africans.

been perfectly competent as a practitioner, he was not always as acceptable to the slave patient as the Black conjure-man... sometimes, the slaves' reliance on the efficacy of the voodoo remedies made them mistrust White doctors" (p.75). With instances such as the Tuskegee syphilis experiment (1932-1972), more than a century after the abolition of slavery in America, even today, Blacks mistrust the medical system more than Whites (Freimuth, Quinn et al. 2001; Brandon, Isaac et al. 2005). It is therefore reasonable to assume, as is documented, that for Blacks religion still holds a prominent place in assessing and seeking help for health (Taylor, Chatters et al. 2003).

The theoretical implication of the previous discussion is that the *salience* of religion is greater among Blacks than Whites, which was forged through Blacks experience as slaves. Whites are not expected to have a stronger salient experience. (2) Those qualitatively different experiences are stronger for Blacks because it was an essential part of their survival. (3) Those qualitative experiences are thought to transcend or preserved from slavery to today. (4) Those qualitatively different religious experiences are expected to yield Blacks a stronger protective effect from religion on problem drinking.

### **3.4c Race, Religion and Relation to Proscription vs. Prescription of Alcohol Use**

Blacks' lower levels of problem drinking than Whites could also be understood through the direct effects of race-composition of the denominations they belong to. I call this the alcohol-specific denomination-race difference perspective. That is, predominantly Black religious denominations not only fundamentally differ from predominantly White institutions in practical aspects such as formality of worship structure (Chaves, Anderson et al. 2009), they may differ also in stance on, and means of control of alcohol use. As mentioned in earlier paragraphs, although several predominantly Black churches were formed during slavery out of the Protestant traditions, they maintained fundamental distinctiveness from those that are predominantly White. Using slavery as the originating context of could potentially explain how these churches differ on pro/prescriptions of alcohol. For instance, James and Johnson (1996) in their work of patterns of African American addiction noted that beginning with slavery, liquor was limited to the slaves and that slaves were relatively sober as a group compared to European settlers during that period because, " they drank when the master allowed it to happen" (p9), which was usually on holidays

and celebrations for agricultural success. They further document, however, that the realities of slavery left limited time to drink as slaves often worked long hours.

In the context of the Temperance Movement, a significant proportion of Black churches supported the movement, but ironically, Prohibition—the political arm of Temperance, was used in a discriminatory way, especially by White southerners, to further restrict the rights of Blacks, specifically Black males who were thought to be likely to violate White females when under the influence of alcohol (James and Johnson 1996). Given that during slavery and after, the Black church served as the gatekeeper and social haven for Blacks, it would seem plausible that they would take measures, whether through preaching, disciplining members or regulating access to alcohol, to protect Blacks from the social consequences of alcohol use.

In fact, results from descriptive analyses I conducted from the National Congregations Study (1998 and 2006-2007) data showed a greater majority of Black Protestant<sup>18</sup> denominations—the measure conceptually used to describe predominantly Black religions (67%-prohibit vs. 33%), prohibit the use of alcohol than predominantly White denominations<sup>19</sup> (2%-prohibit vs. 97% among Catholics, and 22%-prohibit vs. 77% among other White denominations. Although both predominantly Black and White denominations would allow full-fledged membership to persons who drink alcohol in moderation, a higher proportion of Black Protestants would not allow membership (38%) compared to Catholics (10%) and other White denominations (23%).

Given the discussion of the historical accounts and empirical data from exploratory analyses, I hypothesize that the protective effects of religion on problem drinking are stronger for Blacks than Whites.

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<sup>18</sup> The official definition of Black Protestant according the National Congregation Study Codebook is that the congregation is affiliated with one of the seven major denominations that are predominantly African American or that the congregation's membership is at least 85% African American. The coding for the original variable is based on the "Steensland model" documented in the study Steensland, Brian, Jerry Z. Park, Mark D. Regnerus, Lynn D. Robinson, W. Bradford Wilcox, and Robert D. Woodberry. 2000. *The Measure of American Religion: Toward Improving the State of the Art*. Social Forces 79(1): 291-318.

<sup>19</sup> Predominantly White religions are defined using a similar method as Black Protestant; however, Catholics were their own category and among the Protestant traditions, I grouped liberals or moderates with conservative, evangelical or fundamentalist because the interest was in the racial composition of the affiliation rather than their ideological or political climate.

### **3.5 Religion and Socioeconomic Status (SES): Karl Marx and Max Weber**

Black-White differences in problem drinking are also hypothesized to be explained by the interaction of religion and socioeconomic status. Both the “differential involvement” and “differential meaning” perspectives also apply to the relationship between religion and socioeconomic status, and subsequently how that affects problem drinking. From the differential involvement perspective, low SES persons are expected to have higher rates of religious involvement. Whether that involvement is good or bad as I will discuss below with reference to Karl Marx, is not relevant. What is relevant is that low SES persons’ higher levels of involvement are expected to yield greater protective benefits religion confers on health.

The second perspective of differential involvement is that the qualitative meaning of religion differs across SES. Therefore, there is a qualitative difference that acts independently or coexists with higher levels of religious involvement, which is expected to yield stronger protective benefits on health among low SES compared to high SES persons. The qualitative difference perspective is discussed with reference to Max Weber who also theorized on SES is related to religion but differs from Marx in fundamental ways.

Whatever degree of protection religion confers on health gained from being in a low SES group will be stronger among Blacks than Whites. The discussion that follows theorizes only on why religious involvement is expected to vary across levels of SES because it is well known that Blacks are distributed more within low SES stratum than Whites.

The works of Karl Marx (1976, 1978) were important for analyzing religion and socioeconomic status (SES) because he thought that religion masked class<sup>20</sup>, (hereafter, SES) consciousness among the poor (Marx 1978). Marx saw the root of SES divisions as the separation of man from the products of his labor by placing a value on his labor in exchange for a commodity. He thought that alienating man from his labor was a strategy employed by the bourgeoisie (upper class/higher SES persons) to maintain the order of social stratification that keeps low SES persons subjugated.

For instance, he argued

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<sup>20</sup> Marx wrote about class. While there are slight conceptual distinctions between class and socioeconomic status (SES) as concepts, the distinction is less relevant for this discussion. I use SES generally to refer to stratification of people based on economic indicators

the determination of the magnitude of value by labour-time is therefore a secret hidden under the apparent movements in their relative values of commodities...however, precisely this finished form of the...commodities...which conceals the social character of the private labour and the social relations between the individual workers, by making those relations appear as relations between material objects, instead of revealing them plainly (Marx 1976, p168-169).

And in another writing, that

Religion is indeed the self-consciousness and self-esteem of man who has either not yet won through to himself or has already lost himself again... The state and this society produce religion, which is an inverted consciousness of this world... Religion is the sigh of the oppressed creature, the heart of a heartless world and the soul of soulless conditions. It is the opium of the [poor and oppressed class] people (Raines 2002, p171).

The theoretical contribution of Marx is that there is an interaction between religion and SES was between control and acceptance of control. Religion for Marx was another instrument of oppression which hid the truth of exploitation. The more the lower SES faced oppression, the more they sought religion. Marx believed that positive association between low SES and religious involvement happens because religion's effects were thought to be like opium, both addictive and illusory. Therefore, if Marx's reasoning were to apply today, using the differential involvement perspective, I would expect the highest mean values of religious involvement among lower SES than among higher SES persons.

For the most part, Marx believed that the positive relationship between lower SES and religion was not a good thing because it detracted them from addressing the root of their problems. In fact, he argued that man (mostly referring to the lower SES) had to discard religion or rid himself of the illusion in order to achieve social change. Marx's views on religion were challenged by many scholars. Maritz (1994), in her work on the popularity of religion in Brazil argued that Marx's treatment of religion was inadequate because he focused on the wrong aspects of religion among the poor. For example, she writes

the historical materialist concepts of alienation and false consciousness... do not take into account the standpoint of the poor, and thus they limit our ability to understand the reasons for the popularity of religion among the poor. Rather than define religion in terms of the degree to which they alienate people from their class... it is more helpful to understand the popularity of religion by analyzing how each religious practice and belief affects the lives of everyday people... In fact, the religious beliefs of the poor may have utilitarian value... and may not be a mere illusory solution to economic problems and social crisis (Mariz 1994, p7).

Max Weber's theoretical accounts of religion and SES departed from those of Marx and reflect a debate of the causal nature of the relationship between religion and SES. That debate will not be discussed in detail here because it cannot be tested with these data. Marx's theory assumed that religion was a result of economic conditions, while Weber's theory suggested that religion can drive economic outcomes as well.

For Weber, the differential involvement of religion by SES was not just a simple dichotomy between illusion among the poor or strategy by affluent. He thought religion actually had different meanings, which translated differently into outcomes—economic success. Weber thought that from the perspective of the poor, "religion is fundamentally a response to the difficulties and injustices of life which attempts to make sense of them and thereby enables [poor] people to cope with them and feel more confident when faced by them" (Hamilton 1995, p138). Therefore, I expect that the low SES persons will have a positive outlook on religion and engage in higher levels of religious involvement.

Weber thought that religion meant something different among affluent people, unlike the poor, accounted for misfortune in terms of guilt or supernatural punishment, which church attendance made visible. For example, he said that higher SES persons, "required only psychological reassurance of the justice of their position...They are not entirely irreligious but...their religious sentiments... tend not to be towards salvation... It is the middle and lower classes who have been the real carriers of ethical religions" (Hamilton 1995, p141). Higher SES persons therefore are expected to engage in lower levels of religious involvement such as service attendance.

Another contribution of Weber's theory on religion to this dissertation is that he believed that religion actually had some rational value among the poor which can lead to affluence. He expands on that thesis through his work: *The Protestant Ethic and the Spirit of Capitalism* (1905). Protestants seemed to possess an ethos or strong work ethic that was responsible for their accumulation of wealth. The pursuit of profit, restraint in consumption, and shrewd saving were rational actions of man. Moreover, Weber noted that the "spirit of capitalism" was also a distinctive characteristic of the lower and middle classes (Weber 2002).

I conclude that religion is associated with SES both through differential meaning and differential involvement perspectives. Regardless of which perspective is adopted, the effect of religion on health outcomes would be expected to vary across SES.

### **3.5a Religion, Socioeconomic Status and Problem Drinking**

While Marx spoke of religion among the poor, he did not speak about the relationship between religion and alcohol use among them. Using the Marx's concept of alienation of man from his work, which was a consequence of exploitation based on SES, I draw from Friedrich Engels—who shared similar ideology of exploitation but did comment on alcohol use. Writing on the conditions of the working class in England, Engels (1987) argued that the poor engaged in heavy alcohol use to comfort themselves from the horrid work and social conditions that resulted from class exploitation. He writes,

All possible temptations, all allurements combine to bring the workers to drunkenness. Liquor is almost their only source of pleasure, and all things conspire to make it accessible to them. The working man comes from his work tired, exhausted and finds his home comfortless, damp, dirty, repulsive. He has urgent need of recreation, he must have something to make work worth is trouble...Drunkenness has here ceased to be a vice, for which the vicious can be held responsible...the inevitable effect of certain conditions upon an object possessed of no volition in relation to those conditions (p133).

Engels' observations about alcohol use were based on the working class but he believed they were indifferent to religion. From the analyses of Marx and Engels, religious involvement and alcohol use was a response to poverty. In either case, the Marxist position would view that the working class poor was distracted (through religion and alcohol) in addressing the root of their conditions. A hypothesis on the relation between religion, socioeconomic status and problem drinking is not straightforward.

From my analyses of Weber's theory, heavy alcohol use may be considered in the same context as purchase of luxuries which is a sin, and would not be expected among the religious. That is because heavy alcohol use is contrary to the ethics such as hard work, devotion to craft and is the hallmark of the "ethic" that garnered them their economic success.



Apart from Marx, Engels, and Weber, the Holy Bible provided some insight that alcohol use, and by extension problem drinking varies across religious involvement and socioeconomic status. The passages in (1<sup>st</sup> Cor 11: 20-22) describe that stance: “for there must also be heresies among you... when ye come together therefore into one place, this is not to eat the Lord’s supper. For in eating every one taketh before other his own supper: one is hungry and another is drunken. What? Have ye not houses to eat and to drink in? or despise you the church of God, and same them that have not...” According to religious scholars, this passage was evidence that within levels of religious involvement setting, the poor had less access to quantity and quality of alcohol and therefore potential to get drunk from alcohol than the affluent—the Corinthians, who Jesus admonished (Wasson 1914; Bacchiocchi nd).

Given that the poor are more likely to seek religion, that heavy alcohol use among the religious runs contrary to the spirit of capitalism, and Biblical examples that the poor had less access to alcohol, I hypothesize that the protective effects of religion on problem drinking will be stronger among lower than higher SES persons.

## CHAPTER IV

### Methods

To test the dissertation's hypotheses, I conducted a secondary analysis using the publicly available Wave 2 (2004-2005) data from the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC).

#### 4.1 Data Set

The NESARC is a nationally representative longitudinal survey funded and conducted by the National Institutes on Alcohol Abuse and Alcoholism (NIAAA). The first survey (Wave 1) was administered between the years 2001-2002. Potential respondents were contacted in writing about the particulars of the survey such as what the researchers were measuring and statistical purposes and laws of confidentiality. Consenting respondents were interviewed. Wave 1 consisted of 43,093 respondents.

The second and latest publicly available dataset (Wave 2) was conducted three years later during the years 2004-2005 with the same respondents from Wave 1. From the original Wave 1 sample, 39,959 were eligible for Wave 2 and of that sample, 34,653 interviews were completed. Data were collected face to face using computer-assisted personal interviews in respondents' homes and the response rate was 81%. The sample used in this dissertation was Non-Hispanic Black (n=6587) and Non-Hispanic White (n=20161). Blacks of all ethnicity were grouped together because of small sample size, but moreover, the epidemiology of alcohol abuse show that Blacks of various ethnicities have lower prevalence rates than Whites. Consequently, since most available data comparing the prevalence of Blacks to White do not stratify for Whites also, they are grouped together as one.

NESARC's target population was the civilian, non-institutionalized adult population (ages 18 and older) of the 50 United States and the District of Columbia, Hawaii and Alaska. The NESARC used a three-stage sampling design consisting of housing units from the Census 2000/2001 Supplementary Survey (C2SS) and a group quarters frame was also included. In stage 1 (the primary sampling unit), 655 PSUs out of 2000 C2SS PSUs were selected with certainty because of size (population of 250, 000 or more), an additional 254 PSUs were yielded using probability to proportional size method. Stage 2

involved selecting households within the sampled PSUs, and stage 3 involved drawing one person from within each household. The NESARC sample is weighted to adjust for non-response at the household and personal levels, and selection of one person per household and oversampling of young adults, Blacks and Hispanics. Adjusted data are representative of the US population on socio-demographics such as age, region, sex, race and ethnicity (Grant and Dawson 2006).

Psychiatric disorders, which include alcohol abuse, were based on American Psychiatric Association Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV). The main response variables, DSM-IV alcohol abuse and heavy drinking were captured using the Alcohol Use Disorder and Associated Disability Interview Schedule DSM-IV Version (AUDADIS-IV). AUDADIS-IV is a state of the art semi-structured interview schedule designed to be used by lay persons (Grant, Dawson et al. 2001). The reliability of DSM-IV alcohol use disorders as measured with the AUDADIS-IV instrument has been extensively tested for validity and reliability in both general and clinical populations. Test-retest reliability ranges for alcohol abuse close to excellent ( $k=0.76$  ( $se=0.05$ ) for the general population and ( $k=.74$  ( $se=0.04$ )) in clinical samples (Grant, Harford et al. 1995; Hasin, Carpenter et al. 1997).

The reliability and validity of consumption-based measures, such frequency of drinking and number of drinks in a day that were used to derive the heavy drinking measure has been established in general and subpopulations (Midanik 1982; Hasin, Carpenter et al. 1997; Rehm, Baliunas et al. 2010).

In terms of reliability, an early study that conducted a literature review and summarized findings of self-reported alcohol use, reported on a study by Maisto and colleagues (1982) who found a high degree of consistency between subject's and collaterals' reports of 12 months heavy consumption ( $r=0.56$ ) (Midanik 1988). Another study found that the interclass correlation coefficient for days per year that persons drank a usual quantity of all alcoholic beverages combined, defined as period of heaviest consumption, was 0.72; 95%CI=0.67-0.77 (Hasin, Carpenter et al. 1997).

On validity of heavy drinking, a study conducted among a representative population of Canadians aged 15 years and older showed that frequency of drinking 5+ drinks on one occasion increased the chance of experiencing alcohol-related harm in two life areas<sup>21</sup> by 72%, and was

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<sup>21</sup> Similar to criterion from DSM-IV alcohol abuse diagnoses. They include friendships, work, study, employment, finances,

associated with 18% higher odds of being assaulted by another drinker in the past 12 months (Room 1995). Another validity study, this time conducted among a sample of college students (n=356) found that estimated Blood Alcohol Level (eBAC), which is a measure of the concentration of alcohol found in blood, differed significantly between those classified as heavy drinkers (eBAC 0.15) compared to non-binge heavy drinkers (eBAC 0.05). Functional impairment occurs at blood alcohol levels at .06, and the legal limits in most States is 0.08 (Read, Beattie et al. 2008).

The NESARC has several strengths which make this data set appropriate for this dissertation in comparison to other data sets such as National Survey on Drug Use and Health (NSDUH). The first strength is that instruments that were used to collect the mental measures in the data, which differs from other nationally representative alcohol-related data sets (Hedden, Gfroerer et al. 2012). For example, the AUDADIS-IV instrument is used in the NESARC compared to capture mental health but the NSDUH and National Comorbidity Survey and National Health Interview Survey—all potential data sets, use either the Kessler 6 or World Mental Health Survey Initiative version of the Composite International Diagnostic Interview (WMH-CDI). The AUDADIS-IV facilitates a more thorough probing of substance use disorders that improves detection of alcohol and other substance use disorders (Grucza, Abbacchi et al. 2007), which could potentially be related to the quality of the data. Second, compared to the WMH-CDI, the AUDADIS-IV is standardized and rely strictly on respondent self-reports, which reduces four of six documented sources of variance responsible for the unreliability of instruments (Grant, Harford et al. 1995), which could be related to the precision of estimates from the data.

Next, NESARC is a general population random sample with an unprecedented large sample size. First, this means that the findings can be generalized to the larger population with strong external validity. Second, according to survey theory, larger sample size means higher precision of estimates (Fowler Jr 2008). Non-Hispanic Blacks were also oversampled to give better probability of inclusion, therefore prevalence estimates of DSM-IV alcohol abuse can be reasonably compared with good confidence, to other larger groups such as Non-Hispanic Whites.

The main Limitation of NESARC data with respect to this dissertation is that many of the cultural and psycho-social variables such as religion were not assessed in Wave 1 to allow tests for causality using Wave 2 data. Given the advantages of NESARC in terms of population size, representativeness of race/ethnicity, precision of estimates on alcohol abuse prevalence, reliability of AUDADIS for alcohol abuse criterion, and inclusion of relevant predictors, NESARC is a strong data set to examine the hypotheses of this dissertation.

#### **4.2 Human Subjects Protection & IRB**

All protocols of the NESARC have been reviewed approved by the Columbia University Medical Center Institutional Review Board (IRB). An IRB protocol to conduct data analyses for this dissertation was submitted to Columbia IRB (protocol # AAAM1964) and was not considered human subjects research and therefore exempt.

#### **4.3 Measures**

##### **4.3a Response Variables**

DSM-IV alcohol abuse in the past 12-months is the first and main operational definition of problem drinking. The 12 month time frame was selected also to match the time frame for which other relevant predictors were asked. An alcohol abuse diagnoses, according to DSM-IV is operationally defined as meeting at least one of four criteria: (1) hazardous use, (2) role obligation failure, (3) legal problems and (4) interpersonal problems (Grant 1997).

Heavy drinking is the second operational definition of problem drinking. Heavy drinking, which is used in this study for sensitivity analyses, is a derived variable following methods documented in (Mulia, Ye et al. 2009). While the heavy drinking measure in that study involved three variables<sup>22</sup>, only two were available in NESARC. They are (1) frequency of drinking 5+ drinks in a single day and (2) largest number of drinks in a single day. Although with two variables, a principal components analyses (PCA) reduces to a correlation coefficient, the procedure was conducted and a continuous variable was generated using

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<sup>22</sup> The third variable used in Mulia, Ye, et al (2009) was frequency of subjective drunkenness, but not available in NESARC

the “predict” function after PCA. Higher scores indicated higher levels of problem drinking. The two variables explained 88% variance with principle components coefficient of .70. Using the continuous measure, a binary variable was derived that corresponded to two groups, (1) those within the upper 25<sup>th</sup> percentile of the distribution (Heaviest drinker) vs. (0) those in the remaining 75<sup>th</sup> percentile (all other categories). This method differed slightly from Mulia, Ye, et al (2009) in that they created four categories of “drinking levels”<sup>23</sup> based on cut-points from 25<sup>th</sup> percentiles. They did, however, define “heavy drinking” as the upper 25<sup>th</sup> percentile of the factor score.

#### **4.3b Exposure Variables**

Race/ethnicity in this study is a derived variable from the original race/ethnicity variable in NESARC, which had five categories (1) White, non-Hispanic, (2) Black, non-Hispanic, (3) American Indian/Alaska Native, non-Hispanic, (4) Asian/Native Hawaiian/Other Pacific Islander, non-Hispanic, and (5) Hispanic, any race. The derived binary variable used in these analyses corresponds to 1 = Non-Hispanic White vs. 0 = Non-Hispanic Black.

Socioeconomic Status (SES) is measured using education, the main focal variable, and personal income, which was included to examine the robustness across SES measures. In the NESARC, the original format of the education variable included 14 categories ordered from (1) = No formal schooling to (13) = Completed Master’s degree or higher graduate degree. A new education variable with three levels was created and categorized as 0 = less than high school, 1 = high school diploma and 2 = some college or higher. Personal income was originally categorized in NESARC as a continuous variable ranging from (0) = No personal income or \$0 to (17) = \$100,000 or more. The personal income variable was recorded into a four level variable as follows: 0 = 0 to \$19,000; 1 = \$20,000 to \$34,999; 2 = \$35,000 to \$69,000 and 4 = greater than \$70,000.

Religious Involvement. There were four religion variables in the NESARC. The religious measures used in NESARC have the advantage over other religious measures in that they are designed for the general population and would not be biased towards or against certain groups, which one author

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<sup>23</sup> In their study, “high”= upper 25<sup>th</sup> percentile; moderate= 26<sup>th</sup> to 50<sup>th</sup> percentile; low=51<sup>st</sup> to 75<sup>th</sup> percentile; and non/low=76<sup>th</sup> percentile and greater.

describes as avoiding the problem of the universal versus the particular (Berry, Bass et al. 2011).

The first variable, labeled *currently attend religious services*, was based on the question: "Do you currently attend religious services at church, synagogue, mosque or other place of worship?" The response for that variable corresponded to 1 = Yes vs. 0 = No. The second religious involvement variable labeled *service attendance* was based on the question "How often do you attend these services". Responses are on a five point scale and range from (1=once a year to 5= twice or more a week) and was used in analyses as a continuous variable. The original service attendance in the NESARC categorized as missing all persons who reported that they did not attend religious services. Consequently, all analyses were originally performed without the observations that did not attend religious services.

After initial comments on my approach, I analyzed whether including those missing cases as a valid category had significant consequences for Black-White differences. Descriptive bivariate analyses showed that the mean levels of service attendance were lower using the variable that contained the missing category. Statistically, these lower means had no consequence for Black-White differences. Furthermore, in multivariable analyses, the odds ratios estimated from the variable that included the missing cases were slightly lower but not appreciably different from the variable that excused those cases. Next, in multivariable analyses, missing data on the covariates also minimizes the potential loss of differences in point estimates of the two versions of service attendance variable that would normally result from the difference in sample size between them. Finally, the results from testing for statistical differences in the coefficients for service attendance between Blacks and Whites were in the same direction and of a similar magnitude as obtained in the original analyses using the service attendance variable that excluded the missing cases. I therefore keep the results from the original analyses that used service attendance that treat persons who did not attend as missing.

Conceptually, the consequences of excluding those persons do not detract from understanding the impact of not attending religious services because an estimate of that effect is captured in the first religion variable currently attending religious services or not. In studies that have included those who never attend services in analyses of service attendance on outcomes, often did not include a variable that indicated whether the person attended religious services or not (e.g. see, (Brown, Parks et al. 2001;

Bazargan, Sherkat et al. 2004; Tumwesigye, Atuyambe et al. 2013) Therefore, in those studies, including a category of never attend was more appropriate because the category would reflect the effect of what would be obtained among persons who did not attend religious services.

*Social interaction* is the third religious variable in NESARC and corresponds to the question “How many members of your religious group do you see or talk to socially at least once every 2 weeks?” Responses ranged from 0 to 100. Using information from the mean and standard deviation and visual review of a histogram of the continuous social interaction, a four level categorical variable was also derived corresponding to 0 = 8 persons or less 1 = 9 to 16 persons, 2 = 17 to 24 persons, and 3 = 25 or more persons. Spirituality is the fourth religion measure in NESARC and based on the question "How important are religious or spiritual beliefs in your daily life?" Responses are on a four point scale and range from 1 = very important to 4 = not at all important. The variable was reverse coded, to match the direction of the service attendance variable. Higher levels on the reverse variable indicated higher levels of spirituality.

#### **4.3c Covariates**

Socio-demographic covariates included continuous age, gender 1 = male vs. 0 = female, and a recoded marital status 2 = married vs. 1 = divorce/widowed/separated vs. 0 = never married. DSM-IV nicotine dependence in the past 12 months was included as the co-occurring substance use disorder covariate. These covariates were selected based on their known association with DSM-IV alcohol abuse (Hasin, Stinson et al. 2007). George, Ellison and Larson (2002) argued that convincing evidence of a robust relationship between religion and health includes an ideal set of covariates starting with standard demographic factors, SES, and social stress. Subsequently, a continuous measure of stressful life events<sup>24</sup> was included. That variable corresponded to a sum score of 12 stressful life experiences reported in the past 12 months. These experiences included death of a family member/friend; serious illness of a family/friend; change in living arrangements; problems with neighbor/friend/relative; change in relationship status including separated or divorced; trouble with boss/colleagues; change of job,

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<sup>24</sup> While the NESARC does not specifically include a variable called “social stress” the items that comprise the stress variable include stressors from social situations such as with family and job, and victimization



responsibilities or hours; fired or laid off; sustained unemployment/looking for work more than one month; major financial crisis; own or family member trouble with the law; criminal victimization of self or family member.

#### **4.4 Analysis Plan**

Univariate and bivariate statistics were conducted before investigation of the hypotheses following recommendations by Hosmer, Lemeshow and colleagues (2013). The first set of analyses was descriptive, which characterized the dispersion and frequency of the variables that are used in this study for Non-Hispanic Blacks and Non-Hispanic White. The analyses also tested for statistical significance across race/ethnicity for all the variables. For continuous measures, a test of means was conducted and a test of proportions for categorical variables. All statistical significance tests were conducted using the survey commands with “svy” prefix in STATA 13.1 (StataCorp 2014). The “svy” commands ensure that significance testing properly accounts for the complex survey designs (Siller and Tompkins 2006) such as those used in the NESARC. An alpha of 0.05 was set as the criteria for detecting whether Black-White differences are due to chance. Following the descriptive analyses, correlations were conducted for the problem drinking variables, the religion variables, and the SES variables.

##### **4.4a Bivariate Analyses**

Bivariate analyses were conducted as a first step before testing the hypotheses. The first hypothesis (**H<sub>1</sub>**) states that for both Blacks and Whites, higher levels of religious involvement are associated with lower odds of problem drinking.

The second hypothesis (**H<sub>2</sub>**) states that the protective effect of religious involvement on problem drinking is stronger for Blacks compared to Whites. As a precursor to investigating these hypotheses, bivariate analyses were conducted between religion and alcohol abuse. Graphs from the “marginsplot” command in STATA 13.1 were then produced to visually illustrate the relationships between religion and DSM-IV alcohol abuse across race/ethnicity. Trend analyses assessed whether there was a linear association between religion variables DSM-IV alcohol abuse, separately for Blacks and Whites.

Significance testing is based on the Adjusted Wald test estimated through the “contrast” command in STATA 13.1. A significant F-test statistic indicates that the null hypothesis of no linear trend can be rejected, suggesting there is a linear association between the variables.

The third hypothesis was not in the dissertation proposal but subsequently added to the dissertation since there is paucity of available data in the literature concerning the multivariable association between religion and SES. The third hypothesis (**H<sub>3</sub>**) states that for both Blacks and Whites, lower SES would be associated with higher levels of religious involvement. Following suite from the approaches used to investigate H<sub>2</sub>, bivariate analyses were conducted between religion variables and education and income. Those were conducted separately by race and reported for Blacks and Whites. Graphs from the “marginplot” function in STATA 13.1 were again produced to facilitate a visual understanding of the relationships between religion and SES. Trend analyses assessed whether there was a linear association between religion variables across levels of SES separately for Blacks and Whites. Significance testing is based on the Adjusted Wald test, computed using the “contrast” command in STATA 13.1. A significant F-test statistic indicates that the null hypothesis of no linear trend can be rejected, suggesting there is a linear association between the variables.

The fourth hypothesis (**H<sub>4</sub>**) states that for both Blacks and Whites, the protective effect of religious involvement on problem drinking is strongest among low SES compared to high SES persons.

The fifth hypothesis (**H<sub>5</sub>**) states that the protective effect of religious involvement on problem drinking is strongest among low SES vs. high SES persons, and the product of the interaction effect is stronger for Blacks compared to Whites.

Testing the association between SES and problem drinking was not included as hypothesis but is investigated through exploratory analyses. This is because there is already a significant body of evidence on the relationship between the two. Subsequently, the exploratory analyses between SES and alcohol abuse were used to facilitate the understanding between hypotheses four and five. That analysis first began with examining bivariate association between SES and problem drinking across Blacks and Whites and supplemented with graphs.

#### 4.4b Multivariable Analyses

Hypothesis number one was first tested using multivariable logistic regression for survey data. Adjusted odds ratios were estimated, but Linearized Standard Errors were the precision measure reported in the tables (instead of 95% confidence intervals) to preserve space given table size constraints. The 95% confidence intervals were reported within the body of the text when the relevant odds ratio is discussed. Race-specific analyses were conducted by sub setting the sample to Blacks and then Whites using the “subpop” function in STATA 13.1. The subpop function ensures that statistical significance is calculated correctly based on all the population elements that were used in the original survey design. The hypothesis was tested over several models and the general equations were as follows:

(Eq.1)

$$\log (DSM-IV Alcohol Abuse_{Yes}), subpop(Black)= b_0 + b_1 \text{ to } 4 \text{ Religion variables} + b_5 \text{ Education} + b_6 \text{ Income} + b_7 \text{ Age} + b_8 \text{ Gender} + b_9 \text{ Stress} + b_{10} \text{ Marital Status} + b_{11} \text{ Nicotine dependence}$$

(Eq.2)

$$\log (DSM-IV Alcohol Abuse_{Yes}), subpop(White)= )= b_0 + b_1 \text{ to } 4 \text{ Religion variables} + b_5 \text{ Education} + b_6 \text{ Income} + b_7 \text{ Age} + b_8 \text{ Gender} + b_9 \text{ Stress} + b_{10} \text{ Marital Status} + b_{11} \text{ Nicotine dependence}$$

The first step (Model 1, Table 6a and 6b) tested whether the global religion variable *currently attend service* was associated with DSM-IV alcohol abuse, while controlling for SES (education, income) and covariates (age, gender, stress, marital status and nicotine dependence). That model was also used to assess the direction and strength of any association between education and income on DSM-IV alcohol abuse. Both SES variables were entered together in one block because they had a small correlation between them ( $r=0.36$ , Table 4), which suggested that multicollinearity would not be an issue.

After model 1, the subsequent analyses were performed on the subset of respondents who responded “yes” to *currently attend services*. Each religion variable (service attendance, social interaction, spirituality) was first assessed independently (Models 2 through Models 4, Tables 6a and 6b), while controlling for SES and covariates. Heeding the cautions highlighted by Taylor, Mattis and colleagues (1999) from misspecification that can result when attempting to measure religious involvement

with single indicators, the three religion variables were assessed together in one block (Model 5, Tables 6a and 6b). That model served as the standard model for which to compare later models involving interactions between pairs of the religion variables.

As documented from the literature review in Chapter 3, section 3.2a, it is possible that spirituality may overlap (interact) with service attendance and social interaction. While there were no specific a priori hypotheses in terms of whether the interaction models would differ across race/ethnicity, it was assumed that the effect of service attendance (Model 6, Tables 6a and 6b) and social interaction (Model 7, Tables 6a and 6b) on DSM-IV alcohol abuse would be stronger among persons with higher levels of spirituality, while controlling for SES and covariates.

A goodness of fit was test using the “svylogitgof” user-written command in STATA 13.1 (Archer, Lemeshow et al. 2007) was first used in Model 5 to assess how well the model fit the data and then again for Models 6 and 7. A non-significant F-test statistic indicates the null hypothesis that the model fits the data well cannot be not rejected and suggests confidence that model fit of the data is acceptable (Hosmer, Lemeshow et al. 2013). To examine whether the interaction model added a better fit to the data than the standard model, the Adjusted Wald test was conducted after Models 6 and 7 using the “test” function in STATA 13.1. A non-significant F-test statistic indicates that null hypothesis that the contribution is zero can be rejected (Heeringa, West et al. 2010), which suggest that the standard model (Model 5) is preferred.

Hypothesis two was tested with two approaches. The first approach directly tested the coefficients obtained from the race-specific multivariable analyses. This was done by saving the estimates from tables 6a and 6b and recalling the estimates using the “suest” command in STATA 13.1. The command produces log-odds ratios (beta coefficients) instead of odds ratios but that does not affect the test. Then, using the “test” command in STATA 13.1, coefficients for each religion variable (and religion interaction terms) for Blacks were compared to the coefficients for Whites, the results are presented in table A4. The Adjusted Wald F-test statistic was used to assess statistical significance.

The Wald test is distributed as a chi-square with degrees of freedom equal to the number of constraints (Long 1997) but results from survey data also report a transformed F-test statistic which is a

“design adjusted” version (Heeringa, West et al. 2010). The Wald test can be used to test that coefficients are equal to zero (as was used to above to test coefficients in Models 6 and 7 in tables 6a and 6b) and whether two coefficients are equal to each other (as within Table A4). A significant F-test statistic would indicate Black-White differences on the strength that variable have on DSM-IV alcohol abuse were not due to chance.

To test the robustness of the results obtained in the “test of coefficients” approach from the previous analyses were performed on pooled data. Analyses of pooled data (e.g. including Blacks and Whites) increases power and also provides a parameter estimate and standard error of the difference between the strata (Behrens, Winkler et al. 2011). The race variable was added to the mean-centered religion variables as an interaction term (Model 3, Table A5). That table also reported adjusted odds ratios and Linearized Standard Errors as the measure of precision instead of 95% confidence intervals, which was reported in the text of the results where relevant. To create the interaction term, all religion variables were first centered on their mean and new “mean centered” variables were created. Then, the race variable was added to each religion variable in separate analyses by using the “#”<sup>25</sup> function in STATA 13.1 which automatically creates the interaction variables and main effects in the analyses. The referent group in each interaction analyses was Whites who had mean levels for the respective religion variable.

Hypothesis three was tested by regressing each religion variable on education and income, separately for Blacks and Whites, while controlling for covariates age, gender, stress, marital status, and nicotine dependence. Linear regression was used for *service attendance* and *spirituality* variables and Poisson regression was used for *social interaction* because it was a count variable. Both regression methods used the “svy” function to account for survey data.

Hypothesis four was tested using two approaches. In the first approach, race-specific models were estimated using logistic regression. Each centered religion variable was allowed to interact with a categorical version of education and income. All logistic regression models adjust for age, gender, stress, marital status and nicotine dependence; however these estimates are not shown in the tables for

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<sup>25</sup> For example (for e.g. `ibn.race#c_religatt`)

simplicity and space constraints presenting the results. Adjusted Wald test were computed using the “contrast” command after the logistic regression, which tests for the overall significance of the interaction term. For the analyses involving education, the referent group was those with some college or higher with mean levels of the respective religion variable. For income, the referent group was those with incomes greater than \$70, 000 who had mean levels of the respective religion variable.

The second approach analyzed pooled data. For these analyses, the education and income variables were specified as categorical variables interacting with the mean-centered continuous religion variables (Model 5 and Model 6, Table A5). The interaction variables were entered in one block. For example, in Model 5 service attendance\*education, social interaction\*education and spirituality\*education were entered together. All models adjust for covariates race, age, gender, stress, marital status and nicotine dependence. Goodness of fit statistic was also computed for these models.

Hypothesis five was tested using two approaches as well. The first approach used pooled data analyses involving a three-way interaction with race, religion and SES. The centered version of the religion variables were used together with the categorical specification of SES to allow for better interpretation of the hypotheses. Finally, the race variable was added to the religion\*SES specification using a dummy variable that represented Non-Hispanic Black. The referent group for those analyses is Whites with high levels of SES (i.e. some college or more for education, and \$70,000 or higher income) with average levels of the respective religion variable. Only the categories most directly relevant to the hypothesis is displayed which are (Blacks with low education or low income and across the religion variables) (Models 7 and 8, Table A5). All the coefficients were reported under a single model (e.g. under Model 7 or Model 8, Table A5), however, each analysis was conducted separately.

These models controlled for age, gender, stress, marital status and nicotine dependence. The coefficients estimates for the controls were averaged across the interactions. This is because the interaction terms were entered sequentially for computational efficiency and to reduce the likelihood of errors for estimating such complex parameter specifications. For example, the race\*education\*service attendance and their second order interaction terms were computed first. Estimates for the covariates were saved. Then the process was repeated for race\*education\*social interaction, and then again for

race\*education\*spirituality (Model 7) and again for the interactions involving income (Model 8).

To compute the final coefficient for sex in Model 8 for example would be (aOR of 0.35 = gender (0.35) race\*education\*service attendance + gender (0.33) race\*education\*social interaction + sex (0.37) race\*education\*spirituality) / 3). The standard error and main effects for race and SES were computed the same way. Finally, second order interaction coefficients were not included in the tables for simplicity in presenting the results and because they have been evaluated in two way interactions in the race-specific analyses before.

Adjusted marginal predicted probabilities and standard errors were computed in the second approach to test the fifth hypothesis. Evaluating the data based on marginal predictions compared to evaluation based on coefficient estimates from logistic regression is advantageous because the procedure adjusts for potential differences in baseline odds ratios between the groups under comparison. After the logistic regression estimation above, the “margins” command in STATA 13.1 was used to predict the probability of DSM-IV alcohol abuse separately for Blacks and Whites. The estimates are adjusted for average age, average levels of stress, being married, female and nicotine dependent. An alternate adjustment would be the average levels of all the covariates but the prior specification took advantage of using meaningful values of the covariates, especially those that were binary or categorical.

This margins estimation approach differed also from the pooled analyses in that estimates are produced for categorical distribution of the interaction between SES and religion variables. This presentation of estimates across categories of SES and religion adds a nuanced view in comparison to estimating the categories of SES across mean levels of continuous religion. A selected grouping of high and low contrasts (see the conceptual diagram in figure 2) was used because it better illustrates the hypothesis. An example of the grouping for education and service attendance would be (1) high education, low service attendance, (2) low education, low service attendance, (3) high education, high service attendance, and (4) low education, high service attendance. As mentioned earlier in section 4.3b, the social interaction variable was coded into a four level categorical variable for these analyses.

To test Black-White differences across categories of SES and religion, a test of marginal predictions was conducted and significance assessed using the Adjusted Wald test statistic with a chi-

square ( $\chi^2$ ) distribution. To prevent against alpha inflation error that occurs for conducting multiple significance tests, the alpha criteria of 0.05 was adjusted for four comparisons by dividing it by 4. Subsequently, whether Black-White differences were due to chance was assessed with an alpha of 0.01. Two types of graphs were produced to enhance the understanding any potential Black-White differences observed. The first are bar charts with the predicted probabilities and 95% confidence intervals of DSM-IV alcohol abuse by race, across the categories of SES and religion and those that stratify the analyses across SES and showing how the relationship of religion on DSM-IV alcohol abuse and how that varies between Blacks and Whites.

#### **4.5 Sensitivity Analyses**

As mentioned earlier in Chapter 2, sections 2.1a and b, different assumptions undergird whether problem drinking is thought of as a mental health outcome (i.e. DSM-IV alcohol abuse) or a behavioral outcome (i.e. Heavy drinking). More importantly, the two variables are not thought to have a causal relationship but rather that they are correlated in complex ways. Finally, religion should have a robust protective effect whether problem drinking is viewed as a mental health or behavioral outcome because there are theoretical reasons (i.e. social control perspective or a psychological coping perspective) to support both.

I am unaware of any published empirical studies that have tested the robustness of religion across problem drinking measures, which this sensitivity analyses can provide. The odds ratios that were obtained from the heavy drinking measure were inspected for size and direction but not tested compared to the odds ratios from the DSM-IV alcohol abuse. The purpose of the sensitivity analyses was not to test whether the odds ratios (effect sizes) were equivalent across different operational definitions of problem drinking.

#### **4.6 Limitations Addressed**

Despite gender's importance as a significant predictor of DSM-IV alcohol abuse and evidence of gender differences in religion variables (i.e. women generally gain more from religion than men), it was



used as a covariate rather than a stratification variable for analyses. First, gender is not the main focal point of this study and stratifying may reduce sample size for some analyses and limit power to detect any significant effects that may be present.

The decision whether to perform analyses separately for men and women was also informed empirically using methods that test for stratification (Rothman 2002). First, the effect of race on alcohol abuse was estimated with the odds ratio for the pooled data and then for a stratified sample by males and females. The Mantel-Haenszel (M-H) test of homogeneity was used to determine whether stratum-specific rates varied. Results showed the M-H combined odds ratio (OR) for alcohol abuse for Whites compared to Blacks was OR=1.65, (95% CI=1.43 to 1.92). Among males, the OR for Whites compared to Blacks was 1.71, (95%CI=1.40 to 2.07) and among, females 1.58, (95% CI=1.24 to 2.02). M-H test of homogeneity with ( $\chi^2(1) = .05, p=.82$ ) indicated there is not sufficient evidence to reject the null hypothesis that the stratum specific ORs are equal. Next, the effect of race on alcohol abuse was estimated with and then without gender as a covariate. The results (not displayed) showed that the unadjusted odds of alcohol abuse for Whites (compared to Blacks) OR=1.59, (95% CI=1.33 to 1.92) did not appreciably differ from the odds when adjusted for gender OR=1.52, (95% CI=1.26 to 1.83).

In a further step beyond those recommended by Rothman (2002), gender was allowed to interact with each religion variable predicting DSM-IV alcohol abuse in race-specific analyses, while controlling for covariates age, stress, marital status and nicotine dependence. The results (not displayed) reveal that for Whites, there were no gender differences in the effect of religion on DSM-IV alcohol abuse except for service attendance (female, aOR=0.76, 95% CI=0.58; 0.99, p=0.43). For Blacks, only the effect of spirituality on DSM-IV alcohol abuse varied by gender (female, aOR=0.60, 95%CI=0.39; 0.93, p=.025). The evidence for not stratifying the analyses by gender is robust: (1) there were no differences in ratios by male and female, (2) adjusting for gender did not appreciably change the odds of alcohol abuse for Blacks and Whites, and (3) a gender effect was not consistent across all the religion variables by race.

For a final check of gender differences, I estimated the effect of Black race compared to White race adjusting for religion variables, socioeconomic status, and covariates age, stress, marital status and nicotine dependence. Table A2 displays those results, which shows that the adjusted odds of DSM-IV

alcohol abuse for Blacks compared to Whites were virtually similar (AOR=0.58 and AOR=0.59) for men and women, respectively.

Another important consideration in examining Black-White differences in DSM-IV alcohol abuse was the possibility that differences were accounted for by age-cohort because the Black-White gap narrows with increasing age. One possibility is that at older ages there is attrition among Blacks who are more likely to die from chronic alcohol conditions whereas Whites survive and have a higher chance of being in the sample. Perhaps it may also be more appropriate to investigate the paradox of Black-White differences across the ages where the gaps in problem drinking are the largest, which would be before 60 years of age. Next, because religious involvement increases, while alcohol abuse declines with age, it might be important to isolate the age specific effects. Despite these potential limitations, age was also added as a covariate. The decision was informed by the following results.

First, crude and age-stratified odds ratios were estimated. Four statistically generated age-cohorts<sup>26</sup> 20 to 40, 41 to 60, 61 to 80, and 81 and older were used. Results from the Mantel-Haenszel (M-H) test of homogeneity (MH  $\chi^2$  (3) =2.2, p=0.53) indicated that there was not sufficient evidence to reject the null hypothesis that the odds ratios across age-cohorts are equal (OR 1.8 in cohort 20 to 40; OR 2.2 in cohort 41 to 60; OR 2.2 in cohort 61 to 80, and OR 1.4 in cohort 81 to 100).

Next, four graphs were constructed. The first graph (Figure B1) displayed the predicted probability of alcohol abuse across age, by race. That figure showed that Blacks generally had lower probability of DSM-IV alcohol abuse than Whites across the life course until about age 60 years and older. At that point, the confidence intervals crossed<sup>27</sup>. Figures B2 through B4 displayed the predicted mean religious values across age, by race, which showed what is already known in the literature that Blacks generally have higher levels on religious indicators than Whites, and that religious involvement increases with age. The multivariable results stratified by age (Table A2) also showed that adjusted odds of DSM-IV alcohol abuse for Blacks compared to Whites (AOR=0.58) during the ages where the gaps are

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<sup>26</sup> An alternate age grouping 20 to 24, 25 to 44, 45 to 64, and 65 and older was also used and the test of homogeneity across odds ratios was also not significant M-H  $\chi^2$ = 3.78, p=0.28. Wider stratum groupings are also recommended by Rothman (2002) for continuous variables such that large strata increase the sample size available.

<sup>27</sup> A comparable figure with confidence intervals was produced. The one without the confidence intervals was chosen for display because of visual simplicity

widest (before 60 years) are not much different from the adjusted odds when using the full sample (AOR=0.60). Finally, I replicated the analyses of all religion variables (their interactions) and socioeconomic status, predicting DSM-IV alcohol abuse among a sample of persons 60 years of age and under (Table A4b). I compared those results to the full sample (Table A4a). There were no Black-White differences in any of the religion variables or SES among the full sample or the restricted (age≤60) sample.

Although theoretically and factually there are age-cohort differences in religious involvement (Pew Forum on Religion and Public Life 2008) , my preliminary found no support for age-cohort stratification. First, the test of homogeneity indicated no evidence that odds ratios on the outcome were different across age-cohort and second, the slopes of religious involvement (at least for service attendance and spirituality) across age appear equivalent between Blacks and Whites. Finally, data did not support any benefits that would be gained by restricting the sample across the ages where Black-White disparities in alcohol abuse are widest.

#### **4.7. Data and Methods for National Congregations Study (1998 to 2006-07)**

The methods for these analyses are reported as an addendum to the main methods section because the analyses of these data were (1) not part of the original analyses plan and (2) were not the subject hypotheses or used to investigate any hypotheses related to this dissertation. IRB was not required to use these data, which are open to the public where one can conduct descriptive statistics directly from the study's website. While the ability to conduct descriptive statistics online was an option, the cross tabulation options were limited to a few variables. Therefore, I downloaded the data to conduct the analyses I needed to provide some empirical support for my theoretical preposition that social control on alcohol use within religious institutions potentially work through denial of opportunity (in section 3.2) and how that potentially varies by racial structure of denominational affiliation.

The National Congregations Study (NCS) (1998 and 2006-07) was used. The NCS is one of the largest national studies in the United States that gathered social, economic, religious and behavioral data from a variety of religious congregations. While other religion-based data sets contained information on alcohol use, the NCS was most appropriate because it contained information that could directly tap an

institution's stance on alcohol use as well as potentially tap both an institution's response to its members alcohol use. The NCS was conducted within the General Social Survey (GSS) and persons who answered they reported they attend religious services at least once a year and gave the name and location of their religious congregation formed the sample. The panel feature of NCS from 2006-07 includes a subsample of the cases that were interviewed in 1998. The sample size was (n=2740). Further information on methodology are available online ([www.soc.duke.edu/natcong/about.html](http://www.soc.duke.edu/natcong/about.html)).

#### **4.7a Measures**

Objector religious denominations is a derived variable that measures of whether a religious denomination proscribes or prescribes to alcohol use. It was created from two variables: religious denominations and whether the congregation prohibits the use of alcohol. The derived variable was created by coding denominations that responded to "yes" to prohibit alcohol as "1" and called objectors and everyone else who responded to "no" with a "0" and labeled non-objectors.

Denial of membership was the first measure that tap the potential means of social control that Ross (1906) described by social religion. While I am not aware of whether this measure has been validated as an indicator of social religion means of control, it was the best approximation conceptually. The variable was also derived from the question: Would the following types of people be permitted to be full-fledged members of your congregation: Someone who drinks alcohol in moderation? Responses were yes, no, don't know, missing. A new binary variable was created corresponding to "1" yes and "0" no. All other categories were excluded because the information did not contribute further to my investigation.

Denial of leadership position was the second measure that potentially taps means of social control through social religion. It was created in similar way to the previous variable, but from this question: Regarding leadership, if they were otherwise qualified, would the following types of people be permitted to hold all of the volunteer leadership positions open to other members: Someone who drinks alcohol in moderation?

A predominantly Black/White institution was a derived variable, which conceptually reflects race-structure of religious denominations. The original variable was created from a taxonomy that used

theological and historical information to categorize religious groups by affiliation based on what is known as the “Steensland” model. Users are directed to Steensland, Park, et al (2009) for the appendix, which lists the specific denominations within each group. Steensland, Park, et al (2009) did not specify why Black Protestants were grouped into their own category. The NCS, which used the Steensland model, additionally grouped congregations into that category whose composition contained at least 80% and higher proportion of African Americans. I recoded that variable into predominantly White, which consisted two categories: “1” Catholics and “2” Protestants and “3” predominantly Black, the last category.

#### **4.7b Analysis**

Analyses were weighted using weights (W7) provided in the data set so that estimates reflected congregation-level estimates (n=248) (Chaves and Anderson 2008). The proportion of denomination that proscribe to alcohol use, that denied membership and leadership opportunities to those who used alcohol was first described. Following that, a cross tabulation was conducted to estimate the distribution of denial of membership and leadership by objectors versus non-objectors to alcohol. A second set of cross tabulations were conducted that compared predominantly White versus predominantly Black religious groups across proscriptions of alcohol use and denial of membership and leadership. Results of the statistical significance between the comparisons are not reported as the analyses were not the subject of hypothesis testing.

## CHAPTER V

### Results

The following sections within this chapter present the findings for the five hypotheses.

**TABLE 1a. Descriptive Statistics of Variables for Dissertation Subsample**

	Non- Hispanic Black	Non- Hispanic White	Total	p-value
<b>RACE/ETHNICITY</b>				
Non-Hispanic Black, n (%)	—	—	6587 (13.5)	—
Non-Hispanic White, n (%)	—	—	20161 (86.5)	—
<b>RELIGION</b>				
<b>Currently attend religious service</b> (yes), n (%)	4690 (69.1)	10090 (51.1)	14780 (53.5)	***
<b>Service attendance<sup>a</sup></b> , mean (sd)	3.7 (1.0)	3.6 (0.9)	3.7 (0.9)	ns
n (%)				***
Once a year	50 (01.0)	72 (0.67)	122 (0.73)	
A few times a year	590 (13.4)	1349 (13.1)	1939 (13.1)	
One to three times a month	1298 (28.1)	2547 (25.3)	3845 (25.8)	
Once a week	1498 (31.8)	4408 (43.5)	5906 (41.4)	
Twice a week or more	1252 (25.8)	1719 (17.4)	2962 (18.9)	
<b>Social interaction</b> , mean (sd)	7.5 (14.1)	8.1 (14.7)	7.9 (14.5)	**
<b>Spirituality<sup>a,b</sup></b> , mean (sd)	3.8 (0.53)	3.3 (0.86)	3.4 (0.8)	**
n (%)				***
Very important	5333 (79.5)	10603 (52.8)	1232 (04.9)	
Somewhat important	1031 (16.9)	6379 (32.0)	2058 (08.6)	
Not very important	123 (02.3)	1935 (09.6)	7410 (30.0)	
Not important at all	77 (01.3)	1155 (05.5)	15936 (56.4)	
<b>SOCIOECONOMIC STATUS</b>				
<b>Education</b> , n (%)				***
Less than high school	1258 (17.6)	2058 (10.1)	3316 (11.1)	
Completed high school	1977 (30.1)	5579 (28.2)	7556 (28.5)	
Some college or higher	2252 (52.3)	12524 (61.7)	15876 (60.4)	
<b>Personal income</b> , n (%)				***
\$0-\$19,999	3237 (47.7)	8013 (39.5)	11250 (40.6)	
\$20,000-\$34,999	1644 (26.0)	4578 (22.5)	6222 (23.0)	
\$35,000-\$69,999	1410 (21.8)	5214 (26.0)	6624 (25.4)	
\$70,000	296 (04.5)	1256 (12.1)	2652 (11.1)	

**TABLE 1a. Descriptive Statistics of Variables for Dissertation Subsample, continued**

	Non-Hispanic Black	Non-Hispanic White	Total	p-val (B-W) <sup>9</sup>
<b>SOCIO-DEMOGRAPHIC AND OTHER COVARIATES</b>				
<b>Age</b> , mean (sd)	48.5 (16.6)	51.1 (17.7)	50.5 (17.5)	***
<b>Sex</b>				***
Male, n (%)	2326 (43.7)	8853 (48.1)	11179 (47.5)	
Female, n (%)	4261 (56.3)	11308 (51.9)	15569 (52.5)	
<b>Stress<sup>f</sup></b> , mean (sd)	1.9 (1.9)	1.4 (1.6)	1.5 (1.7)	***
<b>Marital Status</b> , n (%)				***
Married/cohabiting	2376 (42.8)	11756 (66.5)	14132 (63.3)	
Widowed/separated/divorced	2240 (25.4)	5310 (19.0)	7550 (19.8)	
Never married	1971 (31.7)	3095 (14.5)	5066 (16.8)	
<b>DSM-IV Nicotine Dependence</b> (yes), n (%)	817 (12.5)	2991 (15.1)	3808 (14.7)	***
<b>PROBLEM DRINKING</b>				
<b>DSM-IV alcohol abuse</b> (yes), n (%)	718 (13.1)	3684 (19.2)	4402 (6.0)	***
<b>DSM-IV alcohol abuse items</b> , (yes), n (%)				
Interfered with work/school	33 (1.0)	103 (0.7)	136 (0.8)	
Interfered with taking care of family/home	58 (1.7)	160 (1.2)	218 (1.3)	
Continued use despite problems with family	88 (2.8)	323(2.3)	411 (2.4)	
Arrested as a result of drinking	64 (2.2)	230 (1.6)	294 (1.7)	
Physical fights as a result of drinking	78 (2.6)	221 (1.7)	299 (1.8)	**
Drank in dangerous situations	189 (6.2)	1289 (8.9)	1478 (8.6)	**
Drove after drinking too much	63 (1.8)	488 (3.6)	551 (3.4)	***
Drove while drinking	334 (10.4)	1286 (8.9)	1620 (9.1)	
<b>Heavy drinking items</b>				
➤ <b>Largest number of drinks in a single day</b> , mean (sd)	3.7 (3.6)	4.6 (4.4)	4.4 (4.3)	***
➤ <b>How often drank 5+ drinks in a single day</b> , n (%)				***
Every day to nearly every day	101 (03.7)	281 (02.1)	382 (02.2)	
Two to four times a week	173 (05.9)	665 (05.2)	838 (05.3)	
Once a week	102 (03.4)	436 (03.3)	538 (03.3)	
One to three times a month	176 (05.5)	998 (07.4)	1174 (07.2)	
Seven to eleven times a year	53 (01.8)	439 (03.3)	492 (03.1)	
Three to six times in the last year	115 (04.0)	896 (06.6)	1011 (06.3)	
One or two times in the last year	173 (05.4)	1108 (08.2)	1281 (07.9)	
Never in the last year	2526 (70.4)	9198 (64.0)	11724 (64.7)	
<b>Heavy drinking, continuous</b> (factor score) <sup>d</sup> , mean (sd)	-0.15 (1.2)	0.03 (1.3)	0 (1.3)	**
<b>Heavy drinking, binary<sup>e</sup></b> (upper 25th pctile), n (%)	718 (13.2)	3684 (19.2)	4402 (18.4)	***

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ns= not significant, † p<.10, \* p<.05, \*\*p<.01, \*\*\*p<.001 \*\*\*\*p<.0001.

All statistical test conducted using survey commands in STATA 13 and p-value based on weighted data (Adjusted Wald test (F) for continuous variable; Pearson designed-based chi-square for categorical)

a= range is from 1=once a week to 5= twice or more per week

b= reverse ordered/coded to match direction of the variable "frequency of religious service attendance"

c= range 1 to 52 persons

d= based on regression scoring after principal components factor analysis, range (-0.96 to 9.58); higher values indicate greater values on the variable

e= Classified as being in the upper 25th percentile of a factor score from two consumption-based drinking measures (5+ drinks and maximum number of drinks) on a single day as per methods in Mulia, Ye, Greenfield, Zemore (2009) Disparities in Alcohol-related Problems among White, Black and Hispanic Americans

n, mean, and sd are based on un-weighted sample, and col % is based on survey weighted analyses

f= range 1 to 14 events

g=B-W= Black-White difference

## 5.1 Descriptive Statistics

Table 1a presents the results of the descriptive statistics for the subsample used in this dissertation. The proportion of Non-Hispanic Blacks (13%) and Non-Hispanic Whites (87%) in this NESARC subsample is fairly representative of the distribution within the general population (Humes, Jones et al. 2011). Slightly more than half (53%) of this subsample currently attends religious services. Blacks had a higher proportion currently attending services (69% vs. 53%,  $p<.001$ ) compared to Whites. Among those who currently attend religious services, a higher proportion of both Blacks and Whites attended services on average between "one to three times a month" and "once a week". Adjusted residuals analyses performed after the significant chi-square test between service attendance and race showed statistical race difference in the category attend services "twice a week or more"; the distribution was 25.8% among Blacks and 17.4% among Whites. Statistical race differences were also found in the category "once a week" but this time, the distribution was 31.8% among Blacks compared to 43.5% among Whites.

Among those who currently attend religious services, Blacks had statistically significant lower mean number religious group members whom they interacted with on a regular basis (7 vs. 8,  $p<.01$ ) than Whites. Among the full subsample, Blacks had a statistically significant higher mean level of spirituality compared to Whites (3.8 vs. 3.3,  $p<.001$ ). The cross tabulation further shows that for both groups, the highest proportion rated spirituality as "very important" but that proportion was much larger for Blacks (79% vs. 53%) than for Whites.



This NESARC subsample had fairly high levels of education. Roughly 60% of persons had some college education or higher. Education attainment differed significantly across race/ethnicity ( $p < .001$ ). Adjusted residual analysis showed that Whites had a higher proportion (62% vs. 52%) of those within the highest level of educational attainment compared to Blacks. Race/ethnic differences were also found for personal income ( $p < .001$ ). Whites compared to Blacks had a higher proportion of those within the top two income categories “\$35k to 69K”, 26% vs. 22% and “\$70k and greater”, 12% vs. 4%.

For socio-demographics, Blacks were on average younger (48 vs. 51 years of age,  $p < .001$ ) female (56% vs. 52%) and never married (32% vs. 14%) compared to Whites. Blacks had a higher mean number of experiencing stressful life experiences compared to Whites (1.9 vs. 1.4,  $p < .001$ ). The range of experiences was 0 to 12. Blacks had a lower proportion of nicotine dependence compared to Whites (12% vs. 15%,  $p < .001$ ).

In terms of problem drinking based on DSM-IV alcohol abuse, Blacks had a lower prevalence (4% vs. 6%,  $p < .001$ ) compared to Whites. The race-differences in prevalence were robust for males (6.3% vs. 9.8%) and females (2.2% vs. 3.1%), and for those between the ages of 20 to 24 years (6% vs. 14%), those between ages 25 and 44 (6% vs. 9%), those between ages 45 and 64 (3% vs. 5.5%) and for those ages 65 years and older (0.5% vs. 1.6%) (Results not displayed).

Statistically significant Black-White differences were only found across three criterion domains of DSM-IV alcohol abuse. The proportion of Blacks that “drank in dangerous situations” (6.2%) was lower than that of Whites (8.9%) and for “drove after drinking too much” (1.8% for Blacks vs. 3.6% for Whites). Only for “physical fights” did Blacks (2.6%) have a higher proportion than Whites (1.7%).

For heavy drinking, Blacks also had a lower mean number of alcoholic drinks in a single day (4.4 vs. 3.6,  $p < .001$ ). In terms of drinking 5+ drinks in a single day, Blacks had a higher proportion compared to Whites at the most risky end of the spectrum, “drinking every day to nearly every day” (3.7% vs. 2.1%). The majority of the total sub sample (64.7%) was at the less risky end of the spectrum, “never in the last year had 5+ drinks in a single day”. Blacks had a higher proportion of persons within the less risky end of the spectrum (70% vs. 64%) compared to Whites. Blacks also had lower mean levels on the heavy drinking factor score compared to Whites (-0.15 vs. 1.3,  $p < .01$ ), where the range was (-0.96 to

9.58). Higher scores indicated being in a higher distribution of heavy drinking. The dichotomous variable for heavy drinking also showed that Blacks had a lower proportion of persons within the upper 25<sup>th</sup> percentile of heavy drinking compared to Whites (13% vs. 19%,  $p < .001$ ).

Table 1b shows the odds of individual criteria for DSM-IV alcohol abuse predicting a diagnosis. The table also demonstrates the sensitivity of the criterion items to heavy drinking— a non-diagnostic measure of problem drinking. A final goal of that table is to demonstrate whether the associations between diagnostic criteria and problem drinking measures differ between Blacks and Whites.

**TABLE 1b. Logistic Regression Analyses of Symptoms Predicting Dichotomous DSM-IV Alcohol Abuse and Heavy Drinking Variables by Race/Ethnicity**

Item	Item severity <sup>a</sup>	Criterion	Non-Hispanic Black		Non-Hispanic White	
			DSM-IV Alcohol Abuse	Heavy Drinking <sup>b</sup>	DSM-IV Alcohol Abuse	Heavy Drinking <sup>b</sup>
	(-2.84 to 3.70)		OR	OR	OR	OR
Interfered with work/school, (n=184)	1.43	A1	5.2**	8.5**	4.6***	8.2***
Interfered with taking care of family/home, (n=293)	1.42	A1	31.0***	10.8**	3.7***	8.0***
Continued use despite problems with family, (n=547)	0.51	A2	10.0***	12.2***	4.8***	7.3***
Arrested as a result of drinking, (n=384)	0.06	A4	4.4**	8.2***	6.4***	9.3***
Physical fights as a result of drinking, (n=409)	-0.15	A2	20.34***	10.3***	9.4***	10.1***
Drank in dangerous situations, (n=1801)	-0.47	A3	36.9***	8.1***	52.1***	11.9***
Drove after drinking too much, (n=690)	-1.66	A3	11.4***	7.3***	22.3***	12.3***
Drove while drinking, >1 time, (n=2011)	-1.96	A3	219.9***	6.0***	77.0***	8.1***

ns=not significant, †  $p < .10$ , \*  $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

All statistical test conducted using survey commands in STATA and p-value based on weighted data.

a= Item severity range based on 33 items from DSM-IV alcohol abuse and dependence items in the study by Khaler and Strong (2006) A Rasch Model Analysis of DSM-IV Alcohol Abuse and Dependence Items in the National Epidemiological Survey on Alcohol and Related Conditions. b= Classified as being in the upper 25th percentile of a factor score from two consumption-based drinking measures (5+ drinks and maximum number of drinks) on a single day as per methods in Mulia, Ye, Greenfield, Zemore (2009) Disparities in Alcohol-related Problems among White, Black and Hispanic Americans.

A1: Drinking resulting in failure to fulfill role obligations at work, school, or home

A2: Continued to drink despite social or interpersonal problems cause by drinking

A3: Recurrent drinking in situations where alcohol use is physically hazardous

A4: Alcohol related legal problems

All models control for sex, following the analytical approach in Neighbors, Trierweiler, Ford and Muroff (2003) Racial Differences in DSM Diagnosis Using a Semi-Structured Instrument: The importance of Clinical Judgment in the Diagnosis of African Americans.

Each of the diagnostic criteria significantly predicted both DSM-IV alcohol abuse and heavy drinking for both Blacks and Whites. Among Blacks and Whites, the diagnostic criterion with lower severity scores (A3), more strongly predicted the odds of DSM-IV alcohol abuse than it did heavy drinking as indicated by larger odds ratios. The effects of criterion item interfered with taking care of family and home had a more stronger effect predicting DSM-IV alcohol abuse than heavy drinking among Blacks (OR 31.0 vs. 10.8), but that pattern was the opposite among Whites (OR 3.7 vs. 8.0). Physical fights as a result of drinking had showed a similar difference in pattern by race. It more strongly predicted DSM-IV alcohol abuse than heavy drinking among Blacks, but was the opposite among Whites.

The diagnostic criteria that had the strongest effect on DSM-IV alcohol abuse and heavy drinking also differed between Blacks and Whites. Continued use despite drinking—a high severity item, was the second strongest predictor of DSM-IV alcohol abuse among Blacks, and that effect was almost 10 times stronger on abuse was compared to the effect among Whites (OR 31.0 vs. 3.7). A lower severity item—drinking in dangerous situations, appeared to have a stronger effect on DSM-IV alcohol abuse among Whites than Blacks (OR 52.0 vs. 36.9). Physical fights was the third strongest predictor of DSM-IV alcohol abuse for both Blacks and Whites, but that effect appeared stronger for Blacks than Whites (OR 20.3 vs. 9.4).

The top three predictors of DSM-IV alcohol abuse for Whites (drinking in dangerous situations, driving after drinking too much, and driving while drinking) were the top three predictors for heavy drinking also. For Blacks, the number one predictor of a DSM-IV diagnosis of alcohol abuse (drove while drinking) was not the same for heavy drinking (continued use despite problems with family). The second strongest item predicting DSM-IV alcohol abuse (drank in dangerous situations) was the fifth strongest predictor of heavy drinking. The third strongest item predicting DSM-IV alcohol abuse (interfered with taking care of family/home) was the second strongest predictor of heavy drinking among Blacks.

The next few tables contain the correlation among alcohol measures, (Table 2), correlations among religion variables (Table 3), and correlation between the education and income (Table 4).

**TABLE 2. Correlation Between DSM-IV Alcohol Abuse Heavy Drinking**

DSM-IV Alcohol Abuse	r
Largest number of drinks in a single day, mean (sd)	0.37***
How often drank 5+ drinks in a single day, mean (sd)	0.36***
Heavy drinking (factor score), mean (sd)	0.41***

ns= not significant, ‡ p<.10, \* p<.05, \*\*p<.01, \*\*\*p<.001 \*\*\*\*p<.0001

**TABLE 3. Correlation Among Religion Variables, by Race/Ethnicity**

	Non-Hispanic Black		Non-Hispanic White		Total	
	A	B	A	B	A	B
A <b>Service attendance</b>	1		1		1	
B <b>Social interaction</b>	0.26***	1	0.28***	1	0.28***	1
C <b>Spirituality</b>	0.21***	0.09***	0.39***	0.16***	0.32***	0.13***

ns= not significant, ‡ p<.10, \* p<.05, \*\*p<.01, \*\*\*p<.001 \*\*\*\*p<.0001

**TABLE 4. Correlation Between Education and Income, by Race/Ethnicity**

	Non-Hispanic Black	Non-Hispanic White	Total
	A	A	
A <b>Education</b>		1	1
B <b>Personal Income</b>	0.41***	0.32***	0.36***

‡ ns= not significant, ‡ p<.10, \* p<.05, \*\*p<.01, \*\*\*p<.001 \*\*\*\*p<.0001

The correlation between problem drinking measures DSM-IV alcohol abuse and heavy drinking was moderate (Table 2,  $r=0.41$ ,  $p<.0001$ ). Among Blacks, the highest correlation between religion variables was between service attendance and social interaction (Table 3,  $r=0.26$ ,  $p<.0001$ ) but for Whites it was between service attendance and spirituality (Table 3,  $r=0.39$ ,  $p<.0001$ ). The correlation between education and income was small to moderate and significant in the overall and race/ethnicity subsamples ( $p<.0001$ ), which ranged between ( $r=0.41$ ) for Blacks and ( $r=0.32$ ) for Whites (Table 4).

## 5.2 Association between Religion and Problem Drinking

**Hypothesis # 1: Higher levels of religious involvement are associated with lower odds of problem drinking**

### 5.2a Among Non-Hispanic Black

Table five is the first insight into hypothesis number one.

**TABLE 5. Bivariate Association: Religion and DSM-IV Alcohol Abuse, by Race/Ethnicity**

	Non-Hispanic Black		Non-Hispanic White		p-val (B-W) <sup>b</sup>
	Yes (Abuse)	No	Yes (Abuse)	No	
<b>Service Attendance, m(sd)</b>	3.1 (0.9)	3.7 (1.0)	3.2 (1.0)	3.6 (0.9)	0.45
	F (1, 52)=28.9; p<.0001		F (1, 65)=63.8; p<.0001		
n (col %)					
Once a year	02 (01.7)	46 (01.0)	4 (00.9)	67 (00.8)	0.88
A few times a year	26 (26.3)	535 (12.7)	93 (23.3)	1198 (12.3)	
One to three times a month	40 (37.6)	1206 (27.4)	154 (37.4)	2312 (24.5)	
Once a week	30 (26.3)	1428 (32.2)	122 (29.9)	4209 (44.4)	
Twice a week or more	09 (07.9)	1219 (26.7)	32 (08.4)	1661 (18.1)	
	F (4, 198)=7.0; p<.0001		F (4, 242)=20; P<.0001		
<b>Social Interaction, m(sd)</b>	4.6 (8.1)	7.7 (14.4)	6.7 (13.4)	8.2 (14.8)	0.00
	F (1, 52)=18.5; p<.0001		F (1, 65)=15; p<.001		
<b>Spirituality, m(sd)</b>	3.5 (0.7)	3.7 (0.5)	3.0 (0.9)	3.3 (0.8)	0.00
	F (1, 61)=17.7; p<.001		F (1, 65)=157; P<.0001		
n (col %)					0.00
Not at all important	04 (01.0)	68 (01.4)	105 (08.3)	967 (05.0)	0.00
Not very important	11 (05.9)	109 (02.3)	194 (15.6)	1620 (09.0)	
Somewhat important	70 (33.8)	900 (15.7)	543 (46.0)	5496 (30.6)	
Very important	137 (59.3)	4998 (80.7)	361 (30.0)	9979 (55.3)	
	F (3, 153)=15.8; p<.0001		F (3, 193)=77.8; P<.0001		

All statistical test conducted using survey commands in STATA 13 and p-value based on weighted data (adjusted Wald test (F) for continuous variable; Pearson-based chi-square for categorical)

a= testing difference between yes (alcohol abuse) vs. no (alcohol abuse). b=B-W= Black-White difference among those who meet criteria for DSM-IV alcohol abuse, n=sample size. Mean and sd are based on un-weighted sample, and col % is based on survey weighted analyses

Persons with DSM-IV alcohol abuse, compared to those without abuse, have lower mean levels of service attendance (3.1 vs. 3.7,  $p<.0001$ ); mean levels of social interaction (4.6 vs. 7.7,  $p<.0001$ ) and spirituality (3.5 vs. 3.7,  $p<.0001$ ). The cross tabulation of DSM-IV alcohol abuse and religion variables further corroborate those findings. For instance, persons with DSM-IV alcohol abuse, compared to those with no abuse, had lower proportions at the higher frequency levels of the service attendance spectrum “once per week” (26% vs. 32%) and “twice a week or more” (8% vs. 27%). For spirituality, only among the highest level “those who rated spirituality as very important” is where persons with DSM-IV alcohol abuse had lower proportions (59% vs. 81%) compared to those without alcohol abuse. Sixty four percent (64%) of persons who were diagnosed with DSM-IV alcohol abuse also would be classified as being in the upper 25<sup>th</sup> percentile of heavy drinking (Table A3).

Table 6a contains the multivariable results of hypothesis # 1 for Blacks. Multivariable results controlled for education, income, age, gender, stress, marital status and nicotine dependence. Those results showed that currently attending religious services versus not currently attending service, had a strong protective effect against the DSM-IV alcohol abuse (aOR=0.41; 95% CI=0.29-0.59;  $p<.0001$ ). Among the subpopulation of persons who currently attend religious services, when considered in isolation only higher frequency of service attendance (aOR=0.67; 95% CI=0.53-0.83;  $p<.001$ ) and higher levels of spirituality (aOR=0.65; 95% CI=0.52-0.83;  $p<.001$ ) were protective of DSM-IV alcohol abuse. When service attendance, social interaction and spirituality (Table 6a, Model 5) were considered simultaneously, only service attendance was robust in protecting against alcohol abuse (aOR=0.71; 95% CI=0.57-0.89;  $p<.01$ ). That model, which served as the base religion model did not appear to fit the data well according to the Goodness of Fit criteria ( $F(9, 44) = 3.9$ ;  $p<.01$ ).

Table 6a, Model 6 shows that the protective effect of spirituality on DSM-IV alcohol abuse was stronger at higher, compared to lower, frequency of service attendance (aOR=0.65; 95% CI=0.43-0.97;  $p<.05$ ). Goodness of Fit criteria ( $F(9, 44) = 4.0$ ;  $p<.01$ ) indicated that the interaction between spirituality and service attendance (model 6) was not a good fit/model of the data. Findings from the Adjusted Wald test did not suggest that it was not a better fit than the base model ( $F(1, 52) = 4.7$ ;  $p<.05$ ). The interaction spirituality and social interaction on DSM-IV alcohol abuse was not statistically significant among Blacks.

**TABLE 6a. Logistic Regression Results: Religion Variables Predicting DSM-IV Alcohol Abuse, Non-Hispanic Black**

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7	
	aOR	Std Err	aOR	Std Err	aOR	Std Err	aOR	Std Err	aOR	Std Err	aOR	Std Err	aOR	Std Err
<b>Religion</b>														
Currently attend services, yes	0.41	0.07****												
Service attendance			0.67	0.07***					0.71	0.08***	0.86	0.11	0.71	0.08**
Social interaction					0.96	0.12			0.98	0.01	0.98	0.01	0.98	0.03
Spirituality							0.65	0.07	0.88	0.24	0.60	0.19	0.85	0.39
<b>Religion interaction terms</b>														
Spirituality * service attendance											0.65	0.13*		
Spirituality * social interaction													0.99	0.05
<b>Socioeconomic Status</b>														
<i>Education</i>														
Some college or higher <sup>a</sup>	1		1		1		1		1		1		1	
Completed high school	0.85	0.26	0.95	0.37	0.99	0.38	0.94	0.28	0.96	0.37	0.92	0.35	0.96	0.37
Less than high school	1.19	0.25	1.30	0.38	1.39	0.42	1.22	0.25	1.31	0.39	1.33	0.39	1.32	0.39
<i>Personal Income</i>														
\$70, 000 <sup>a</sup>	1		1		1		1		1		1		1	
\$35,000-\$69,999	0.93	0.27	0.62	0.29	0.60	0.28	1.10	0.36	0.64	0.31	0.65	0.32	0.64	0.31
\$20,000-\$34,999	0.70	0.22	0.50	0.18	0.46	0.17	0.86	0.29	0.52	0.19 <sup>†</sup>	0.52	0.20	0.52	0.19 <sup>†</sup>
\$0-\$19,999	0.35	0.11**	0.20	0.09****	0.20	0.09****	0.42	0.15*	0.21	0.10****	0.22	0.10**	0.21	0.10
<b>Covariates</b>														
Age	0.97	0.00****	0.99	0.00 <sup>†</sup>	0.98	0.01 <sup>†</sup>	0.97	0.01****	0.99	0.01 <sup>†</sup>	0.99	0.01 <sup>†</sup>	0.99	0.01 <sup>†</sup>
Female	0.40	0.07****	0.49	0.12***	0.43	0.11****	0.38	0.07****	0.48	0.13**	0.48	0.12**	0.48	0.13**
Stress	1.20	0.05****	1.26	0.07	1.28	0.07****	1.23	0.05****	1.27	0.07****	1.27	0.07****	1.26	0.07****
Never married	0.94	0.96	1.04	0.15	1.07	0.15	0.99	0.10	1.04	0.15	1.05	0.15	1.04	0.15
Nicotine Dependence	2.04	0.40***	1.81	0.58 <sup>†</sup>	2.00	0.62 <sup>†</sup>	2.22	0.43****	1.77	0.57 <sup>†</sup>	1.87	0.59 <sup>†</sup>	1.76	0.57 <sup>†</sup>

Goodness of fit test	F (9, 44)=3.9; p<.01 Model 5	F (9, 44)=4.0; p<.01 Model 6	F (9, 44)=4.1; p<.01 Model 7
Adjusted Wald F-test		F (1, 52)=4.7; p<.05	F(1, 52)=.04; p=.86

ns= not significant, † p<.10, \* p<.05, \*\*p<.01, \*\*\*p<.001\*\*\*\*p<.0001. All statistical test conducted using survey commands in STATA 13

All models adjust for age, sex, stress, marital status and nicotine dependence

Model 1= Currently attend religious services, yes + education + income

Model 2= service attendance + education + income

Model 3= social interaction + education + income

Model 4= Spirituality + education + income

Model 5= Models 2 thorough 5 + education + income

Model 6= Interaction between spirituality and service attendance + education + income

Model 7= Interaction between spirituality and social interaction + education + income

aOR= Adjusted Odds Ratio; Std Err=Linearized standard error

Goodness of fit test assessed with svylogit command for survey data; non-significant p-value indicates model fit the data well

Adjusted Wald F-test for adding interaction (Models 6 and 7 vs. Model 5); a non-significant p-value indicates the nested model (5) is preferred



## 5.2b Among Non-Hispanic White

Table 6b contains the multivariable results of hypothesis # 1 for Whites. . Multivariable results controlled for education, income, age, gender, stress, marital status and nicotine dependence. White persons with DSM-IV alcohol abuse had lower mean levels of service attendance (3.2 vs. 3.6,  $p < .0001$ ), social interaction (6.7 vs. 8.2,  $p < .001$ ), and spirituality (3 vs. 3.3,  $p < .001$ ). Adjusted residual analyses show that differences between DSM-IV alcohol abuse and those without for the spirituality variable (30% vs. 55%) only occurred at the highest level, "rated spirituality as very important".

For Whites, multivariable logistic regression controlling for education, income, age, gender, stress, marital status and nicotine dependence (Table 6b, Model 1) showed that currently attending services versus not attending services was associated with lower adjusted odds of DSM-IV alcohol abuse (aOR=0.58; 95% CI=0.51-0.68;  $p < .0001$ ). Increasing levels of service attendance (aOR=0.68; 95% CI=0.60-0.77;  $p < .0001$ ), social interaction (aOR=0.98; 95% CI=0.97-0.99;  $p < .001$ ), and spiritually (aOR=0.78; 95%CI=0.73-0.84;  $p < .001$ ) was uniquely associated with lower adjusted odds of DSM-IV alcohol abuse (Models 2 through 4, respectively). An adjusted odds ratio of 0.98 for social interaction, which was statistically significant, suggested a non-linear relationship to DSM-IV alcohol abuse. When social interaction was modeled as a categorical variable with 8 and fewer persons as the referent group, persons who interacted socially with 25 plus other religious members had a 0.62 times lower odds of DSM-IV alcohol abuse (aOR=0.62; 95% CI=0.37-0.98;  $p < .05$ ) (results not displayed).

When all religion dimensions were examined simultaneously (Model 5), only service attendance was robust in protecting against DSM-IV alcohol abuse (aOR=0.98; 95% CI=0.97-0.99;  $p < .001$ ). The model where all three religion dimensions were estimated together did not appear to fit the data well according to the Goodness of Fit criteria ( $F(9, 44) = 4.0$ ;  $p < .01$ ). For Whites, the protective effect of spirituality on DSM-IV alcohol abuse did not vary across levels of service attendance. Only social interaction was (aOR=0.96; 95%CI=0.94-0.98;  $p < .0001$ ). Further inspection with the categorical distribution of social interaction (categorical results not displayed) showed that among persons with mean levels of spirituality, those who interact with 25 or more religious members had 0.25 lower adjusted odds

of DSM-IV alcohol abuse compared to the odds among persons who interacted with 8 or fewer religious members with mean levels of spirituality (aOR=0.25; 95%CI=0.10-0.63;  $p<.01$ ). While model 8 did not appear to fit the data well according to the Goodness of Fit criteria ( $F(9, 57) = 4.5$ ;  $p<.0001$ ), it appeared to fit the data better than the standard model ( $F(1, 65) = 20.3$ ;  $p<.0001$ ) with all three religion variables estimated in one block (Model 5).

**TABLE 6b. Logistic Regression for Religion Variables Predicting DSM-IV Alcohol Abuse among Non-Hispanic White**

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7	
	aOR	Std Err	aOR	Std Err	aOR	Std Err	aOR	Std Err	aOR	Std Err	aOR	Std Err	aOR	Std Err
<b>Religion</b>														
Currently attend services, yes	0.58	0.04												
Service attendance			0.68	0.04****					0.76	0.06**	0.78	0.06**	0.77	0.06**
Social interaction					0.99	0.00**			1.00	0.00	1.00	0.00	1.01	0.01*
Spirituality							0.78	0.03****	0.66	0.07****	0.58	0.07****	0.56	0.06****
<b>Religion interaction terms</b>														
Spirituality * service attendance											0.83	0.10		
Spirituality * social interaction													0.96	0.01****
<b>Socioeconomic Status</b>														
<i>Education</i>														
Some college or higher <sup>a</sup>														
Completed high school	1.00	0.08	0.91	0.13	0.90	0.13	1.06	0.09	0.9274	0.14	0.93	0.14	0.932	0.14
Less than high school	0.50	0.08****	0.35	0.11**	0.36	0.12**	0.54	0.08****	0.3672	0.13**	0.37	0.12**	0.375	0.12
<i>Personal Income</i>														
\$70, 000 <sup>a</sup>	1		1		1		1		1		1		1	
\$35,000-\$69,999	0.94	0.10	0.80	0.11	0.74	0.10*	0.97	0.10	0.82	0.11	0.81	0.11	0.81	0.11
\$20,000-\$34,999	0.66	0.08***	0.56	0.11**	0.53	0.11**	0.68	0.08**	0.58	0.12**	0.57	0.11**	0.57	0.12**
\$0-\$19,999	0.48	0.05****	0.44	0.09****	0.41	0.08****	0.50	0.06****	0.46	0.09****	0.46	0.09****	0.46	0.09****
<b>Covariates</b>														
Age	0.97	0.00****	0.97	0.00****	0.97	0.01****	0.97	0.01****	0.97	0.00****	0.97	0.00****	0.97	0.00****
Female	0.36	0.03****	0.33	0.04****	0.32	0.04****	0.37	0.03****	0.35	0.05****	0.35	0.05****	0.35	0.05****
Stress	1.17	0.02****	1.16	0.04****	1.16	0.04****	1.18	0.03****	1.16	0.04****	1.16	0.04****	1.16	0.04****
Never married	1.22	0.05****	1.18	0.09*	1.22	0.08**	1.23	0.05****	1.18	0.09*	1.17	0.09*	1.18	0.09*
Nicotine Dependence	1.50	0.14****	1.46	0.27*	1.58	0.29*	1.58	0.15****	1.47	0.27*	1.45	0.27*	1.51	0.27*

---

Goodness of fit test

F (9, 57)=4.4;  
p<.0001

F (9, 57)  
=4.3; p<.0001

F (9, 57)=4.5;  
p<.0001

---

Adjusted Wald F-test

F (1, 65)=2.3;  
p=.13

F(1, 65)=20.3;  
p<.0001

---

ns= not significant, † p<.10, \* p<.05, \*\*p<.01, \*\*\*p<.001\*\*\*\*p<.0001. All statistical test conducted using survey commands in STATA 13

All models adjust for age, sex, stress, marital status and nicotine dependence

Model 1= Currently attend religious services, yes + education + income

Model 2= service attendance + education + income

Model 3= social interaction + education + income

Model 4= Spirituality + education + income

Model 5= Models 2 thorough 5 + education + income

Model 6= Interaction between spirituality and service attendance + education + income

Model 7= Interaction between spirituality and social interaction + education + income

aOR= Adjusted Odds Ratio; Std Err=Linearized standard error

Goodness of fit test assessed with svylogit command for survey data; non-significant p-value indicates model fit the data well

Adjusted Wald F-test for adding interaction (Models 6 and 7 vs. Model 5); a non-significant p-value indicates the nested model (5) is preferred

### 5.2c Black-White differences

#### Hypothesis # 2: The protective effects of religious involvement on problem drinking is stronger for Blacks compared to Whites

Table 5 above, also presents the first indication for hypothesis number two, but are from bivariate analyses. Those results indicate that among persons with DSM-IV alcohol abuse, there were no differences in mean levels of service attendance. Black persons with DSM-IV alcohol abuse had lower mean levels of social interaction (4.6 vs. 6.7,  $p < .001$ ). Blacks with DSM-IV alcohol abuse had higher mean levels of spirituality than Whites with DSM-IV alcohol abuse (3.5 vs. 3.0,  $p < .0001$ ).

Figures 3 through 5 graphically illustrate Black-White differences in the association between the religion variables and DSM-IV alcohol abuse. Figure 3 shows that DSM-IV alcohol abuse significantly declines with increasing frequency of service attendance. Blacks had lower probability of DSM-IV alcohol abuse than Whites across all levels of service attendance; however, that probability only statistically differed with frequency levels of “a few times a year” and “one to three times a month”.

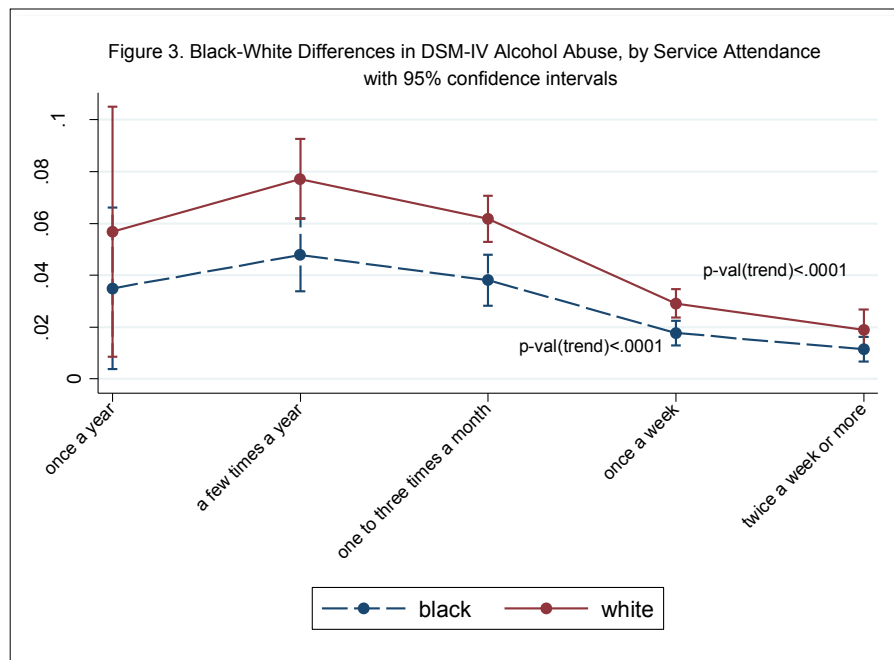
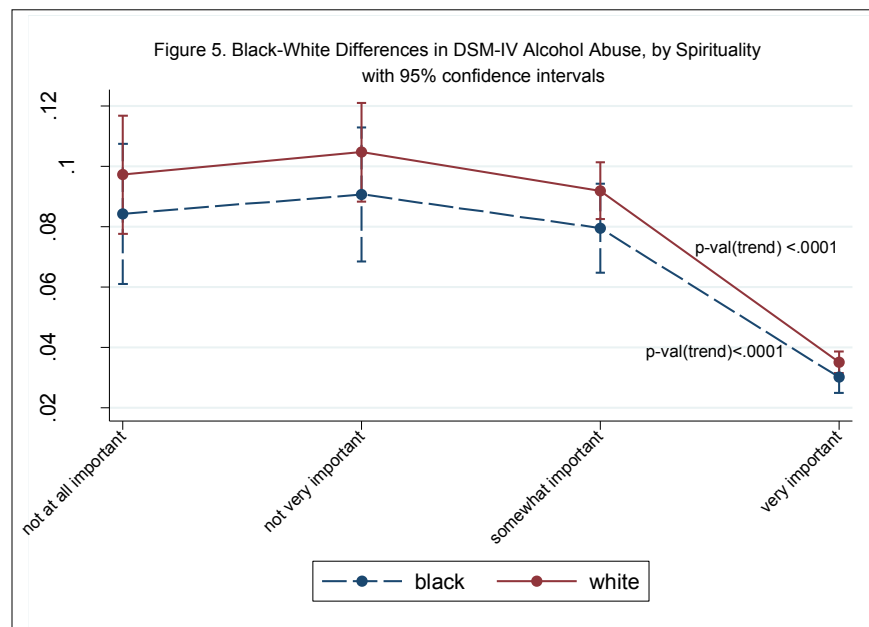
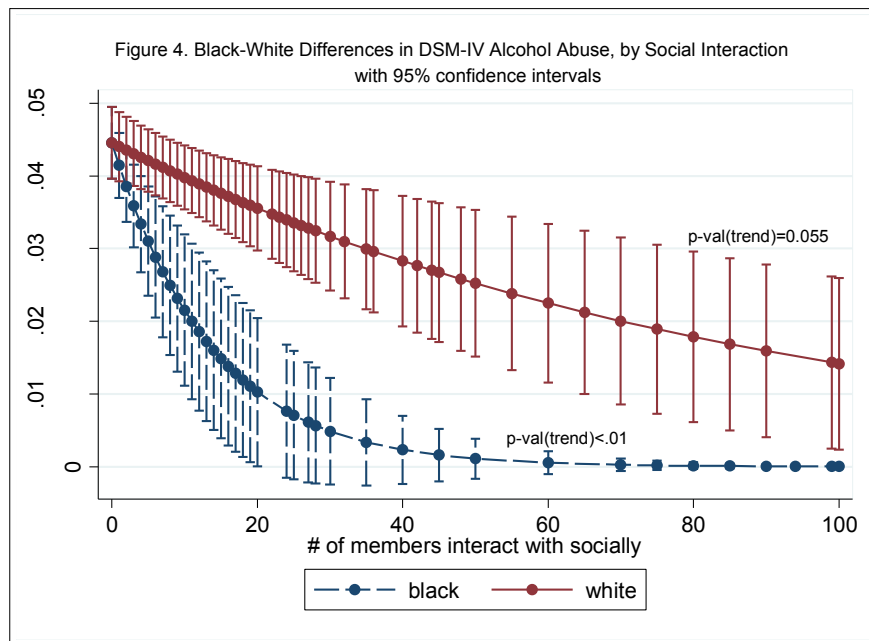


Figure 4 shows that the probability of DSM-IV alcohol abuse significantly declines as the number of religious members one interacts with increases, but that trend was not significant for Whites. They had

higher probabilities of DSM-IV alcohol abuse than Blacks across all levels of social interaction. The Black-White gap was narrow up until about 10 persons then widen as the number increased. Figure 5 shows that the probability of DSM-IV alcohol abuse significantly decreased with spirituality. Blacks had lower probabilities of DSM-IV alcohol abuse than Whites across all levels of spirituality. The Black-White difference was only statistically significant at the highest end of spirituality, which was the only level at which the confidence intervals did not overlap.



The first test for Black-White differences in the effect of religion on DSM-IV alcohol abuse are presented in table A4, which was done by testing for differences in the coefficients generated from race-specific analyses that are from tables 6a and 6b above. There were no Black-White differences in the effect of any of the religion variables or interactions between religion variables (for e.g. spirituality and service attendance and spirituality and social interaction) on DSM-IV alcohol abuse. Multivariable results from the analyses of pooled data that tested for race-differences by evaluating the interaction coefficients confirmed the aforementioned findings (Model 3, Table A5). The interactions between race and service attendance, and between race and spirituality were non-significant ( $p > .05$ ). Only the interaction between race and social interaction appeared significant ( $p < .01$ ), but there is little confidence in these results given the odds ratio is almost 1 (aOR=0.98).

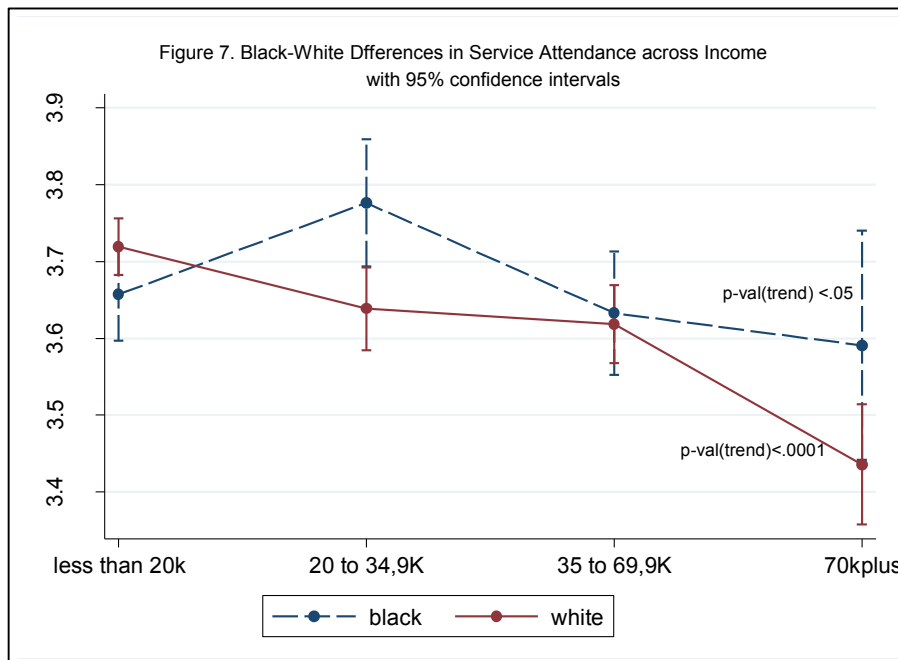
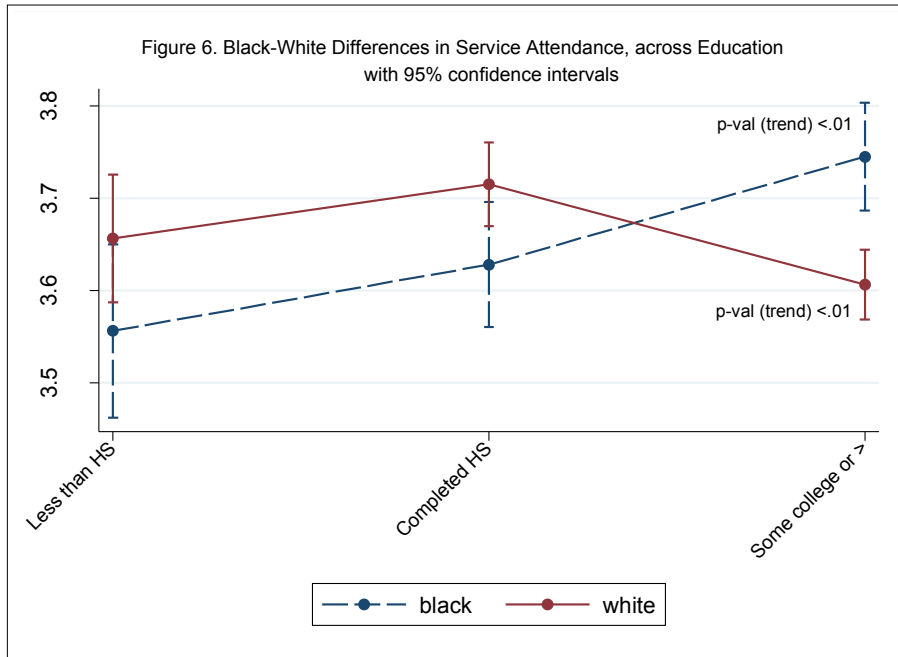
### **5.3 Association between Religion and Socioeconomic Status (SES)**

#### **Hypothesis # 3: Lower SES is associated with higher levels of religious involvement**

##### **5.3a Among Non-Hispanic Black**

Bivariate results from cross-tabulations between religion and SES (for categorical specifications of the variables) and comparisons of means for continuous specifications, among Blacks are presented in tables A6a and A6a continued. The highest proportional increase across low to high education attainment occurred in the highest frequency levels of service attendance “once a week” (16% to 56%) and “twice a week or more” (15% to 57%). Frequency of service attendance differed across educational attainment ( $F(7, 361) = 3.0; p < .05$ ) but not across income. Table A6a continued also showed that the un-weighted mean of service attendance for Blacks was around 3.6 among persons with less than a high school diploma and increased to 3.8 among those with some college or higher.

Figure 6 shows the service attendance had a statistically significant increasing trend ( $p < .01$ ) across education. Higher income was associated with a decreasing trend ( $p < .05$ ) in levels of spirituality (Figure 9). The trend in spirituality across income was sensitive to spirituality when specified as a continuous variable (not significant) versus categorically ( $F(7, 417) = 3.3; p < .01$ ) (see Table A6a continued).





Multivariable linear regression controlling for age, gender, stress, marital status and nicotine dependence (Table 7a) showed that education was positively associated with service attendance ( $\beta=0.13$ ;  $se=0.02$ ;  $p<.0001$ ) and social interaction ( $\beta=0.11$ ;  $se=0.05$ ;  $p<.05$ ). Increasing income was associated with lower levels of service attendance ( $\beta= -0.04$ ;  $se=0.02$ ;  $p<.05$ ) but not spirituality.

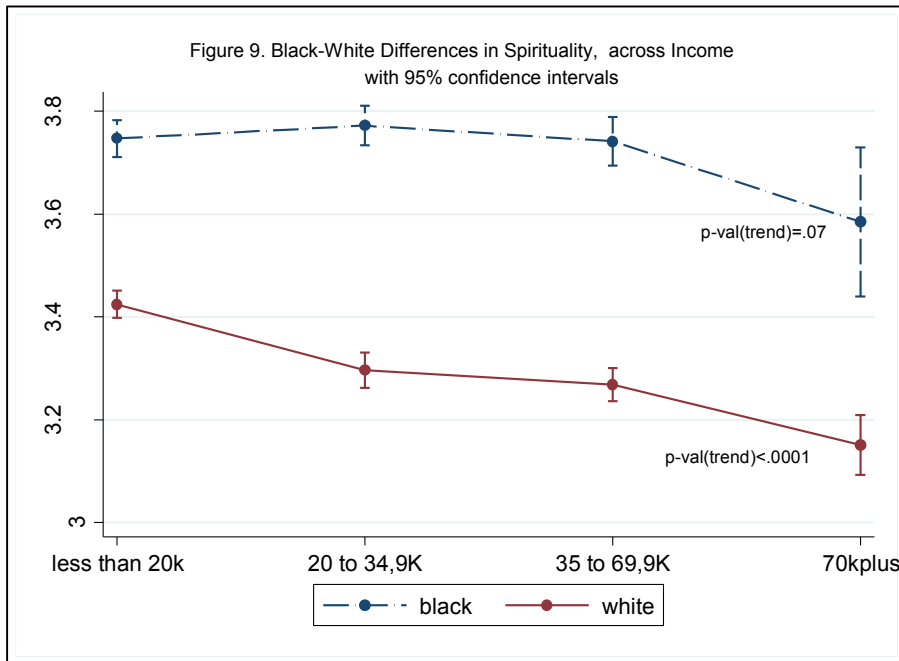
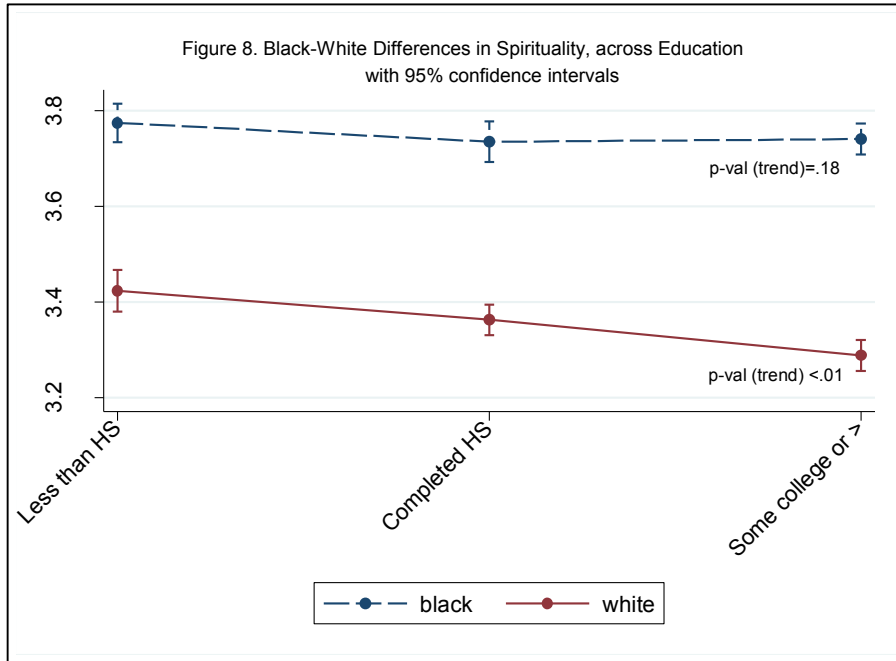
**TABLE 7a. Regression Results: Socioeconomic Status Predicting Religious Involvement, Non-Hispanic Black**

	Service attendance		Social interaction		Spirituality	
	$\beta$	Std Err	$\beta$	Std Err	$\beta$	Std Err
<b>Socioeconomic Status</b>						
Education	0.13	0.02***	0.11	0.05*	0.00	0.01
Income	-0.04	0.02*	-0.03	0.04	-0.01	0.01
<b>Covariates</b>						
Age	0.01	0.00***	0.01	0.00*	0.00	0.00***
Female	0.23	0.04***	-0.16	0.08	0.13	0.02***
Stress	0.00	0.01	0.04	0.02 <sup>‡</sup>	0.02	0.01**
<b>Marital Status</b>						
wid/div/sep	-0.11	0.05*	-0.03	0.10	-0.01	0.02
never married	-0.20	0.05***	-0.19	0.08*	-0.08	0.02**
Nicotine Dependence	-0.42	0.06***	-0.52	0.10***	-0.04	0.03

ns= not significant, ‡  $p<.10$ , \*  $p<.05$ , \*\* $p<.01$ , \*\*\* $p<.001$  \*\*\*\* $p<.0001$

### 5.3b Among Non-Hispanic White

Bivariate results showed that for Whites, education was statistically associated with service attendance, social interaction and spirituality regardless whether they were specified in continuous or categorical form (Tables A6b, and A6b continued). Only service attendance and spirituality changed across income levels. Adjusted residual analysis shows that differences across education and income categories in service attendance occurred in the level of “one to three times a month”. Social interaction increased with education ( $F(2, 64) = 4.1$ ;  $p<.05$ ) but not income. Service attendance and spirituality had statistically significant decreasing trends with income and education (see Figures 7 above and 8 and 9 below).



Multivariable results controlling for age, gender, stress, marital status and nicotine dependence (Table 7b) showed that social interaction had a small positive association with education ( $\beta=0.09$ ,  $se=0.04$ ,  $p<.05$ ). Income was associated with decrease in service attendance ( $\beta= -0.08$ ,  $se=0.01$ ,  $p<.001$ ); social interaction ( $\beta= -0.09$ ,  $se=0.02$ ,  $p<.001$ ); and spirituality ( $\beta= -0.04$ ,  $se=0.01$ ,  $p<.001$ ).

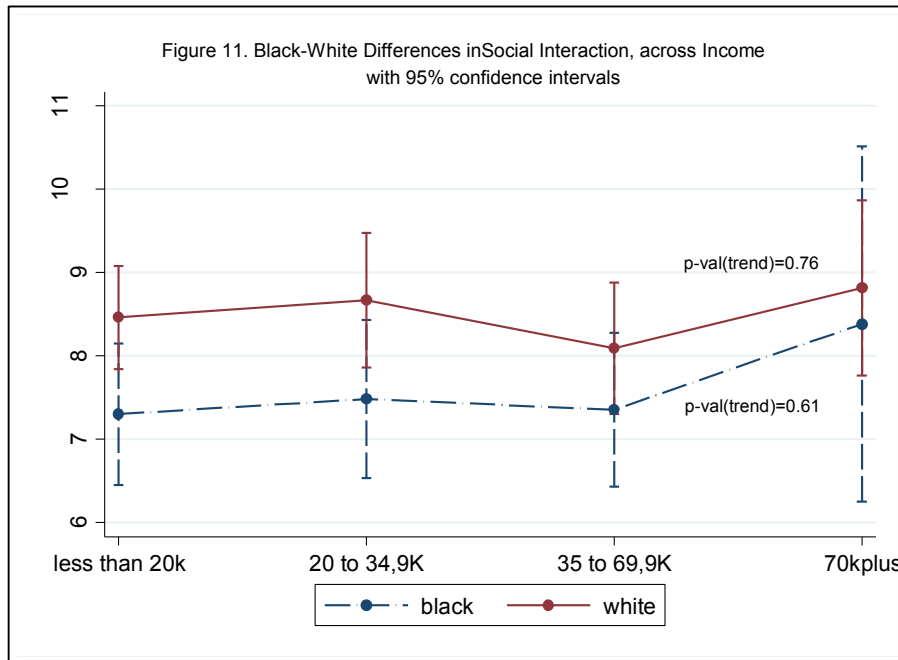
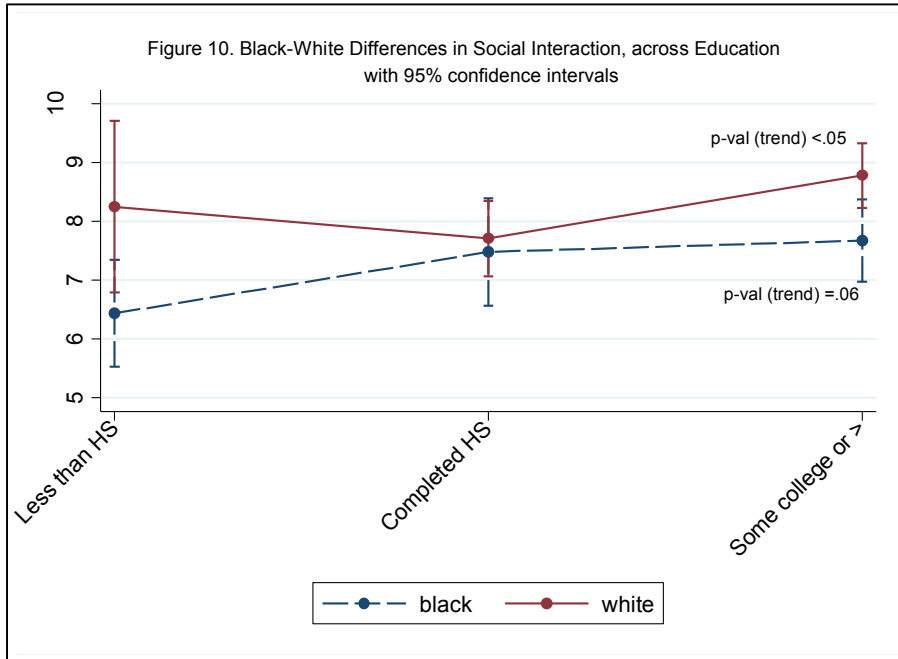
**TABLE 7b. Regression Results: Socioeconomic Status Predicting Religious Involvement, Non-Hispanic White**

	Service attendance		Social interaction		Spirituality	
	$\beta$	Std Err	$\beta$	Std Err	$\beta$	Std Err
<b>Socioeconomic Status</b>						
Education	0.00	0.02	0.09	0.04*	-0.02	0.01
Income	-0.08	0.01***	-0.09	0.02***	-0.04	0.01***
<b>Covariates</b>						
Age	0.01	0.00***	0.00	0.00	0.01	0.00***
Female	0.02	0.03	-0.34	0.05***	0.28	0.01***
Stress	0.00	0.01	0.00	0.02	0.02	0.00**
<b>Marital Status</b>						
wid/div/sep	-0.14	0.03***	-0.28	0.05***	-0.12	0.02
never married	-0.16	0.04***	-0.06	0.09	-0.27	0.02
Nicotine Dependence	-0.30	0.04***	-0.28	0.09**	-0.11	0.02***

ns= not significant, † p<.10, \* p<.05, \*\*p<.01, \*\*\*p<.001 \*\*\*\*p<.0001

### 5.3c Black-White differences

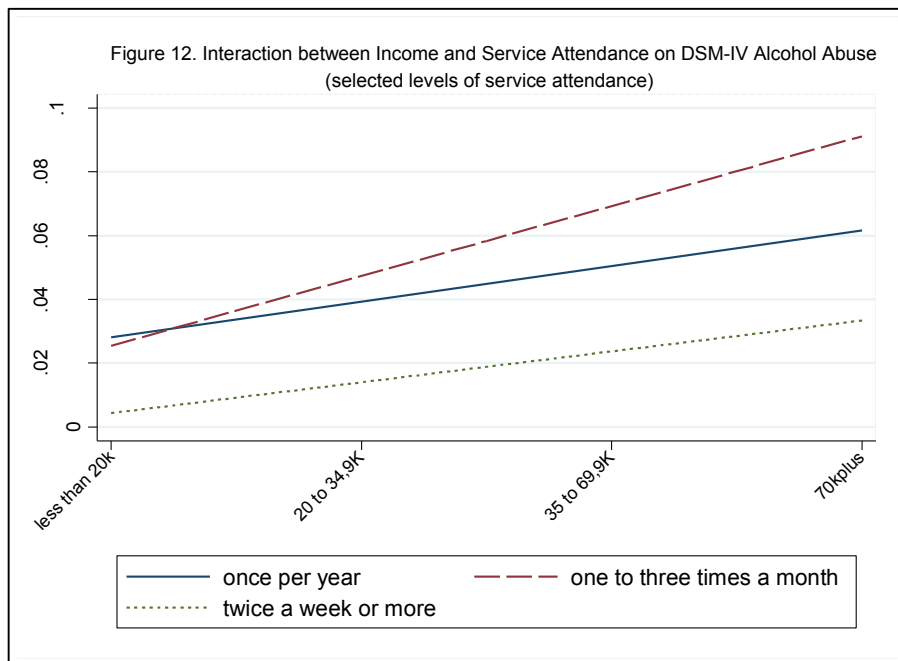
A series of linear regression were ran using the SES variables as predictors of each religious involvement variable. Tables 7a and 7b displays those results of Black-White differences in the relationship between socioeconomic status and religion. No test of statistical significance were conducted for Black-White differences it was not related to any hypotheses. Beta coefficients showed that for Whites, income had almost twice the negative effect on service attendance ( $\beta = -0.08$  vs.  $\beta = -0.04$ ), almost three times negative association for social interaction ( $\beta = -0.09$  vs.  $\beta = -0.03$ ), four times negative effect on spirituality ( $\beta = -0.04$  vs.  $\beta = -0.01$ ) compared to Blacks. The slope of service attendance (Figure 7) and spirituality (Figure 9) across income declines sharper for Whites than Blacks. For education, the positive association with service attendance was stronger for Blacks than Whites ( $\beta = 0.13$  vs.  $\beta = 0.0$ ) and for social interaction ( $\beta = 0.11$  vs.  $\beta = 0.09$ ), although the graph shows those differences were negligible because the confidence intervals overlapped (Figure 10). Income appear to have a stronger decline on social interaction among Whites than Blacks, but both slopes were non-statistically significant (Figure 11).



#### 5.4 Religion Predicting Problem Drinking: Variation by Socioeconomic Status

##### Hypothesis # 4: The protective effects of religious involvement on problem drinking is strongest among low SES compared to high SES persons

This section reports on hypothesis four. A multivariable logistic regression on pooled data (i.e. combining Blacks and Whites) was computed controlling for age, gender, stress, marital status and nicotine dependence. Results are presented in table A5. Analyses of the pooled data show that persons with incomes of “\$19,000 or less” with mean levels of service attendance had 0.62 lower odds of DSM-IV alcohol abuse than persons with “\$70,000 or greater” income with mean levels of service attendance (aOR=0.62; 95%CI=0.44-0.89;  $p < .05$ , Model 6). Figure 12 provides a visual view of that finding. The slope for “one two three times a month” (long dashed lines), which is about the mean of service attendance is much steeper than the slopes at low end “once a year” and high end “twice a week or more”. The overall interaction term, however, was not significant. Education did not moderate the effect of any of the religious involvement variables on DSM-IV alcohol abuse.



The following results are analyses using multivariable regression models, but were estimated separately by race, instead of using the full sample like what was done above. Separate interaction terms for each religious involvement variable and education, and then separately for income were specified. Those results for Blacks and Whites are in the same tables, and tables are separated by education (Table A7a) and by income (Table A7b).

#### **5.4a Among Non-Hispanic Black**

Tables A7a and A7b show that the protective effect of service attendance, social interaction and spirituality on DSM-IV alcohol abuse was not moderated by education or income adjusting for age, gender, stress, marital status and nicotine dependence. All p-value for F-test statistics were greater than an alpha level of 0.05.

#### **5.4b Among Non-Hispanic White**

The protective effect of service attendance, social interaction and spirituality on DSM-IV alcohol abuse was not moderated by education. The protective effect of mean levels of service attendance on DSM-IV alcohol abuse, however, was strongest among those with incomes "\$19,000 and less" compared to those with incomes "\$70,000 and greater" (aOR=0.62; 95%CI=0.44-0.85;  $p<.01$ , Model 4, Table A7b). The overall interaction term was significant ( $F(3, 65) = 3.3$ ;  $p<.05$ ). The effect of social interaction and spirituality on DSM-IV alcohol abuse did not vary across income.

#### **5.4c Black-White differences**

**Hypothesis # 5: The protective effect of religious involvement on problem drinking is strongest among low SES vs. high SES persons, and the product of the interaction effect is stronger for Blacks compared to Whites**

This section addresses hypothesis number five. First, multivariable analyses were performed on the pooled sample and an interaction term for race by education by each religious involvement was specified. Table A5 displays those findings. Blacks with less than a high school education with mean levels of service attendance had lower odds of DSM-IV alcohol abuse compared to Whites with some

college or higher education with mean levels of service attendance (aOR=0.59; 95%CI=0.44-0.85; p<.01, Model 7, Table A5).

The second approach estimated the marginal adjusted predicted probably of DSM-IV alcohol abuse for Blacks and Whites and then compared those coefficients for statistical significance using the Adjusted Wald Test. Statistical significance was assessed at a p-value of .01 because it was adjusted for alpha inflation that can occur from multiple comparisons. Tables A8a and A8b show results adjusted for mean age, female, mean stress, being married and nicotine dependent for education and income, respectively. Blacks with high education “some college or higher” and low social interaction “8 < members”, had lower predicted probabilities (Predprob) of DSM-IV alcohol abuse compared to Whites of similar levels (Predprob 0.02 vs. Predprob 0.04;  $\chi^2 (1) = 7.47$ ; p<.001). Blacks with high education “some college or higher” and high spirituality “rating as very important”, had lower predicted probabilities of DSM-IV alcohol abuse than Whites of similar levels (Predprob 0.03 vs. Predprob 0.04;  $\chi^2 (1) = 10.52$ ; p<.001). There were no Black-White differences in predicted probabilities of DSM-IV alcohol abuse over categories of income and religion (Table A8b). Figures 13, 14a, 14b and B5 through B8b illustrate the findings for Black-White differences in categories of socioeconomic status and religion using bar charts, and B9 through B14 with line graphs of race differences in religious involvement variables separated out by socioeconomic status categories.

## 5.5 Sensitivity Analyses Results

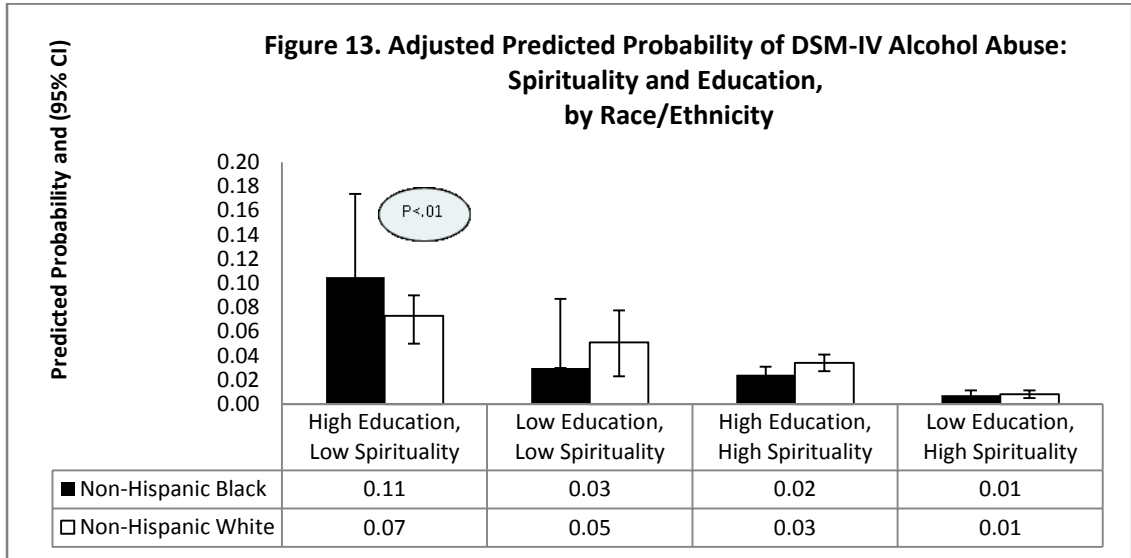
I also conducted sensitivity analyses to verify whether religion and SES had similar direction of associations across problem drinking measure heavy drinking as it did for DSM-IV alcohol abuse. I conducted multivariable logistic regression adjusting for age, gender, stress, marital status and nicotine dependence for heavy drinking and added it next to the estimates for DSM-IV alcohol abuse, which were produced previously. Those results appear in table A9. For each religious involvement predictor, there was a protective effect on both problem drinking measures and the effect sizes (odds ratios) do not appear to be much different across DSM-IV alcohol abuse or heavy drinking. There was no consistent magnitude in the effect size difference by problem drinking measure. Although most of the effect sizes

from religious involvement measures on heavy drinking compared to DSM-IV alcohol were stronger among Whites, some were weaker. For instance, among Whites, the protective effect of currently attending religious services was stronger for heavy drinking (aOR=0.51) compared to DSM-IV alcohol abuse (aOR=0.58). The interaction between spirituality and service attendance among Whites was not significant predicting DSM-IV alcohol abuse (aOR=0.87, p=ns) but was significant predicting heavy drinking (aOR=0.74, p<.001). Among Blacks, the protective effect of currently attending religious services was weaker for heavy drinking (aOR=0.48) compared to DSM-IV alcohol abuse (aOR=0.42).

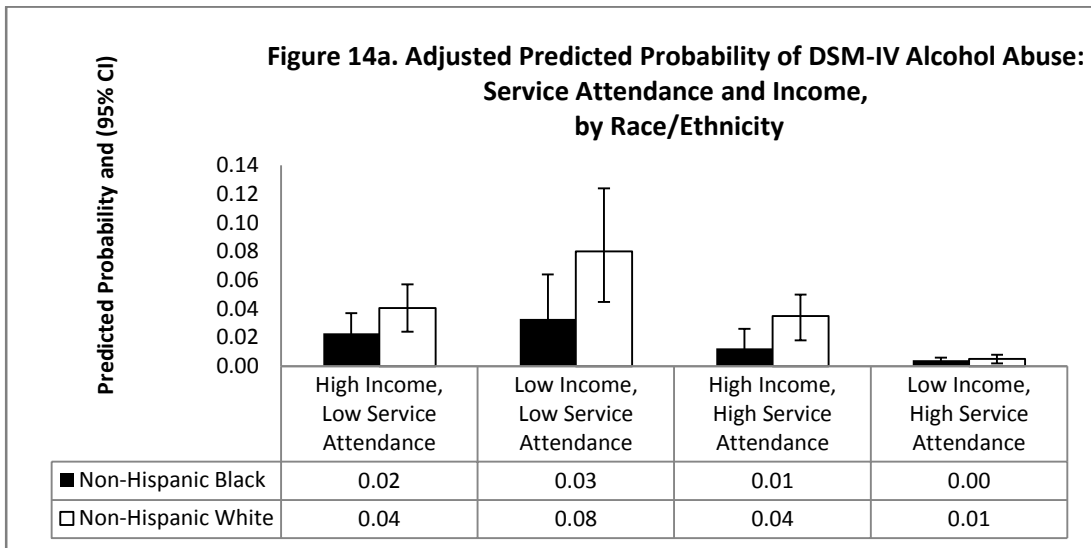
The income effect on heavy drinking among both Black and Whites was not as strong for the heavy drinking measure as it was on DSM-IV alcohol abuse. Classifying problem drinking with the heavy drinking measure had more significant impact for Blacks across socioeconomic status and religion. In most cases, the protective effects of all the religious involvement measures across (high compared to low levels of SES) were stronger. For instance, the effect of spirituality and education on DSM-IV alcohol abuse was not significant (aOR=1.10, p=ns), but it was strongly related to heavy drinking (aOR=0.51, p<.05). Among Whites, the effects of the interaction of religion and socioeconomic status on problem drinking were relatively unchanged between the two operational measures of problem drinking. While there appeared the overall effect that the interaction effect of religion and socioeconomic is sensitive to the operational measure of problem drinking, this was of little consequence for Black-White differences. There were no overall Black-White differences across any of the religion and education groupings for heavy drinking (results not shown), but some specific combinations were.

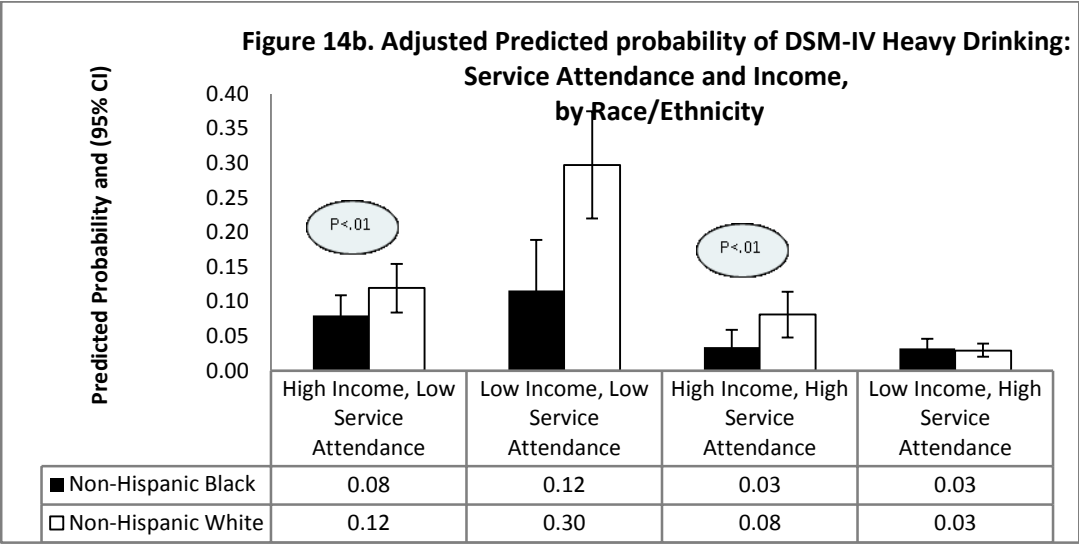
To visually demonstrate some of these findings, For example, in Figure 13, there were no global race-differences (according to an Omnibus test) across all the categories of spirituality and education; however, there was a Black-White difference for the category “high education, low spirituality”.





Black-White differences across categories of religion and SES showed appear to depend on how problem drinking was specified. For instance, when specified as DSM-IV alcohol abuse, no Black-White differences were found across any of the service attendance and income grouping (Figure 14a) but significant differences were found across two domains for heavy drinking (Figure 14b).





A similar pattern was of non-significant Black-White differences across spirituality and income using DSM-IV alcohol abuse, but significant differences on two domains were found using heavy drinking (Figures B8a and B8b, respectively).

## CHAPTER VI

### Conclusion

#### 6.1. Summary of Results

Blacks had a lower prevalence and odds of problem drinking whether it was defined in terms of behavior—such as with a heavy drinking measure or as a mental health outcome—defined through DSM-IV alcohol abuse (Kerr, Greenfield et al. 2011; Pacek, Malcolm et al. 2012). The pattern of lower prevalence among Blacks has been fairly stable over the past four decades (Harper 1976; Caetano and Clark 1998). The findings that Blacks have lower problem drinking than Whites seem paradoxical. First, Blacks have worse health outcomes than Whites for several conditions that include hypertension, diabetes, and cirrhosis of the liver—an alcohol-related outcome. Second, tension-reduction theories state that low individual-level socioeconomic status and high exposure to disadvantage are socioeconomic status-related stressors. To cope with these stressors, some people frequently engage in drinking, which often eventually develops into problem drinking (Pearlin and Radabaugh 1976). Third, the social determinants perspective posits that low levels of social, economic and cultural resources such as poverty and poor environmental health are risk factors for health, which include alcohol abuse (Galea and Vlahov 2002; Wilkinson and Marmot 2003). Blacks are thought to be at greater exposure to socioeconomic status-related stress and to be at greater exposure to poor environmental health conditions (Smedley, Stith et al. 2003; Centers for Disease Control and Prevention 2011a). Those perspectives taken together would predict that Blacks should have higher rates of problem drinking, yet the findings show the opposite.

Despite the paradoxical finding of Blacks lower prevalence rate of problem drinking than Whites, surprisingly few studies have specifically sought to explain this pattern. A handful of early studies, although it was not their specific intent to explain Black-White differences in problem drinking, suggested that religion and socioeconomic status are important factors for explaining Black-White differences (Herd 1994; Jones-Webb, Hsiao et al. 1997). This dissertation advanced that research agenda, but departs from previous studies in several ways. First, unlike the previous studies, this dissertation directly provides

a theoretical model beforehand hypothesizing how religion and socioeconomic status would explain Blacks lower prevalence rates.

Second, the dissertation used a stronger methodological approach to investigating Black-White differences in problem drinking in three ways. (1) Prior studies have only included one religion variable therefore they have probably miss-specified the role of religion in predicting health (Taylor, Mattis et al. 1999). I include several measures/dimensions of religion and also specify theoretically driven statistical interactions among the religion variables. (2) The dissertation went beyond simple linear additive models, and used a theoretical model to inform the statistical analyses of religion and socioeconomic status predicting Black-White differences in problem drinking. (3) This dissertation used sensitivity analyses to examine whether the results predicting DSM-IV alcohol abuse are consistent when using an alternate measure of problem drinking.

Results Blacks lower prevalence rate of DSM-IV alcohol abuse and heavy drinking than Whites. Black-White differences were also in the direction as with the DSM-IV measure, although the overall prevalence rate was higher with this heavy drinking measure. The Black-White ratio in prevalence of problem drinking was similar across the two measures. There appear to be some fundamental differences in how those groups meet diagnosis of DSM-IV alcohol abuse and heavy drinking. The criterion items that a DSM-IV diagnosis are based on appear less sensitive to predicting heavy drinking among Whites than Blacks. Two criterion items from different conceptual domains predict DSM-alcohol abuse and heavy drinking differently for Blacks than Whites. Finally, the rank order for the criteria based on the strength of association (as measured by the effect size) on DSM-IV alcohol abuse and heavy drinking differs between Blacks and Whites.

Consistent with prior research (Taylor, Chatters et al. 1996), this dissertation found Black-White differences in all the religion variables, but not all in the expected direction. Blacks had higher frequency of service attendance and levels of spirituality but Whites had higher mean levels of social interaction with other religious members. While all dimensions of religion were protective of DSM-IV alcohol abuse, the relationship was only statistically significant for service attendance and spirituality, in the full sample, and among Whites, but not Blacks.

The first important contribution of understanding Black-White differences in problem drinking is that dimensions of religion work differently across race/ethnicity on DSM-IV alcohol abuse. Among Blacks, spirituality and service attendance operate interactively such that the protective effect of service attendance on DSM-IV alcohol abuse is stronger at higher levels of spirituality. That interaction model fit the data better than a model where the three religion variables were estimated together, but assumed to operate independently. These findings are in contrast to two studies that investigated the role of religion predicting abstention from alcohol among African Americans. Those studies (Krause 1991; Krause 2003) found that subjective religiosity, not service attendance, was statistically associated with abstention from alcohol. The subjective religiosity measure used in those studies includes a measure of spirituality similar to the one in this dissertation. Those studies, however, differed in several ways from the analyses in this dissertation. The sample used in those studies was the elderly, the outcome was abstention not alcohol abuse, and the spirituality measure was part of a multi-item construct.

The findings of those studies were relevant to contrast with the findings of this dissertation because service attendance and spirituality represent objective and subjective dimensions of religion. The evidence is mixed on whether these dimensions exist independently or overlap (Chatters, Levin et al. 1992; Coyle 2002). Seventy percent of Blacks consider themselves as both spiritual and religious compared to fifty percent among Whites (Taylor, Chatters et al. 2003). Given the prominent role of religion in the lives of Blacks, it was especially important to understand how religious dimensions shape their drinking. Some evidence suggests that both dimensions operate in tandem for Blacks. For example, one qualitative study among Black women found that although they think of religion and spirituality as two separate things, they believe that service attendance provided a conduit for spirituality. That view was illustrated through one participant who said, "one of the ways I get in touch with spirituality sometimes is through practice of a religious organization" (Mattis 2000, p115). The relationship between spirituality and religiosity among African Americans is context dependent (Mattis and Jagers 2001) such as the population(s) (e.g. age and gender) under analyses. Further research should identify whether the interaction between spirituality and religious involvement on problem drinking is robust across age, gender and other axes of stratification.

For Whites, service attendance and spirituality had robust, independent protective effect on DSM-IV alcohol abuse. The model where spirituality varied with levels of social interaction fit the data better for Whites compared to a model where all religion were linearly estimated in one block. I was surprised that the model for spirituality and social interaction did not fit the data well for Blacks given that frequent church attendance was thought to be very important given its association with larger social networks, exchanges of goods and resources and access to formal support (Ellison and Levin 1998). As prior research has shown, interaction between dimensions of religion may operate differently for Blacks and Whites (Jacobson, Heaton et al. 1990).

For Whites, the association between spirituality and social interaction was not linear. Rather spirituality had its strongest protective effect on DSM-IV alcohol abuse at levels of social interaction with 25 and greater number of religious members. I was not able to test whether the strength of the interaction between spirituality and service attendance for Blacks on DSM-IV alcohol abuse is greater than the interaction between spirituality and social interaction among Whites. This is because the two coefficients were not comparable, since the former was based on a linear relationship and the latter a non-linear relationship. If those important distinctions between the models were ignored, it appears that the former has a stronger protective effect on alcohol abuse given its much smaller effect size (aOR=0.65 (For Blacks, Model 6, Table 6a) vs. aOR=0.96 (For Whites, Model 7, Table 6b).

In these data, there was insufficient evidence to reject the null for hypothesis number two that the protective effect of religion on problem is equal for Blacks compared to Whites. The religious program focus, format of worship, practices of religion, and the functions that religion serves to the community differ between Black and White congregations (Chatters, Levin et al. 1998; Cavendish 2000; Bartkowski and Matthews 2005). Despite those differences, both racial groups may yield similar levels of the protective benefits that religion confers on health (Ferraro and Koch 1994). Perhaps the models of religion on health between the groups are different qualitatively as well as quantitatively; therefore statistical comparisons may be not meaningfully capture Black-White differences. The next step was to examine whether the protective effects of religion on problem drinking varied across levels of socioeconomic status.

The benefits of religion on health are thought to be greatest among persons with low socioeconomic status versus high socioeconomic status (Ellison and Levin 1998). Hypothesis number three was the first step towards investigating whether that relationship is true for problem drinking. In these data, multivariable analyses controlling for age, gender, stress, marital status and nicotine dependence show that the relationship between socioeconomic status and religion is interdependent as is argued by one scholar (Iannaccone 1998). Higher education was associated with higher levels of religious involvement. That relationship was only statistically significant for service attendance and social interaction among Blacks, and only for social interaction among Whites. Higher income was associated with lower levels of religious involvement. That relationship was only statistically significant for service attendance among Blacks but for all three religion variables among Whites. Indeed, prior research found that education but not income was associated with service attendance among Blacks, however no explanation offered for that selected finding (Taylor 1988).

The positive relationship between education and service attendance is thought to occur because attendance is seen as a social activity. Moreover, religious attendance develops social capital, which rises with education as does other forms of socializing (Greeley 1997; Sacerdote and Glaeser 2001). A more nuanced theoretical rationale posited that higher church attendance as a response to increasing education may be related to two types of social capital formation: one that bridges low SES with higher socioeconomic status persons and the other that solidify bonds among high socioeconomic status persons (Wuthnow 2002). According to either theoretical position, education is expected to be positively correlated with service attendance.

The relationship between income and service attendance can be understood through economic models of religious participation and capital production<sup>28</sup> rather than a model of social capital. The causal nature between income and religiosity under the economic model is unclear. For example, one perspective for the relationship between the two is that with wage increases (using income as a proxy), religious participation becomes more money and time intensive and tradeoffs between time and money may negatively impact attendance. Conversely, congregations whose members have relatively higher

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<sup>28</sup> Capital production here refers to the after-life consumption/utility hypothesis, which posits that the primary inputs of religious participation is to gain rewards post-life.

levels of income tend to hold fewer and shorter meetings and require less time-consuming activities (Iannaccone 1998). Another economic-driven hypothesis for the relationship between religion and income (using contributions/tithes as a proxy) is that even accounting for tax incentives, less frequent attendance among higher income persons may actually be a response to the “free rider problem” or “spillover effects of charitable giving”, where individuals benefit from the contributions of others (Sullivan 1985; Gruber 2004).

The investigation into the association between religion and socioeconomic status was the first part to investigating hypothesis number four, which stated that the protective effect of religious involvement on problem drinking is strongest among low compared to high socioeconomic status persons. Only exploratory analyses were conducted between socioeconomic status and problem drinking given that those findings are extensively discussed in the literature. One very important finding emerged from these analyses. For Blacks, lower, compared to higher education was a risk factor for problem drinking although that effect was not statistically significant (see Table A10 for a summary of results). Lower income, relative to higher income was protective of problem drinking. For Whites, both higher income and education were statistically significant risk factors for problem drinking (i.e. below 1 odds ratios for lower education and income).

The first implication of those findings is that the direction of association between socioeconomic status and problem drinking, at least for education, varies by race/ethnicity. Figure B15a shows that the Black-White gap in DSM-IV alcohol abuse increases across income. Figure B15b shows that Black-White differences in DSM-IV alcohol abuse are not significant at low levels of education, but are at higher levels of education, which are opposite to what would be expected from a social determinants model and as have been found in previous research (Barr, Farrell et al. 1993). Perhaps those differences can be understood from the fact that socioeconomic status measures such as education and income mean different things, or derive different benefits between Blacks and Whites. Differences across race in meaning or what benefits that socioeconomic status provides are thought to reflect differences in opportunity or access, or quality (Williams 1999; Shapiro 2004). Second, measures of socioeconomic status are thought to be differentially be related to health (Braveman, Cubbin et al. 2005). This is because the socioeconomic status measures income and education reflect different domains such as class,



prestige or power (Liberatos and Kelsey 1988; Krieger, Williams et al. 1997). Education is expected to influence health through lifestyle choices while income is expected to influence health through access to material resources and prestige. Alcohol abuse appears more sensitive to income as found in behavioral economic studies examining alcohol consumption behaviors in response to price (Chaloupka, Grossman et al. 2002; Cook and Moore 2002). Education, is found to have a weak association with heavy drinking (Van Oers 1999). It is unclear why low education was a risk factor for DSM-IV alcohol abuse among Blacks but a protective factor for Whites and should be further investigated.

The dissertation found limited support for hypothesis number four that the effect of religion on DSM-IV alcohol abuse varies across socioeconomic status. The effects of all religion measures on DSM-IV alcohol abuse did not vary by education. Only the effect of service attendance on DSM-IV alcohol abuse varied by income. The protective effect of mean levels of service attendance on DSM-IV alcohol abuse was stronger among persons with lower income than higher income. Those results were driven by the White subsample owing to the sharp decline in attendance levels with income among them. The specification of continuous by continuous or continuous by categorical interactions is arbitrary (Rothman 2002). When socioeconomic status and religion are grouped categorically, it became clear that lower marginal predicted probabilities of DSM-IV alcohol abuse were found among the low socioeconomic status and high levels of religious involvement group.

The dissertation found little support to reject the null hypotheses that the (1) strength of the protective effect of religion on problem drinking is stronger among low compared to high socioeconomic status, and (2) that interaction effect is equivalent between Blacks and Whites. First, the analyses of pooled-data supported one of the motivations to probe beyond simple linear additive modes to explain Black-White differences. Adding socioeconomic status and religion variables did not explain Black-White differences in DSM-IV alcohol abuse, (Model 1 to Model 2, Table A5). When race was allowed to interact with religion variables (Model 3, Table A5) and with socioeconomic status (Model 4, Table A5), only then the coefficient for race became non-significant.

Given the findings that race interacts with socioeconomic and cultural determinants, it would seem reasonable that race differences in problem drinking might be explained by the interaction between SES and religion. The dissertation found mixed support for that hypothesis. The coefficients from the 3-

way interaction models with the pooled data, and several comparisons from the marginal predicted probabilities between Blacks and Whites were not statistically significant. In the 3-way interaction models, the main effect race coefficient was still significant and the interactions were not. More importantly, the size of the Black-White difference in DSM-IV alcohol abuse appeared relatively stable across these competing models. Contrary to the hypothesis, I did not expect that Black-White differences would be observed across the high education and high spirituality category or the high education and low social interaction category. I would have expected Black-White differences in the low education, high spirituality and high social interaction categories given my theoretical expectation that the benefits of religion would be pronounced at low socioeconomic status. At least four of five locations of religion and SES where Black-White differences were observed were across “high-high” or “high-low” quadrants, and only two across “low-low” quadrants (see Figure B16).

The marginal predicted probability of heavy drinking also highlighted more Black-White differences among high religion (service attendance and spirituality) and high income and additionally for low income and low religion (service attendance and spirituality). While these results were not found across social interaction, which might have enabled me to generalize with some confidence, it appears that Black-White differences were found mostly among the high-high extremes of religion and SES (3 times) or the low-low extremes (2 times).

One potential explanation for why the lower marginal means of drinking among Blacks compared to Whites are if a larger sum and proportion of persons are in the categories that are protective. For instance, if Blacks had a lower mean probability of alcohol abuse at low education and high service attendance, then it would be expected that there are more Blacks in that category and therefore driving the results.

In terms of the Black-White differences in adjusted marginal means across SES and religion, that was not always the case. In fact, for most of the groupings, there were larger weighted numbers of Whites than Blacks. For example, the category of high education and high service attendance had the biggest Black-White difference in marginal predicted probability of DSM-IV alcohol abuse (ratio of 1: 4). In that category, however, the weighted cell percent for Whites (1.6%) was larger than for Blacks (1%). Similarly, for high income and high spirituality, the Black-White ratio of marginal predicted probability of

DSM-IV alcohol abuse was 1: 2 and the weighted proportion of Whites (5.2%) was larger than for Blacks (3.4%).

The major implication of this observation from further inspection of the marginal means are that the effects of the interaction of religion and SES on DSM-IV alcohol abuse are best understood at the individual, and not group level because a proportion of persons in the cell was not driving the race-differences. As found with the logistic regression interaction models, race-specific models showed that there is not a universal way that religion and SES work. As mentioned in section 6.1, the interaction models (among religion variables and between religion and SES) worked differently for Blacks and Whites. Given these the concurrence between the adjusted marginal predicted probabilities and logistic regression, I recommend race-specific models to better explore the paradox of low prevalence rate of alcohol abuse among Blacks than Whites.

## **6.2. Implications of Religion in Future Alcohol Research**

The study of religion and spirituality in alcohol research has either mostly focused on religion's role in recovery or abstinence. Those studies that focused on the relationship between religion and problem drinking have in large found a protective effect. Generalizations have been difficult because of methodological differences in the number and type of religious measures and alcohol outcomes used. While prior research found that religious denomination matters because some are prescriptive of alcohol use while others condemn use entirely, this study did not use that religious measure because it was not available. Three variables that measured both internalized and institutionalized aspects of religiosity were used and the evidence indicates that both types of religious involvement matter. Service attendance is a measure considered to characterize the institutional aspects and best represented the social control perspective. The protective effects on DSM-IV alcohol abuse were robust.

Service attendance may be a crude indicator of social cohesion and social control; therefore, the mechanisms by which the variable operates to influence problem drinking should be investigated. For example, I theorized that service attendance increases level of attachments to others. According to Durkheim's work in *Suicide*, stronger attachments protect against deviant behavior. Therefore, that theory can be further investigated by including a variable that represents social cohesion or attachments to see

whether inclusion reduces the effect of the service attendance variable on problem drinking. Moreover, the finding that social interaction was not significant suggests that global measures that appear to tap social attachment may be inadequate, and other variables that more closely tap the social attachment construct should be considered.

Another theorizing of the service attendance link to problem drinking is that churches may impose moral sanctions on drinking. The more people are exposed to these types of messages (presumably through higher levels of attendance), the higher likelihood that they would not engage in problem drinking behavior. To further test that theory, future research would include a mediating variable representative of types of religious instruction. Such a variable might be difficult to find or create since clergy rarely preach the same messages, especially about alcohol use. Congregants' attitudes towards drug and alcohol use may serve as another variable to test the mediation hypothesis. Caution should be taken though with such a variable selection to make sure that the variable is not a measure that is contaminated with secular views about problem drinking.

Related to congregant's attitudes towards drug and alcohol use, are how scriptures get incorporated into people's norms for drinking, and how those norms get distributed within the community. As mentioned earlier, in my tenure as a church member, I have not heard directly a sermon about alcohol use. It is quite possible that the message was preached on a day that I was not there. However, in general, when a message was preached about some deviant behavior, scripture was always provided by the pastor so that congregants can verify for themselves. On those occasions, the scriptures enhanced my understanding of the deviant behavior, but not always changed my opinion and decision to engage in the behavior or not. From my literature searches, I did not find scholarly information about how scripture on alcohol use gets incorporated into people's norms for drinking. As in the case with attendance, use of scripture to regulate other types of deviant behavior, I presume that the effects of scripture on drinking would vary at the individual level and depend on several factors such as individual religiosity, levels of current alcohol use, and prior socialization of religious values as an adolescent.

One speculation for the possibility that evidence on scripture of alcohol use may not be as strong of a factor (as seems to the case with my personal experience), is the role of parental or familial religious values on shaping adolescents alcohol use (Perkins 1987; Harrell and Powell 2014). For

example, Heath, Madden and colleagues (1999) in a study of resiliency factors affecting adolescent alcohol use found that family norms for religious involvement was a significant protective factor against alcohol use, adjusting for parental education, family religious affiliation, and individual adolescent religious values. It is unclear, however, at what point in age, if any, do religious norms about alcohol use impact childhood and adolescent socialization into alcohol use, and whether that impacts problem drinking as an adult.

Related to service attendance and scripture as mechanisms by which religion can impact problem drinking is the consideration that the moral community (see section 3.3 for a discussion) can be as immediate as the family. The moral community hypotheses, and its variants, predict that the impact of individual religiosity on protecting against deviant behavior will be stronger in communities (which level vary in studies from the church to an entire region) with highest rather than weaker levels of religiosity (Stark, Kent et al. 1982; Sturgis and Baller 2012). Specific to alcohol abuse, De Ridder (2010) argued that any equation predicting alcoholism should, not only include religious aspect, but a social component which is the family as the primary social unit. It is possible that religious norms about alcohol use and its distribution within the moral community (in this example, family) may affect one's drinking and/or problem drinking behavior. While I have not found studies on adults that tested such hypothesis, one study among adolescents show that while adolescents' individual religious attendance was protective against alcohol related problems<sup>29</sup>, adjusting for family social support, family, peer and school variables washed away the effect of individual level religiosity (Mason and Windle 2002). The authors suggested that family influence played a strong role in protecting adolescents against alcohol-related problems.

These examples are based on adolescent and not adult populations, do not necessarily model problem drinking, and use different indicators of religiosity. Despite these methodological limitations, these studies can provide a basis for speculation that scriptures somehow make it into one's drinking behavior/outcomes and that religious norms about drinking, within the community (variously defined) may additionally influence the individual.

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<sup>29</sup> The items that comprise the alcohol related problems in this study are similar to the items that comprise the DSM-IV alcohol abuse disorder. This outcome was modeled as a continuous variable based on that scale.

In addition to the institutional dimensions of religion, spirituality is thought to be a measure of the internalized aspect of religion and its protective effect on DSM-IV alcohol abuse was robust. This indicates that spirituality may also be important for preventing problem drinking as it is with recovery from problem drinking. Whether spirituality is equally protective of DSM-IV alcohol abuse and recovery from alcohol is an empirical question that can be tested by simultaneously estimating the effect of spirituality on alcohol abuse and recovery.

Next, future research should also consider the interaction among religion variables but let theory guide the statistical analyses. For example, there was sufficient theoretical evidence to suggest an interaction between spirituality and service attendance but not between social interaction and service attendance so it was not included in the study analyses.

A final point about the investigation of religion in alcohol research is that these religion measures were robust to the specification of problem drinking, which I predicted through two theoretically informed positions (i.e. social control and psychological coping). For example, if one considers problem drinking a behavior (as specified by the heavy drinking measure), the social control perspective would posit that religion would regulate behavior. Sensitivity analyses indeed show that service attendance was protective against heavy drinking as it was for DSM-IV alcohol abuse. Although spirituality is theorized to be protective against problem drinking through a psychological coping with mental health model, it also was robust in predicting the heavy drinking measure.

### **6.3. Future Research on Racial Disparities in Problem Drinking**

Although the dissertation did not fully explain Blacks lower prevalence rates of problem drinking than Whites, results provide important steps for future investigations. First, the results demonstrate that the religion and problem-drinking connection may operate differently across Blacks and Whites. Therefore, it may be more important first to focus in-depth on race-specific analyses about how religion functions to protect each group from problem drinking.

Perhaps service attendance, social interaction and spirituality in the scheme of other religious variables such as influence of the clergy and religious teachings may be less responsive to predicting Black-White differences. For example, mean Black-White differences in spirituality was modest (3.8 vs.

3.3 = 0.05) and even smaller for service attendance (3.7 vs. 3.6= 0.01) (Table 1a). Given the large sample size of the NESARC such small differences could be detected. However, small differences weaken the support for hypotheses that salience of religion is stronger for Blacks than Whites.

It may be that other religious measures such as the relationship with clergy and pastoral involvement are more relevant for explaining Black-White differences in the effect religion has on problem drinking. It is plausible that direct contact with clergy may be different between Blacks and Whites and therefore impact health and problem drinking differently. In fact, clergy is often one the first sources of contact people seek for help with substance use (Wang, Berglund et al. 2003; Wallace Jr, Meyers et al. 2004) and Blacks are more likely than Whites to contact clergy for support with mental health problems including alcohol abuse (Bohnert, Perron et al. 2010). Thus, it seems imperative that in future alcohol research include a religion variable that taps the role of clergy. As one scholar and pastoral clinician argued in a seminal publication on the methodological issues of religion in alcohol research; alcohol and drug use is considered a pastoral problem because the use and misuse of alcohol is a theological issue given that rules and norms surrounding alcohol use and abuse are intricately discussed in biblical and other religious text regardless of denomination (Morgan 1998).

So far, the discussion for advancing research on racial disparities in problem drinking has focused on exclusively at predictors at the individual-level. Perhaps studies that employ multilevel analyses with area-level constructs of socioeconomic status and religion are needed. As with individual-level socioeconomic predictors, findings based on area-level measures are mixed. For example, one study found that Asians and Blacks living in neighborhoods with higher levels of disadvantage<sup>30</sup> had lower odds of substance use disorders compared to Whites, but the relationship for Blacks was not statistically significant (Molina, Alegría et al. 2012). In contrast, one study found that neighborhood disadvantage was negatively associated with heavy drinking for White men but positively associated with heavy drinking among Black men (Karriker-Jaffe, Zemore et al. 2012). From these mixed results, it is clear that no firm conclusions can be made about the moderating role of area-based socioeconomic status in explaining Black-White differences in problem drinking. In fact, these should further motivate more studies in this area.

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<sup>30</sup> An aggregate measure of education, employment, income and financial assets

Theories driven by the social determinants perspective would predict that health outcomes such as problem drinking should be worse among the groups that are exposed to greater disadvantage. Blacks are more likely than Whites to reside in neighborhoods with greater levels of alcohol marketing and other forms of disadvantage that are risk factors for drinking (Kwate and Meyer 2009; Theall, Lancaster et al. 2011). Despite what would be predicted by the social determinants perspective, the mixed findings from studies that used area-based measures of SES suggest that there are protective resources at the neighborhood level as well. Moreover, Blacks may have benefited more than Whites from those area-based protective resources given their lower prevalence rates of problem drinking.

One such protective neighborhood-level resource is also religion, more specifically, the presence of religious institutions. In predominantly Black communities, one can observe as many churches as there are liquor stores or advertisement of alcohol. Kwate and colleagues (2007) conducted in a study in Harlem, New York City—a place where this relationship is most vividly seen—that quantified the spatial association between churches and alcohol advertisements. They found a moderate correlation between churches and alcohol advertisement ( $r=0.26$ ,  $p<.05$ ). More importantly, the study showed that churches had some protective effect on alcohol exposure in the community given the negative and statistically regression coefficient predicting alcohol advertisement density.

#### **6.4. Public Health Significance**

The public health implications of this research are complex. The first implication is whether and how can religion be used to address alcohol abuse. Religious institutions that participate in “faith-based” models of health promotion, have provided health and social services (DeHaven, Hunter et al. 2004) including alcohol prevention and recovery (Hodge and Pittman 2003) to residents within the community. Perhaps one of the clearest examples of where public health has involved religion in its alcohol prevention initiatives is Russia. There, part of the public health initiative is to systematically locate drug and alcohol rehab prevention within the church (Elliott 2013). In the study, they estimated that 61% of graduates from church-based alcohol programs remain sober for long-term periods compared to an average of 10% of persons who used government and commercial clinic rehab programs. Similar public health efforts regarding alcohol use has also been conducted in the United States (Hodge and Pittman



2003).

In the United States context, faith-based models of health prevention and promotion are especially a prominent feature among Black communities (Levin 1984; Chatters, Levin et al. 1998). As Eric Lincoln (1984) stated, “to understand the power of the African American church, it must be first understood that there is no distinction between the African American church and the Black community. The church is the spiritual fact of Black subculture, and whether one is a member or not is beside the point” (as cited in Giger, Appel et al. 2008, p378).

Anecdotal, as well as empirical accounts, show that the coexistence and close proximity of alcohol outlets and churches is commonplace in the Black community (Harper and Dawkins 1977). While it is plausible that Blacks may derive stronger benefit from that co-existence of religion at the community level compared to Whites, it is difficult to suggest public health recommendations for policy or future research. First, the data did not provide very strong support that the religious measures were strong protective factors against alcohol abuse for Blacks, nor that residual protective effect from these factors was stronger among Blacks compared to Whites.

The findings here are least suggestive of religious involvement as an explanatory factor for Blacks lower prevalence of problem drinking. At first, this may suggest abandoning the idea that religion can explain Black-White differences in problem drinking. There, however, is always hope with religion. Perhaps there are other measures of religious involvement such as prayer or clergy involvement that are more salient to studying Black-White differences in alcohol abuse than the measures used in this study. Next, given there was relatively no systematically and theoretically driven research to explaining the paradox of Blacks lower drinking than Whites despite higher adversity, religious involvement seemed like an appropriate starting place given my theoretical justification in chapter 3.

In response to a challenge to think beyond religious factors for explaining the paradox of low alcohol abuse among Blacks compared to Whites I thought an alternate scenario that could explain the paradox was higher law enforcement surveillance within predominantly Black communities. It is well documented that law enforcement surveillance is high in communities of lower socioeconomic status and with higher proportion of African Americans. Next law enforcement surveillance is correlated with individuals' race/ethnicity, through racial profiling and other mechanisms related to racism and

segregation (Meehan and Ponder 2002; Roberts 2004; Brunson and Miller 2006). Plausibly, Blacks lower rate of problem drinking may be related to them staying “below the radar” to avoid the purview of law enforcement surveillance that may be a function of racial profiling and potentially higher social costs (such as loss of job and other benefits) they could incur from alcohol-related arrests. For instance, although Whites are aware of the consequences of an alcohol-related arrest, Blacks may place greater weight on those decisions than Whites. Blacks may have fewer resources to rely on should these benefits be cut off after an arrest and are probably aware that they receive higher sentences than Whites for similar substance related offenses (Mustard 2001; Beckett, Nyrop et al. 2005).

Blacks would therefore want to minimize situations where alcohol use can lead to detection, such as drinking and driving and may be more likely to confine drinking to spaces with limited visibility. Partial support for this conjecture can be evaluated by inspecting the odds of each criterion item on predicting a DSM-IV diagnoses. I would expect lower odds on the criterion items that are associated with higher visibility from law enforcement. On the other hand, it is possible that because Whites may not be subject to the same level of police surveillance because of race, or the community in which they reside, that they may take more chances in situations where alcohol use can lead to abuse. These include excessive consumption of alcohol and driving after.

Data from the NESARC sample used in the dissertation (Table 1b) show that the strongest predictors of DSM-IV alcohol abuse among Blacks were: drinking in dangerous situations (such as operating machinery), drinking which led to involvement in physical fights, and drinking that interfered with taking care of family and home responsibilities. The strongest predictors of DSM-IV diagnoses among Whites were: driving while drinking on more than one occasion, drinking in dangerous situations, and driving after drinking too much, which all seem to be more highly visible to law enforcement surveillance (i.e. sobriety checks). Finally, the odds of being arrested as a result of drinking on DSM-IV alcohol abuse among Whites are about one and a half times high than the odds among Blacks (OR=6.4 vs. OR=4.4, respectively). While those findings could potentially indicate support for a theory that Blacks lower problem drinking rates are related to law enforcement surveillance, I conducted exploratory analyses to investigate the empirical merits of such claim.

I used data from the New York Social Environment Study, 2005, which is a sample of approximately 4000 respondents from New York City. That survey measured health and substance use behaviors, and included a measure of DSM-IV alcohol abuse (Ahern, Galea et al. 2008). For these exploratory analyses, participants were linked to the nearest police precinct that had the largest overlap with their zip code of residence. Although not all alcohol and substance use activity occurs within a person's residence, it was the best approximation available to locate a respondent within a police precinct boundary. I used historical New York City crime data on arrests as a proxy for law enforcement surveillance. The indicators were aggregate number of total misdemeanor offenses and total violations for 2005 for each police precinct (New York City Police Department 2014). To minimize bias associated with crude numbers of arrests, rates of those offenses were calculated per 1000 using population denominators for each precinct from the American Community Survey 2005-2009 estimates. Rates were then merged to each respondent's corresponding police precinct. Rates were then coded based on tertile cut-points into groups that signified "low", "medium" and "high" levels of policing.

Empirically, I would expect that on the individual level, the probability of alcohol abuse for Blacks would be lower with increasing levels of law enforcement surveillance. On a group level, I would expect Black-White differences to become narrow at higher levels of police activity because the probability of alcohol abuse should decline for Blacks and rise among Whites. I used a generalized estimation equation regression, with cluster by police precinct, predicting DSM-IV alcohol abuse with predictors: black-white race, continuous age, gender, nicotine dependence, and misdemeanor arrest rate. The process was repeated substituting misdemeanor rate with total violations. Then, I predicted marginal probabilities of alcohol abuse and graphed the results, which is displayed through figure B17.

Findings were similar across law enforcement measures so only the graph for misdemeanor rate is shown and discussed. In the NYSES data, findings confirm that Blacks have lower probabilities of DSM-IV alcohol abuse than White. However, the results do not support the expectation that probability of alcohol abuse among Blacks would decline with increasing law enforcement activity, instead it rises but the slope does not appear statistically significant. On group level, there were no statistically significant Black-White differences across levels of community level law enforcement activity, although the gap appears to widen at higher levels of activity. It is difficult to draw any substantial conclusions from this

crude investigation of an alternate hypothesis for lower drinking rates among Blacks, and further research is warranted.

In conclusion, the traditional health disparities framework is less suited for investigating understand Black-White differences in alcohol abuse. First, the religious measures did not appear to explain race-differences, and even at low levels of SES, the odds of alcohol abuse was still lower among Blacks, which is another reason religion appeared not to moderate race predicting alcohol abuse. These findings suggest abandoning the disparities framework. Before this analytic framework is abandoned, however, further analysis on better representative samples should be conducted. For instance, the NESARC sample did not have much variance in socioeconomic status among Blacks. Table 1a shows that the sample of Blacks in the NESARC with high education (over 16 years of schooling or some college or higher) (52% vs. 18%) was significantly higher compared to the average percent among Blacks in another sample with arguably a better nationally representative sample of African Americans (Jackson, Neighbors et al. 2004; Broman, Neighbors et al. 2008). Also, although there was not support for stratification by age-cohort, or by gender, other research found age-cohort differences in religious involvement within gender-specific analyses (Brown, Chen et al. 2013). Further consideration of conducting analyses within the socio-demographic grouping is warranted.

## **6.5. Limitations**

Some potential limitations of this dissertation are: (1) collapsing ethnicity and grouping Black race together, (2) restricting service attendance to only those who currently attend religious services, (3) non-systematic investigation of race-differences across demographic subgroups and (4) limited number of religion variables, (5) not investigating pathways from religion and health behaviors (i.e. comparing the merits of a mediator religion model to the moderator model used), and (6) treating socioeconomic status as a correlate of stress, and subsequently the moderating variable, but not directly examining stress.

It is quite possible that there may have been a greater number of instances where Black-White differences in problem drinking could have occurred across the interaction of religion and socioeconomic status had Blacks been separated by ethnicity. That may be because Black subgroups differ on both domains of religion and socioeconomic status, which could potentially mask important differences (Arthur

and Katkin 2006). Beyond the small sample size and restricted the power that could result from stratifying Blacks across ethnicity, I believe that grouping Blacks together had little consequence for Black-White differences. Several differences in other domains such as employment that are thought to be related to ethnicity among Blacks, but matter less for religion. For example, Taylor, Chatters and Joe (2011) found that Black Caribbeans—a fairly large subgroup of Blacks, differed only from African Americans on one out of five measures of non-organizational religious participation (requesting prayer from others) and one out of five measures of subjective religiosity (self-evaluated religiosity). They were also only different from each other on one of two measures of spirituality (self-evaluated spirituality), but not importance of spirituality, which was the measure used in this dissertation. Multivariate analyses comparing other dimensions of religion showed that African Americans do not statistically differ from Black Caribbeans (Taylor, Chatters et al. 2007; Taylor and Chatters 2011).

Although Black Caribbeans and African Americans differ across the socioeconomic status measures of education and income (Kasinitz 1992), the groups are similar in terms of how those variables are associated with religion. Taylor, Chatters and Joe (2011) study showed that the effects of income and education on the importance of spirituality—one measure used in this dissertation, was similar across the groups. For older Black Caribbeans, the association between income and spirituality was ( $\beta=-.117$ ) and ( $\beta=-0.45$ ) for older African Americans. While these coefficient sizes were not tested and that was larger among African Americans, the direction was the same. The association between education and spirituality was ( $\beta=.012$ ) among older Black Caribbeans and ( $\beta=.005$ ) among African Americans, and education was not statistically associated with spirituality for both groups.

Despite the methodological importance of analyzing ethnicity among Blacks (as is the same case can be made among Whites), it appears reasonable to speculate that keeping all Blacks together would not be as a major limitation for explaining Black-White differences in problem drinking.

A second potential limitation raised is that restricting the sample for the variable frequency of attending religious services to persons who currently attend services changes the sample size from which inferences on other religion variables are made. This may appear to be a methodological limitation because a group is systematically excluded. However, the contribution of that group to learning about religion's effect on problem drinking is not ignored, and in fact, captured from the first religion variable—

whether one is currently attending a religious institution or not. Conceptually, service attendance is not just meant to capture levels of involvement compared to non-involvement, but to get some insight about the broader concept of attachment.

Therefore, practically, this observation should be conducted *among* the persons within the religious setting where exchange of information, attachments, and other psycho-social mechanisms operate. The consequence is that one cannot learn about how levels of exposure to psycho-social religious mechanisms operate among persons who have no exposure to them. For that same reason, the second variable social interaction is a direct measure of interaction within the religious setting, and responses are only based among those who have something to report, which are the people who currently attend services—a natural exclusion. Lastly, the spirituality measure is considered a distinct dimension from religiosity, therefore, it would seem reasonable that a person does not have to be currently attending religious services to be spiritual. Naturally, a frequency on variable would include more persons than a frequency of service attendance and social interaction variables and it would not be appropriate to exclude cases that do not currently attend services.

I therefore, believe that in absence of a religion variable that can capture the effect of currently attending services or not and lack of conceptual clarity, exclusion of the cases from the service attendance variable would be a major limitation. I argue that in this case, that limitation could be reasonably relaxed.

The third potential limitation has been addressed and discussed in the methods. It is possible that could have been a greater number of instances where Black-White differences in problem drinking if demographic variables such as age and gender not been masked through statistical controlling. Surely levels of religious involvement increase with age, and females have higher levels of religious involvement than males. While those are true, I believe they operate in the same direction for Blacks and Whites. Furthermore, the figure B2 shows that slope of religious involvement (service attendance) across age was similar for Blacks and Whites. While the gap in income distribution potentially changes across age for Blacks and Whites, there is no theoretically justified reason to expect it to be different by race or sex. Empirical results from Table A2 showed that the estimates of income and education on DSM-IV alcohol abuse were not much different across the full sample and for a sample with those aged 60 years and

under, although there was a gendered difference. However, theoretically, there was not a strong reason to think otherwise. For example, Marx made no distinctions across gender or age when he thought that religion the opiate of the masses. He generalized his observations to the population and limited it to class and religion.

In addition to the empirical results I provided, I believe this potential limitation did not restrict the ability to detect a greater number of Black-White differences in problem drinking across the interaction of religion and socioeconomic status.

A fourth potential limitation is that the dissertation examined a relatively narrow set of religious dimensions to tap theoretical constructs of social control. For example there are stronger variables that potentially better tap the social control of alcohol use, as found in the National Congregations Study (NCS) data. While those limitations seem reasonable, this was the first study I am aware of that specified a set of theoretical arguments as to how religion potentially constrains problem drinking and how that effect potentially differs across race through education and religion. I see this as not a limitation, but a starting point to investigate other religious involvement measures and how they interact with education and income to differentially predict Black-White differences in problem drinking. Furthermore, the NESARC only contained these four religion variables. The intent of these broad measures was to be reasonably applicable to the general population across the United States, which vary significantly by religious tradition, affiliation and other characteristics too many for one data set to reasonably capture.

A fifth potential limitation was not investigating pathways from religion and health behaviors. The decision was deliberate to examine the direct association from religion to DSM-IV alcohol abuse without trying to identifying mediating pathways. Social support is one classic pathway through which religion is thought to influence health (George, Ellison et al. 2002; Powell, Shahabi et al. 2003). While social support may be protective of some health behaviors, it may be negatively associated with heavy drinking. This is because social support is a direct measure of one's social network; therefore if members of one's network tend to drink heavily, this increases the likelihood that he/she will also drink heavily (Reifman, Watson et al. 2006). Although social support could conceivably work in opposite directions, I evaluated it as a potential mediator of the religion alcohol abuse relationship.

First, I examined the correlations with religious items and DSM-IV alcohol abuse and results are displayed in tables A11 and A12. Results indicate that social support is positively correlated with religious involvement (e.g. for service attendance  $r=.06$  among Blacks and  $r=.05$  among Whites). Social support, however, practically had no correlated with DSM-IV alcohol abuse among Blacks ( $r=.0079$ ) and inconsequentially small correlation among Whites ( $r=0.017$ ).

Although at this point, social support could have been dropped as a candidate for mediator, I evaluated in multivariable analyses whether adding social support to a model that included religion, SES, and covariates: age, gender, marital status and nicotine dependence, would reduce to coefficient estimates of the religion variables. The 12-item scale of the interpersonal support evaluation list (ISEL) was the social support measure. Although the scale was designed to tap four distinct domains of support, there is support for evaluating the scale as one dimension (Brookings and Bolton 1988). For simplicity, and because this was not a main part of the dissertation analyses, I used the full scale, ignoring domains. Results (not shown) indicate that social support, in both continuous and non-linear form was not statistically associated with DSM-IV alcohol abuse, nor did it reduce the protective effect of religion variables on the outcome.

A sixth potential limitation of the dissertation was treating socioeconomic status as a correlate of stress, and subsequently the moderating variable without examining its association to a more direct measure of stress. I began that investigation by examining the correlations from tables A11 and A12. The measure of perceived stress in the NESARC (the Perceived Stress Scale-4) was not strongly correlated with education or income, and those correlations were smaller among Blacks than Whites. Perceived stress was positively, but not statistically correlated to DSM-IV alcohol abuse among Blacks, while it was negatively correlated and statistically significant among Whites.

Next, I used marginal predicted probabilities of DSM-IV alcohol abuse to evaluate the interaction between high and low vales of perceived stress and high and low values of religion (1) to test whether perceived stress would have been a stronger and direct measure than using SES and (2) whether there were any Black-White differences across several domains of religion and stress. Those results are in table A13. I then visually compared the estimates from that table to the estimates from similar analyses that were conducted using SES measures: income and education (Tables A8a and A8b).



The results did not provide support that a perceived stress measure was better to evaluate race-differences across levels of religion. I therefore retain my decision to use SES as the variable for evaluating the moderating effects of race-differences on the religion to DSM-IV alcohol abuse association. First, table A13 showed that there were no new Black-White differences across the interaction of perceived stress and religion that was not identified with the interaction of SES and religion (the only significant Black-White differences for example were low social interaction and low perceived stress, and high perceived stress and high spirituality). When using income as the focal variable, Black-White differences were also found within the same location (i.e. low income and low social interaction, and high income high spirituality, Table A8b). The most important finding against using a direct measure of stress was that the marginal mean probabilities were much smaller for perceived stress interacting with religion variables than it was for income or education interacting with religion on DSM-IV alcohol abuse. For example, the adjusted predicted probability of high perceived stress and low service attendance for Blacks was 0.03 (Table A13), while the margin for high income and low service attendance for Blacks was 0.11 (Table A8b).

Overall, these results suggested that examining SES as the main variable for which we expect to see an interaction with religion on race-differences in problem drinking was a better choice than using a direct measure of stress.

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## APPENDIX A. List of Appendix Tables

**TABLE A1. Variable Descriptions**

<b>VARIABLES</b>	<b>MEASURES</b>
<b><i>Main focal variables</i></b>	
Race/Ethnicity	Non-Hispanic Black Non-Hispanic White
Religion	Service Attendance Social Interaction Spirituality
<b><i>Secondary focal variable</i></b>	
Socioeconomic Status	Education/ years of school completed Annual personal income
<b><i>Main response variable</i></b>	
Problem Drinking	DSM-IV Alcohol Abuse Heavy Drinking
<b><i>Covariates</i></b>	
Age	Age at time of interview
Gender	Male Female
Stress	Number of stressful life events
Marital Status	Current marital status at time of interview
Co-occurring Substance Use Disorder	DSM-IV Nicotine Dependence

**TABLE A2. Black-White Differences in the Effect of Religion and SES (and their interaction) on DSM-IV Alcohol Abuse: Across Age and a Full Sample, and Across Gender**

DSM-IV alcohol abuse	Full Sample		Under age 60		Over age 60		Male		Female	
	aOR	Std Err	aOR	Std Err	aOR	Std Err	aOR	Std Err	aOR	Std Err
<b>Race/Ethnicity<sup>a</sup></b>										
Non-Hispanic Black <sup>b</sup>	0.63	0.06****	0.58	0.05****	0.49	0.16*	0.63	0.07****	0.72	0.11*
Non-Hispanic Black <sup>c</sup>	0.60	0.09***	0.58	0.09***	0.70	0.33	0.58	0.10****	0.59	0.15****
<b>Religion</b>										
Service attendance	0.76	0.05****	0.74	0.05****	0.87	0.16	0.82	0.07*	0.63	0.07****
Social interaction	1.00	0.00	1.00	0.00	0.96	0.01***	1.00	0.00	0.98	0.01
Spirituality	0.68	0.06****	0.64	0.07****	1.06	0.31	0.66	0.08****	0.75	0.12
<b>Socioeconomic Status</b>										
<b>Education<sup>d</sup></b>										
Less than high school	0.46	0.12****	0.46	0.16*	0.39	0.25	0.42	0.12*	0.51	0.19
Completed high school	0.95	0.12	0.96	0.13	0.69	0.25	1.13	0.18	0.61	0.17
<b>Income<sup>e</sup></b>										
\$0-\$19,000	0.42	0.08***	0.52	0.11***	0.23	0.11*	0.57	0.12*	0.40	0.16*
\$20,000-\$34,000	0.59	0.11***	0.64	0.12*	0.59	0.27	0.48	0.12*	1.02	0.40
\$35,000-\$69,000	0.81	0.11	0.89	0.13	0.62	0.28	0.76	0.12	1.11	0.43
<b>Covariates</b>										
Female	0.36	0.05****	0.39	0.05****	0.21	0.10***	...	...	...	...
Age	0.97	0.00****	...	...	...	...	0.98	0.01****	0.97	0.01****
Stress	1.18	0.04****	1.19	0.04****	1.23	0.10****	1.10	0.04*	1.32	0.05****
Marital Status	1.16	0.08*	1.33	0.10****	0.58	0.16*	1.10	0.10	1.20	0.13
Nicotine Dependence	1.52	0.25*	1.53	0.26*	0.99	0.58	1.46	0.32	1.70	0.48

a=Referent group= Non-Hispanic White

b=Crude relationship of race and alcohol abuse across age groups and full sample, not adjusted for any covariates

c=Multivariable relationship of race and alcohol abuse, adjusted for religion, education, sex, stress, marital status, nicotine dependence

d= Referent group= Some college or higher

e= Referent group= \$70,000 plus

aOR=Adjusted odds ratio, Std Err=Linearized standard error

**TABLE A3. Cross-Tabulation Between DSM-IV Alcohol Abuse and Heavy Drinking**

<b>Heavy Drinking</b>	<b>DSM-IV Alcohol Abuse</b>	
	No	Yes
No	28, 964 (90.2)	726 (35.9)
Yes	2547 (9.8)	983 (64.1)

F (1, 65)=2582; p&lt;.0001

un-weighted sample and col %,



**TABLE A4a. Black-White Differences in The Effect of Religion and SES on DSM-IV Alcohol Abuse: A Test of Coefficients Approach**

	Non-Hispanic Black		Non-Hispanic White		Black-White difference <sup>e</sup>
	$\beta$	Std Err	$\beta$	Std Err	
<b>Religion</b>					
Currently attend services, yes <sup>a</sup>	-0.88	0.17****	-0.53	0.07****	F (1, 65)=3.0; p=.08
Service attendance <sup>b</sup>	-0.33	0.11***	-0.27	0.08***	F (1, 65)=0.2; p=.65
Social interaction <sup>b</sup>	-0.02	0.01	-0.003	0.00	F (1, 65)=1.4; p=.24
Spirituality <sup>b</sup>	-0.12	0.31	-0.41	0.10****	F (1, 65)=0.8; p=.38
<b>Religion interaction terms</b>					
Spirituality * service attendance <sup>c</sup>	-0.43	0.20*	-0.19	0.12	F (1, 65)=1.1; p=.29
Spirituality * social interaction <sup>d</sup>	-0.01	0.05	-0.041	0.01****	F (1, 65)=0.4; p=.52
<b>Socioeconomic Status</b>					
<b>Education<sup>a</sup></b>					
Completed high school	0.17	0.21	0.01	0.08	F (1, 65)=1.2; p=.27
Less than high school	-0.16	0.30**	-0.69	0.15****	F (1, 65)=0.5; p=.46
<b>Personal Income<sup>a</sup></b>					
\$35,000-\$69,999	-0.07	0.30	-0.06	0.10	F (1, 65)=2.50; p=.12
\$20,000-\$34,999	-0.36	0.31	-0.41	0.12***	F (1, 65)=0.0; p=.96
\$0-\$19,999	-1.03	0.32**	-0.73	0.11****	F (1, 65)=0.0; p=.86
					F (1, 65)=0.8; p=.36

ns= not significant, † p<.10, \* p<.05, \*\*p<.01, \*\*\*p<.001\*\*\*\*p<.0001. All statistical test conducted using survey commands in STATA 13

a= coefficients(aOR) from model 1 (table 8a and 8b)

b=coefficients(aOR) from model 5 (table 8a and 8b)

c, d=coefficients (aOR) from models 6 and 7, respectively (table 8a and 8b)

e=performed using SUEST and "test" command in STATA 13

f= modeled as a continuous variable

$\beta$  =Beta coefficient, Std Err=Linearized standard error

**TABLE A4b. Black-White Differences in the Effect of Religion and SES on DSM-IV Alcohol Abuse (among population 60 years of age and under): A test of coefficients approach**

	Non-Hispanic Black		Non-Hispanic White		Black-White difference <sup>e</sup>
	$\beta$	Std Err	$\beta$	Std Err	
<b>Religion</b>					
Currently attend services, yes <sup>a</sup>	-0.89	0.17****	-0.55	0.07****	F (1, 65)=3.1; p=.08
Service attendance <sup>b</sup>	-0.36	0.11***	-0.29	0.08***	F (1, 65)=0.2; p=.65
Social interaction <sup>b</sup>	-0.02	0.01	0.00	0.00	F (1, 65)=1.6; p=.21
Spirituality <sup>b</sup>	-0.08	0.32	-0.47	0.12****	F (1, 65)=1.3; p=.26
<b>Religion interaction terms</b>					
Spirituality * service attendance <sup>c</sup>	-0.44	0.21*	-0.19	0.13	F (1, 65)=1.0; p=.31
Spirituality * social interaction <sup>d</sup>	0.03	0.08	-0.05	0.01****	F (1, 65)=1.0; p=.31
<b>Socioeconomic Status</b>					
<b>Education<sup>a</sup></b>					
Completed high school	0.20	0.21	0.03	0.09	F (1, 65)=0.6; p=.45
Less than high school	-0.11	0.32	-0.67	0.15****	F (1, 65)=2.2; p=.14
<b>Personal Income<sup>a</sup></b>					
\$35,000-\$69,999	-0.94	0.33***	-0.07	0.11	F (1, 65)=0.0; p=.98
\$20,000-\$34,999	-0.32	0.34	-0.41	0.12****	F (1, 65)=0.0; p=.79
\$0-\$19,999	-0.08	0.32	-0.69	0.12****	F (1, 65)=0.5; p=.48

\*p<.05, \*\*p<.01, \*\*\*p<.001, \*\*\*\*p<.0001

a= coefficients(aOR) from model with currently attend religion + education + income + covariates (age, gender, stress, marital status, nicotine dependence)

b=coefficients(aOR) from model with service attendance + social interaction + spirituality + education + income + covariates (age, gender, stress, marital status, nicotine dependence)

c= coefficients (aOR) from model with service attendance + social interaction + spirituality + spirituality\*service attendance + education + income + covariates (age, gender, stress, marital status, nicotine dependence)

d=coefficients (aOR) from modes with service attendance + social interaction + spirituality + spirituality\*social interaction + education + income + covariates (age, gender, stress, marital status, nicotine dependence)

e=performed using SUEST and "test" command in STATA 13

$\beta$  =Beta coefficient, Std Err=Linearized standard error

**TABLE A5. Black-White Differences in the Effect of Religion and Socioeconomic Status on DSM-IV Alcohol Abuse: A Pooled Analyses With 3-way Interaction**

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7		Model 8	
	aOR	Std Err	aOR	Std Err	aOR	Std Err	aOR	Std Err	aOR	Std Err	aOR	Std Err	aOR	Std Err	aOR	Std Err
<b>Race/Ethnicity<sup>a</sup></b>																
Non-Hispanic Black	0.50	0.05 <sup>*</sup>	0.60	0.09 <sup>***</sup>	0.50	0.11 <sup>***</sup>	0.61	0.24	0.60	0.09 <sup>***</sup>	0.60	0.09 <sup>***</sup>	0.56	0.07 <sup>****</sup>	0.56	0.08 <sup>****</sup>
<b>Religion</b>																
Service attendance			0.76	0.05 <sup>***</sup>	0.76	0.06 <sup>***</sup>	0.76	0.05 <sup>****</sup>	0.77	0.06 <sup>***</sup>	0.92	0.06	0.70	0.05 <sup>****</sup>	0.81	0.08
Social interaction			1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.02	1.00	0.02	0.98	0.00 <sup>***</sup>	0.98	0.01
Spirituality			0.68	0.07 <sup>****</sup>	0.66	0.07 <sup>****</sup>	0.68	0.06 <sup>****</sup>	0.72	0.08 <sup>***</sup>	0.74	0.13	0.80	0.03 <sup>****</sup>	0.92	0.08
<b>Race by Religion Interaction<sup>b</sup></b>																
Black*service attendance					0.94	0.12										
Black*social interaction					0.98	0.01										
Black*spirituality					1.42	0.43										
<b>Socioeconomic Status</b>																
<b>Education<sup>c</sup></b>																
Less than high school			0.46	0.12 <sup>***</sup>	0.46	0.12 <sup>***</sup>	0.31	0.12 <sup>***</sup>	0.36	0.14 <sup>*</sup>	0.46	0.12 <sup>***</sup>	0.40	0.09 <sup>***</sup>	0.49	0.10 <sup>***</sup>
Completed high school			0.95	0.12	0.95	0.12	0.92	0.14	0.97	0.14	0.94	0.12	0.95	0.13	0.98	0.11
<b>Income<sup>d</sup></b>																
\$0-\$19,000			0.42	0.07 <sup>****</sup>	0.42	0.08 <sup>****</sup>	0.45	0.09 <sup>****</sup>	0.42	0.09 <sup>****</sup>	0.34	0.07 <sup>****</sup>	0.40	0.07 <sup>****</sup>	0.38	0.06 <sup>****</sup>
\$20,000-\$34,000			0.59	0.11 <sup>***</sup>	0.58	0.11 <sup>***</sup>	0.57	0.11 <sup>***</sup>	0.58	0.11 <sup>***</sup>	0.55	0.11 <sup>***</sup>	0.60	0.06 <sup>***</sup>	0.58	0.10 <sup>***</sup>
\$35,000-\$69,000			0.81	0.11	0.80	0.11	0.81	0.11	0.79	0.11	0.75	0.12	0.82	0.10	0.79	0.10
<b>Race by SES interaction<sup>e</sup></b>																
Black*less than high school							2.90	1.50 <sup>*</sup>								
Black* \$0-\$19,000							0.53	0.25								
<b>Religion by Education interaction<sup>f</sup></b>																
Service attendance * less than high school									0.90	0.13						
Social interaction* less than high school									0.94	0.03						
Spirituality* less than high school									0.81	0.45						

**Religion by Income interaction<sup>g</sup>**

Service attendance* \$0-\$19,000	0.62	0.11 <sup>†</sup>
Social interaction* \$0-\$19,000	1.00	0.01
Spirituality * \$0-\$19,000	0.74	0.20

**Race\* Religion by education interaction<sup>h</sup>**

Black*less than high school*service attendance	0.59	0.14 <sup>†</sup>
Black*less than high school*social interaction	0.88	0.07
Black*less than high school*spirituality	0.80	0.24

**Race\* Religion by income interaction<sup>i</sup>**

Black* \$0-\$19,000*service attendance	0.70	0.14
Black* \$0-\$19,000*social interaction	0.97	0.02
Black* \$0-\$19,000*spirituality	0.73	0.12

**Covariates**

Age	0.97	0.00 <sup>****</sup>	0.97	0.00 <sup>****</sup>	0.97	0.00 <sup>****</sup>	0.97	0.00 <sup>****</sup>	0.97	0.00 <sup>****</sup>	0.97	0.00 <sup>****</sup>	0.97	0.00 <sup>****</sup>	0.97	0.00 <sup>****</sup>
Female	0.30	0.02 <sup>****</sup>	0.36	0.04 <sup>****</sup>	0.36	0.04 <sup>****</sup>	0.36	0.02 <sup>****</sup>	0.37	0.04 <sup>****</sup>	0.37	0.04 <sup>****</sup>	0.35	0.01 <sup>****</sup>	0.36	0.03 <sup>****</sup>
Stress	1.15	0.02 <sup>****</sup>	1.17	0.04 <sup>****</sup>	1.17	0.04 <sup>****</sup>	1.18	0.03 <sup>****</sup>	1.18	0.04 <sup>****</sup>	1.17	0.04 <sup>****</sup>	1.18	0.02 <sup>****</sup>	1.18	0.03 <sup>****</sup>
Never married	1.15	0.05 <sup>***</sup>	1.16	0.08 <sup>*</sup>	1.16	0.08 <sup>*</sup>	1.16	0.08 <sup>*</sup>	1.16	0.08 <sup>*</sup>	1.16	0.08 <sup>*</sup>	1.18	0.06 <sup>*</sup>	1.18	0.07 <sup>*</sup>
Nicotine Dependence	1.51	0.13 <sup>****</sup>	1.52	0.25 <sup>*</sup>	1.52	0.25 <sup>*</sup>	1.51	0.25 <sup>*</sup>	1.52	0.25 <sup>*</sup>	1.49	0.25 <sup>*</sup>	1.59	0.18 <sup>***</sup>	1.57	0.22 <sup>****</sup>

Goodness of fit	F(9, 57)=14.3; p<.0001	F(9, 57)=1201.9; p<.0001	F(9, 57)=1056.1; p<.0001	F(9, 57)=8.8; p<.0001	F(9, 57)=921; p<.0001
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ns= not significant, † p<.10, \* p<.05, \*\*p<.01, \*\*\*p<.001, \*\*\*\*p<.0001. All statistical test conducted using survey commands in STATA 13, aOR=Adjusted odds ratio, Std Err=Linearized standard error  
a=Referent group= Non-Hispanic White

b=Referent group= Whites with mean religion values

c= Referent group= Some college or higher

d= Referent group= \$70,000 plus

e=Whites with some college or higher and for income, Whites with \$70,000 plus

f= Some college or higher with mean religion values

g= \$70,000 or more with mean religion values

h= Whites with some college or higher with mean religion values

i= Whites with \$70,000 plus income with mean religion values

**TABLE A6a. Bivariate Association: Religion and Socioeconomic Status, Non-Hispanic Black**

	Service attendance					Social Interaction	Spirituality			
	Once a year	A few times a year	one to three times a month	once a week	twice a week or more		not at all important	not very important	somewhat important	very important
<b>Education</b>	<b>n(col %)</b>					<b>m(sd)</b>	<b>n(col %)</b>			
Less than high school	22 (25.3)	132 (20.4)	249 (16.4)	255 (16.2)	209 (14.6)	6.9 (14.4)	11 (13.4)	21 (15.4)	174 (16.1)	1047 (18.0)
Complete high school	12 (27.3)	199 (34.1)	385 (29.6)	429 (28.0)	357 (28.5)	7.3 (13.9)	22 (25.4)	35 (34.0)	326 (31.8)	1587 (29.6)
Some college or higher	16 (37.4)	259 (45.5)	664 (54.0)	823 (55.9)	686 (56.9)	7.8 (14.1)	44 (61.1)	67 (50.6)	531 (52.0)	2699 (52.3)
p-val	F(7, 361)=3.0; p<.05)					F (2, 52)=2.8; p=.07	F (4, 266)=0.6, p=.65			
<b>Income</b>	26 (44.5)	304 (50.5)	620 (46.7)	737 (47.7)	606 (45.6)	7.3 (14.0)	41 (49.3)	52 (44.5)	480 (47.7)	2656 (47.8)
\$20,000-\$34,999	13 (27.7)	126 (22.1)	323 (25.0)	362 (24.9)	244 (30.0)	7.6 (13.6)	9 (15.9)	34 (27.3)	260 (23.7)	1334 (26.5)
\$35,000-\$69,999	08 (24.3)	137 (23.6)	283 (22.3)	336 (23.1)	249 (20.0)	7.5 (14.6)	14 (14.9)	25 (21.0)	241 (24.0)	1124 (21.4)
\$70,000 and greater	03 (3.5)	23 (4.8)	72 (5.9)	63 (4.2)	53 (4.2)	9.1 (15.7)	13 (20.0)	12 (07.2)	50 (04.5)	219 (04.2)
	F (10, 535)=1.4, p=.13					F (2, 52)=.05; p=.95	F (7, 417)=3.3, p<.01			

All statistical test conducted using survey commands in STATA 13  
n, mean, and sd are based on un-weighted sample, and % is based on survey weighted analyses  
a= reverse ordered/coded categories to match direction of the variable "frequency of religious service attendance" variable.

**TABLE A6b. Bivariate Association: Religion and Socioeconomic Status, Non-Hispanic White**

	Service attendance					Social Interaction	Spirituality			
	Once a year	A few times a year	one to three times a month	once a week	twice a week or more		not at all important	not very important	somewhat important	very important
<b>Education</b>	<b>n(col %)</b>					<b>m(sd)</b>	<b>n(col %)</b>			
Less than high school	15 (19.8)	127 (09.0)	176 (6.4)	406 (8.7)	163 (8.8)	7.4 (14.2)	92 (8.1)	160 (08.2)	579 (08.9)	1217 (11.2)
Complete high school	14 (21.4)	333 (24.6)	566 (22.4)	1233 (27.6)	497 (29.1)	7.5 (13.1)	249 (22.9)	479 (26.2)	1805 (28.5)	3017 (28.8)
Some college or higher	43 (58.8)	889 (66.4)	1805 (71.2)	2769 (63.6)	1050 (62.0)	8.4 (15.3)	814 (68.9)	1296 (65.6)	531 (52.0)	6369 (60.9)
p-val	F (7, 490)=6.9; p<.001					F (2, 64)=4.1; p<.05	F (6, 368)=8.1; p<.001			
<b>Income</b>							384			
\$0-\$19,999	36 (52.7)	484 (35.1)	896 (35.2)	1883 (41.2)	801 (45.8)	7.9 (13.9)	(34.9)	560 (29.9)	2240 (35.0)	4791 (44.3)
\$20,000-\$34,999	15 (24.0)	284 (20.2)	564 (21.6)	931 (21.0)	358 (20.9)	8.3 (15.7)	253 (21.9)	479 (24.8)	1507 (23.2)	2318 (21.7)
\$35,000-\$69,999	14 (14.3)	353 (26.2)	706 (28.0)	706 (28.0)	407 (24.3)	7.8 (14.5)	307 (25.9)	599 (29.6)	1783 (28.2)	2509 (24.0)
\$70, 000 and greater	7 (8.9)	228 (18.6)	381 (15.3)	381 (15.2)	144 (08.9)	8.5 (16.1)	211 (17.3)	297 (15.7)	849 (13.6)	985 (09.9)
	F (10, 708)=7.7; p<.0001					F (2,64)=0.6; p=0.56	F (8, 542)=23.9;p<.0001			

All statistical test conducted using survey commands in STATA 13

n, mean and sd are based on un-weighted sample, and col % is based on survey weighted analyses

a= reverse ordered/coded categories to match direction of the variable "frequency of religious service attendance" variable.

TABLE A6a. Continued, Non-Hispanic Black

Education	m(sd)	m(sd)
	<b>Service attendance (continuous)</b>	<b>Spirituality (continuous)</b>
Less than high school	3.6 (1.1)	3.8 (0.5)
Complete high school	3.7 (1.0)	3.8 (0.5)
Some college or higher	3.8 (0.9)	3.8 (0.9)
p-val	F (2, 52)=7.9; p<.01	F (2, 60)=1.7; p=0.19
<b>Income</b>		
\$0-\$19,999	3.7 (1.0)	3.8 (0.5)
\$20,000-\$34,999	3.8 (1.0)	3.8 (0.5)
\$35,000-\$69,999	3.7 (1.0)	3.8 (0.5)
\$70, 000 and greater	3.6 (1.0)	3.6 (0.8)
p-val	F (2, 52)=4.1; p<.05	F (2, 60)=0.84; p=.43

TABLE A6b. Continued, Non-Hispanic White

Education	m(sd)	m(sd)
	<b>Service attendance (continuous)</b>	<b>Spirituality (continuous)</b>
Less than high school	3.6 (1.0)	3.4 (0.8)
Complete high school	3.7 (1.1)	3.4 (0.8)
Some college or higher	3.6 (0.1)	3.3 (0.9)
p-val	F (2, 64)=10.2; p<.001	F (2, 64)=14.5; p<.001
<b>Income</b>		
\$0-\$19,999	3.7 (0.9)	3.4 (0.8)
\$20,000-\$34,999	3.6 (0.9)	3.3 (0.9)
\$35,000-\$69,999	3.6 (0.9)	3.2 (0.9)
\$70, 000 and greater	3.4 (0.9)	3.1 (0.9)
p-val	F (2, 64)=7.4; p<.01	F (2, 64)=55; p<.0001

**TABLE A7a. Logistic Regression Results: Interaction Between Religion and Education Predicting DSM-IV Alcohol Abuse**

Interaction between religion variables and education	Non-Hispanic Black						Non-Hispanic White					
	Model 1		Model 2		Model 3		Model 1		Model 2		Model 3	
	aOR	Std Err	aOR	Std Err	aOR	Std Err	aOR	Std Err	aOR	Std Err	aOR	Std Err
Service attendance * some college or higher (ref)	1.00						1					
Service attendance * completed high school	1.24	0.28					0.87	0.12				
Service attendance * less than high school	0.04	0.18					0.86	0.12				
	F(2, 52)=1.49; p=0.23						F(2, 65)=.80; p=.45					
social interaction* some college or higher (ref)			1						1			
social interaction * completed high school			1.00	0.03					1.01	0.01		
social interaction * less than high school			0.75	0.16					0.95	0.02*		
			F (2, 52)=.94; p=0.40				F (2, 65)=3.0; p=0.56					
Spirituality * some college or higher (ref)					1						1	
Spirituality * completed high school					1.44	0.37					0.90	0.08
Spirituality * less than high school					1.05	0.37					0.71	0.10*
					F (2, 61)=1.0; p=0.37						F(2, 65)=2.9; p=.06	

ns= not significant, † p<.10, \* p<.05, \*\*p<.01, \*\*\*p<.001 . All statistical test conducted using survey commands in STATA 13

Model 1 = service attendance \* education; Model 2 = social interaction \* education; Model 3 = spirituality \* education

aOR= Adjusted odds ratio; Std Err=Linearized standard error

All models adjust for age, gender, stress, marital status and nicotine dependence. When education is interacting with religion, income is the covariate and vice versa

All religion variables are entered continuous and centered at their mean



**TABLE A7b. Logistic Regression for Interaction between Religion and Income Predicting DSM-IV Alcohol Abuse**

Interaction between religion variables and income	Non-Hispanic Black						Non-Hispanic White							
	Model 4		Model 5		Model 6		Model 4		Model 5		Model 6			
	aOR	Std Err	aOR	Std Err	aOR	Std Err	aOR	Std Err	aOR	Std Err	aOR	Std Err		
Service attendance * \$70, 000 (ref)	1						1							
Service attendance * \$35,000-\$69,999	1.85	0.80					0.57	1.77						
Service attendance * \$20,000-\$34,999	1.44	0.64					0.98	0.18						
Service attendance * \$0-\$19,999	1.09	0.52					0.62	0.10**						
	F(3, 52)=1.97; p=0.13						F (3,65)=3.3; p=.02							
social interaction * \$70, 000(ref)			1						1					
social interaction * \$35,000-\$69,999			1.05	0.07					1.00	0.01				
social interaction * \$20,000-\$34,999			1.04	0.07					1.00	0.01				
social interaction * \$0-\$19,999			1.00	0.07					0.98	0.02				
			F (3, 52)=.54; p=0.66						F (3, 65)=.49; p=0.69					
Spirituality * \$70, 000 (ref)					1						1			
Spirituality * \$35,000-\$69,999					0.50	0.17					0.80	0.08*		
Spirituality * \$20,000-\$34,999					1.09	0.41					0.84	0.10		
Spirituality * \$0-\$19,999					0.79	0.27					0.79	0.08*		
			F (3, 61)=2.5; p=0.07						F (3,65)=1.9; p=0.14					

ns= not significant, † p<.10, \* p<.05, \*\*p<.01, \*\*\*p<.001 . All statistical test conducted using survey commands in STATA 13

Model 1 = service attendance \* education; Model 2 = social interaction \* education; Model 3 = spirituality \* education

aOR= Adjusted odds ratio; Std Err=Linearized standard error

All models adjust for age, gender, stress, marital status and nicotine dependence. When education is interacting with religion, income is the covariate and vice versa

All religion variables are entered continuous and centered at their mean

**TABLE A8a.Black-White Differences in Adjusted Marginal Predicted Probabilities of DSM-IV Alcohol Abuse, by Religion and Education**

	Non-Hispanic Black				Non-Hispanic White				Black-White difference <sup>e</sup>
	n	margin	Std Err	p-val	n	margin	Std Err	p-val	
<b>Religion &amp; Education</b>									
<b>Service attendance</b>									
High Education, Low Service Attendance	16	0.05	0.02	0.01	43	0.06	0.01	0.01	X2 (1)=0.16, p=.69
Low Education, Low Service Attendance	22	0.03	0.02	0.05	15	0.02	0.01	0.01	X2 (1)=0.42, p=.51
High Education, High Service Attendance	686	0.01	0.00	0.00	1050	0.02	0.00	0.00	X2 (1)=2.82, p=.09
Low Education, High Service Attendance	209	0.00	0.00	0.02	163	0.01	0.00	0.00	X2 (1)=5.26, p=.02
<b>Social interaction<sup>a</sup></b>									
High Education, Low Social interaction	1816	0.02	0.00	0.00	4696	0.04	0.01	0.00	X2 (1)=7.47, p=.00
Low Education, Low Social interaction	699	0.01	0.00	0.00	667	0.01	0.00	0.00	X2 (1)=0.01, p=.92
High Education, High Social interaction	151	0.01	0.01	0.26	488	0.02	0.00	0.00	X2 (1)=2.09, p=.15
Low Education, High Social interaction	52	0.00	0.00	0.76	64	0.00	0.00	0.12	X2 (1)=2.40, p=.12
<b>Spirituality</b>									
High Education, Low Spirituality	44	0.11	0.04	0.00	814	0.07	0.01	0.00	X2 (1)=1.04, p=.31
Low Education, Low Spirituality	11	0.05	0.04	0.17	92	0.05	0.01	0.00	X2 (1)=0.00, p=.96
High Education, High Spirituality	2699	0.03	0.00	0.00	6369	0.04	0.00	0.00	X2 (1)=10.52, p=.00
Low Education, High Spirituality	1047	0.01	0.00	0.00	1217	0.01	0.00	0.00	X2 (1)=1.09, p=.29

All models adjust for at mean age, stress, female sex, married and being nicotine dependent

High Education= Some college or more; Low Education= Less than high school diploma

Low service attendance=attend religious services once a year; High service attendance=attend religious services twice a week or more

a= coded into a categorical variable; Low social interaction=interact with 8 or less number of members on a social basis; High social interaction=interact with 25 or more number of members on a social basis

Low spirituality=spiritual or religious beliefs not at all important; High spirituality=spiritual or religious beliefs very important

Std Err=Linearized standard error

**TABLE A8b. Black-White Differences in Adjusted Marginal Predicted Probabilities of DSM-IV Alcohol Abuse, by Religion and Income**

	Non-Hispanic Black				Non-Hispanic White				Black-White difference <sup>e</sup>
	n	margin	Std Err	p-val	n	margin	Std Err	p-val	
<b>Religion &amp; Education</b>									
<b>Service attendance</b>									
High Income, Low Service Attendance	3	0.11	0.09	0.23	7	0.05	0.02	0.00	X2 (1)=0.45, p=.50
Low Income, Low Service Attendance	26	0.03	0.02	0.03	36	0.08	0.02	0.00	X2 (1)=3.56, p=.05
High Income, High Service Attendance	53	0.01	0.01	0.07	144	0.04	0.01	0.00	X2 (1)=5.43, p=.02
Low Income, High Service Attendance	606	0.00	0.00	0.00	801	0.01	0.00	0.00	X2 (1)=0.40, p=.52
<b>Social interaction<sup>a</sup></b>									
High Income, Low Social interaction	151	0.04	0.01	0.00	833	0.05	0.01	0.00	X2 (1)=0.95, p=.33
Low Income, Low Social interaction	1775	0.01	0.00	0.00	2949	0.02	0.00	0.00	X2 (1)=4.90, p=.03
High Income, High Social interaction	21	0.00	0.01	0.66	96	0.03	0.01	0.01	X2 (1)=4.56, p=.03
Low Income, High Social interaction	133	0.00	0.00	0.28	298	0.00	0.00	0.14	X2 (1)=0.73, p=.39
<b>Spirituality</b>									
High Income, Low Spirituality	13	0.07	0.04	0.10	211	0.06	0.01	0.00	X2 (1)=0.00, p=.97
Low Income, Low Spirituality	41	0.06	0.02	0.01	384	0.06	0.01	0.00	X2 (1)=0.02, p=.89
High Income, High Spirituality	219	0.04	0.01	0.00	985	0.06	0.01	0.00	X2 (1)=5.59, p=.02
Low Income, High Spirituality	2656	0.01	0.00	0.00	4791	0.02	0.00	0.00	X2 (1)=3.02, p=.08

All models adjust for at mean age, stress, female sex, married and being nicotine dependent

High Education= Some college or more; Low Education= Less than high school diploma

Low service attendance=attend religious services once a year; High service attendance=attend religious services twice a week or more

a= coded into a categorical variable; Low social interaction=interact with 8 or less number of members on a social basis; High social interaction=interact with 25 or more number of members on a social basis

Low spirituality=spiritual or religious beliefs not at all important; High spirituality=spiritual or religious beliefs very important

Std Err=Linearized standard error

**TABLE A9. Sensitivity of Religion and Socioeconomic Status on DSM-IV Alcohol Abuse Compared to Heavy Drinking, by Race/Ethnicity**

	Non-Hispanic Black				Non-Hispanic White			
	DSM-IV Alcohol Abuse		Heavy Drinking		DSM-IV Alcohol Abuse		Heavy Drinking	
	aOR	StdErr	aOR	StdErr	aOR	StdErr	aOR	StdErr
<b>Religion</b>								
Currently attend religious service (yes)	0.42	0.00***	0.48	0.00***	0.58	0.04***	0.51	0.02***
Service attendance <sup>a</sup>	0.85	0.11	0.95	0.09	0.79	0.06**	0.72	0.04***
Social interaction <sup>a</sup>	0.98	0.02	0.94	0.03	1.01	0.00*	1.00	0.01
Spirituality <sup>a</sup>	0.60	0.21	0.89	0.28	0.51	0.06***	0.51	0.05***
Interaction between spirituality and attendance <sup>a,b</sup>	0.99	0.04	1.08	0.06	0.87	0.11	0.74	0.06***
Interaction between spirituality and religious group interaction <sup>a,b</sup>	0.65	0.13**	0.57	0.09**	0.96	0.00***	0.98	0.01
<b>Socioeconomic status<sup>a</sup></b>								
Education	0.95	0.16	0.88	0.10	1.28	0.14*	1.04	0.08
Income	1.64	0.19	1.14	0.10	1.30	0.08***	1.26	0.05***
<b>Interaction between religion and socioeconomic status<sup>a,b,c</sup></b>								
Service attendance * education	0.96	0.12	0.83	0.07*	1.04	0.44	0.88	0.06
Social interaction * education	1.02	0.02	1.03	0.01*	0.99	0.00	1.01	0.16
Spirituality * education	1.10	0.52	0.51	0.17*	1.44	0.24*	1.22	0.16
Service attendance * income	1.10	0.12	0.88	0.06	1.14	0.08*	1.00	0.04
Social interaction * income	1.00	0.01	1.00	0.00	1.00	0.00	1.00	0.00
Spirituality * income	1.00	0.24	0.69	0.11*	1.08	0.09	1.14	0.07*
<b>Socio-demographic control variables<sup>d</sup></b>								
Age	0.98	0.01	0.97	0.00	0.97	0.00***	0.95	0.00***
Female	0.48	0.12***	0.31	0.05***	0.35	0.05***	0.28	0.02***
Stress	1.27	0.06***	1.17	0.05***	1.16	0.04***	1.09	0.03***
Never married	1.05	0.15	0.98	0.15	1.17	0.09*	1.26	0.07***
DSM-IV Nicotine abuse	1.90	0.61*	3.50	0.62***	1.5	0.28*	3.15	0.36***

ns= not significant, ‡ p<.10, \* p<.05, \*\*p<.01, \*\*\*p<.001, \*\*\*\*p<.0001. All statistical test conducted using survey commands in STATA 13

All models adjust for age, sex, stress, marital status and nicotine dependence

a=continuous specification, b=centered on the mean, c=estimated separately from main effects analyses, which does not include the interaction of religion variables

d=odds ratios are based on the analyses that include main effects for religion and their interaction components, while adjusting for socioeconomic status and income

aOR= Adjusted odds ratio; Std Err=Linearized standard error

**Table A10. Summary of Results for Focal Variables Predicting DSM-IV Alcohol Abuse**

	<b>Non-Hispanic Black</b>	<b>Non-Hispanic White</b>	<b>Black-White Difference<sup>a</sup></b>
<b>Religion</b>			
Service attendance	negative, sig	negative, sig	Black, lower; not sig
Social interaction	null, not sig	null, not sig	Black, lower; not sig
Spirituality	negative, sig	negative, not sig	Black, lower; not sig
<b>Socioeconomic Status</b>			
Education (low)	positive, not sig	negative, sig	White, lower; not sig
Personal Income (low)	negative, sig	negative, sig	Black, lower; not sig
<b>Religion by SES interaction<sup>b</sup></b>			
<i>Service attendance by education</i>	negative, not sig	negative, not sig	Black, lower; sig
<i>Social interaction by education</i>	negative, not sig	negative, not sig	Black, lower; not sig
<i>Spirituality by education</i>	null, not sig	negative, sig	Black, lower; not sig
<i>Service attendance by income</i>	null, not sig	negative, sig	Black, lower; not sig
<i>Social interaction by income</i>	null, not sig	null, not sig	Black, lower; not sig
<i>Spirituality by income</i>	negative, not sig	negative, sig	Black, lower; not sig

a=indicates which racial group had lower mean scores, and whether the difference was statistically significant

b= mean levels of the religion, low levels of the SES variable compared to high levels of the SES variable

Notes: negative= protective against alcohol abuse; null= no relationship; sig=statistically significant

**Table A11. Bivariate Correlations Among: Religion, SES, Perceived Stress, DSM-IV Alcohol Abuse and Selected Covariates, Non-Hispanic Black**

	A	B	C	D	E	F	G	H	I	J
<b>A</b> Service attendance	1									
<b>B</b> Social Interaction	0.2600*	1								
<b>C</b> Spirituality	0.2082*	0.0909*	1							
<b>D</b> Education	0.0781*	0.0240	-0.0252*	1						
<b>E</b> Income	-0.0067	0.0209	-0.0422*	0.3972*	1					
<b>F</b> Perceived stress	-0.0582	-0.0593*	-0.0324*	-0.1065*	-0.2035*	1				
<b>G</b> Stressful life events	-0.0430*	-0.0010	0.0123	0.0626*	-0.0850*	0.2317*	1			
<b>H</b> Social support	0.0663*	0.1041*	0.0841*	0.1704*	0.1852*	-0.3398*	-0.0554*	1		
<b>I</b> Marital status	-0.1162*	-0.0650*	-0.0830*	-0.0269*	-0.1356*	0.1135*	0.1250*	-0.0907*	1	
<b>J</b> DSM-IV nicotine dependence	-0.1383*	-0.0673*	-0.0297*	-0.0986*	-0.0948*	0.1149*	0.1377*	-0.0739*	0.0411*	1
<b>K</b> DSM-IV alcohol abuse	-0.0831*	-0.0326*	-0.0871*	0.0360*	0.0626*	0.0162	0.1222*	0.0079	0.0299*	0.0801*

Note. Perceived stress is based on the Perceived Stress Scale-4 (PSS4) conceptualized as an assessment cognitively mediated emotional responses to objectively stressful life events (Cohen and Williamson 1988); the Stressful life events measures objective stress and perceived stress from 14 stressful life events. \*p<.05 or better. Social support measures respondents' perceptions of the currently availability to them of potential social resources, from the 12-item Interpersonal Support Evaluation List (ISEL 12).

**Table A12. Bivariate Correlations Among: Religion, SES, Perceived Stress, DSM-IV Alcohol Abuse and Selected Covariates, Non-Hispanic White**

	A	B	C	D	E	F	G	H	I	J
<b>A</b> Service attendance	1									
<b>B</b> Social Interaction	0.2832*	1								
<b>C</b> Spirituality	0.3872*	0.1607*	1							
<b>D</b> Education	-0.0393*	0.0251*	-0.0622*	1						
<b>E</b> Income	-0.0924*	0.0062	-0.1217*	0.3228*	1					
<b>F</b> Perceived stress	-0.0310*	-0.0732*	-0.0036	-0.0804*	-0.1767*	1				
<b>G</b> Stressful life events	-0.0529*	-0.0138	-0.0392*	0.0218*	-0.0816*	0.2714*	1			
<b>H</b> Social support	0.0472*	0.1104*	0.0844*	0.1081*	0.1372*	-0.3528*	-0.0573*	1		
<b>I</b> Marital status	-0.0654*	-0.0530*	-0.1185*	-0.0146*	-0.0864*	0.0864*	0.1336*	-0.1325*	1	
<b>J</b> DSM-IV nicotine dependence	-0.1049*	-0.0390*	-0.0634*	-0.0971*	-0.0748*	0.1469*	0.2173*	-0.0557*	0.0708*	1
<b>K</b> DSM-IV alcohol abuse	-0.0945*	-0.0198	-0.1098*	0.0473*	0.0929*	-0.0087*	0.1072*	0.0174*	0.0759*	0.0764*

Note. Perceived stress is based on the Perceived Stress Scale-4 (PSS4) conceptualized as an assessment cognitively mediated emotional responses to objectively stressful life events (Cohen and Williamson 1988); the Stressful life events measures objective stress and perceived stress from 14 stressful life events. \*p<.05 or better. Social support measures respondents' perceptions of the currently availability to them of potential social resources, from the 12-item Interpersonal Support Evaluation List (ISEL 12).

**TABLE A13. Black-White Differences in Adjusted Marginal Predicted Probabilities of DSM-IV Alcohol Abuse, by Religion Variables and Perceived Stress**

	Non-Hispanic Black				Non-Hispanic White				Black-White difference <sup>e</sup>
	n	margin	Std Err	p-val	n	margin	Std Err	p-val	
<b>Religion &amp; Perceived Stress</b>									
<b>Service attendance</b>									
High Perceived Stress, Low Service Attendance	17	0.03	0.02	0.13	19	0.03	0.01	0.02	X2 (1)=0.01, p=.90
Low Perceived Stress, Low Service Attendance	16	0.03	0.01	0.03	30	0.05	0.01	0.00	X2 (1)=1.29, p=.26
High Perceived Stress, High Service Attendance	287	0.01	0.00	0.02	267	0.01	0.00	0.00	X2 (1)=2.53, p=.11
Low Perceived Stress, High Service Attendance	469	0.01	0.00	0.00	728	0.01	0.00	0.00	X2 (1)=0.76, p=.38
<b>Social interaction<sup>a</sup></b>									
High Perceived Stress, Low Social interaction	933	0.02	0.00	0.00	1271	0.02	0.00	0.00	X2 (1)=0.66, p=.42
Low Perceived Stress, Low Social interaction	1232	0.02	0.00	0.00	2976	0.03	0.00	0.00	X2 (1)=11.2, p=.00
High Perceived Stress, High Social interaction	58	0.00	0.01	0.68	82	0.01	0.00	0.30	X2 (1)=1.07, p=.30
Low Perceived Stress, High Social interaction	115	0.01	0.01	0.18	362	0.01	0.00	0.01	X2 (1)=0.90, p=.34
<b>Spirituality</b>									
High Perceived Stress, Low Spirituality	18	0.05	0.03	0.06	224	0.05	0.01	0.00	X2 (1)=1.24, p=.26
Low Perceived Stress, Low Spirituality	30	0.08	0.03	0.01	470	0.10	0.01	0.00	X2 (1)=0.16, p=.69
High Perceived Stress, High Spirituality	1399	0.02	0.00	0.00	2029	0.03	0.00	0.00	X2 (1)=6.06, p=.01
Low Perceived Stress, High Spirituality	1834	0.02	0.00	0.00	4323	0.03	0.00	0.00	X2 (1)=2.29, p=.13

All models adjust for at mean age, female sex, education, income, married and being nicotine dependent

High Perceived Stress= range (2.6 to 5) on 5-point scale; Low Stress= range (1 - 1.5) on 5-point scale

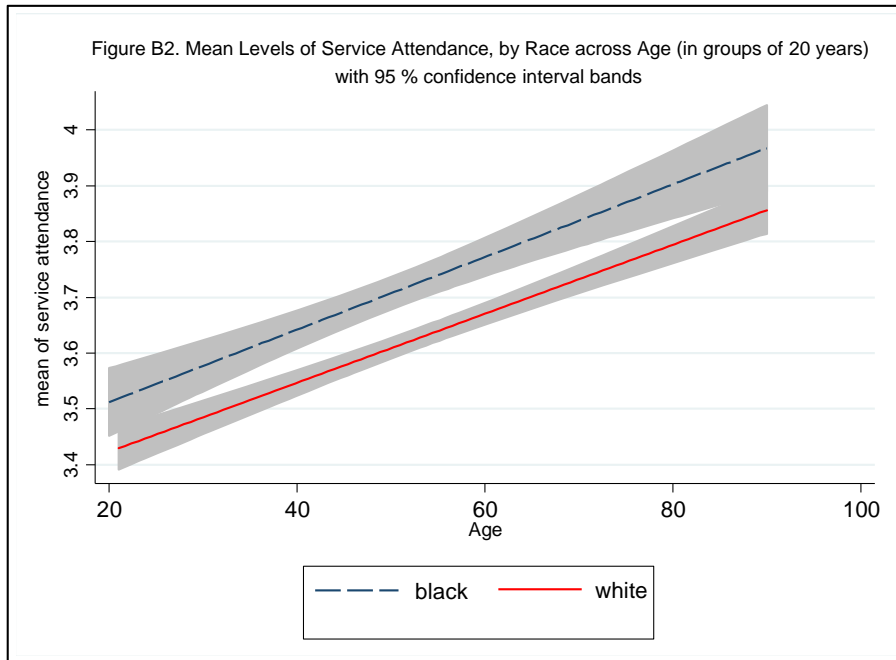
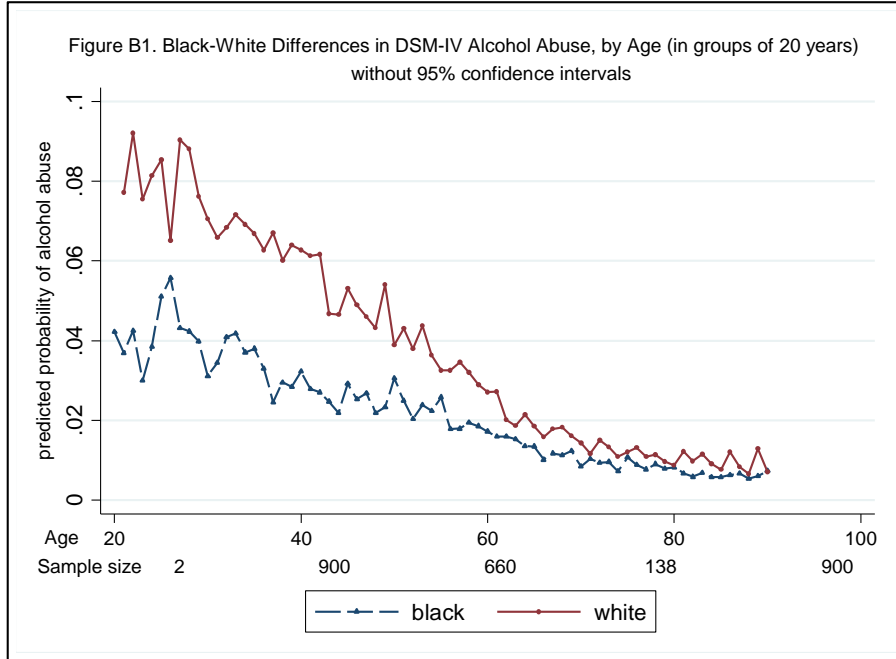
Low service attendance=attend religious services once a year; High service attendance=attend religious services twice a week or more

a= coded into a categorical variable; Low social interaction=interact with 8 or less number of members on a social basis; High social interaction=interact with 25 or more number of members on a social basis

Low spirituality=spiritual or religious beliefs not at all important; High spirituality=spiritual or religious beliefs very important

Std Err= Linearized standard error

APPENDIX B. List of Appendix Figures





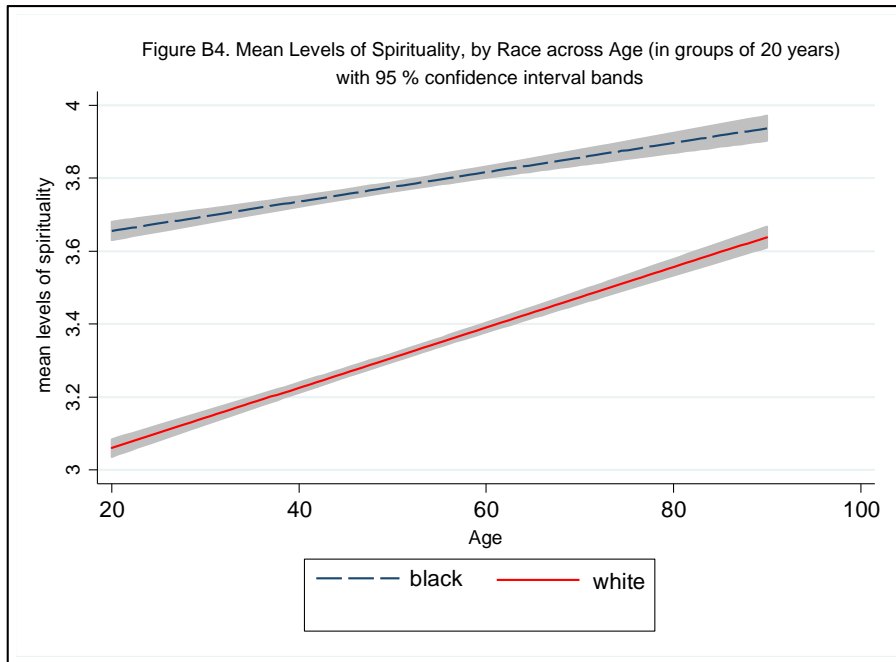
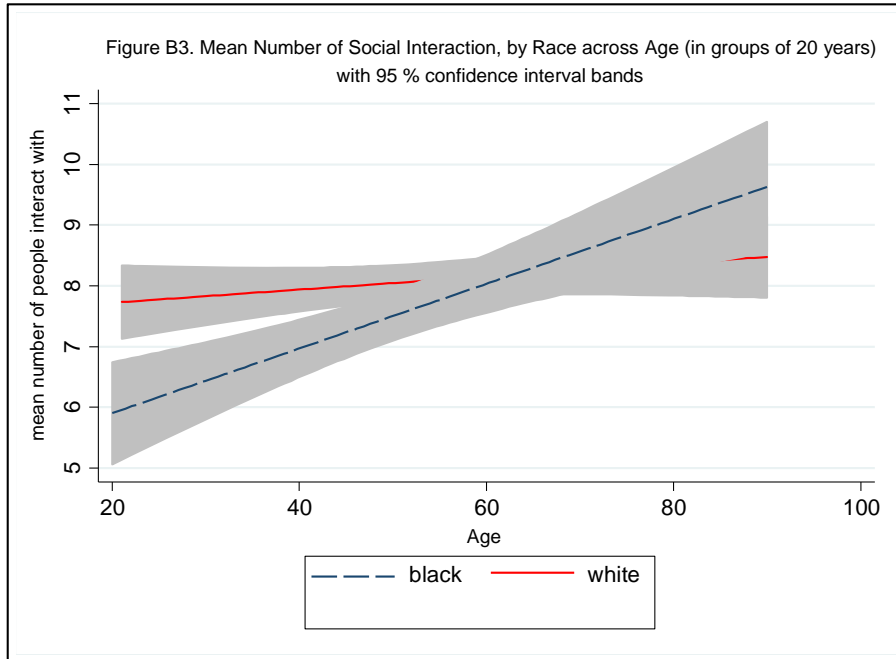


Figure B5. Adjusted Predicted Probability of DSM-IV Alcohol Abuse: Service Attendance and Education, by Race/Ethnicity

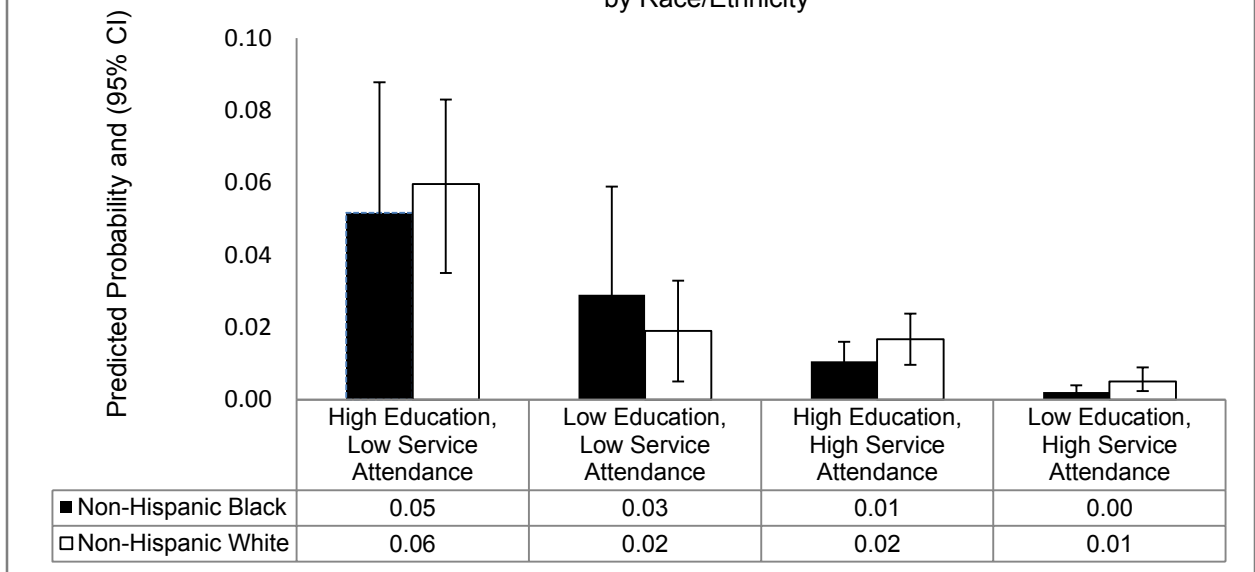


Figure B6. Adjusted Predicted Probability of DSM-IV Alcohol Abuse: Social Interaction and Education, by Race/Ethnicity

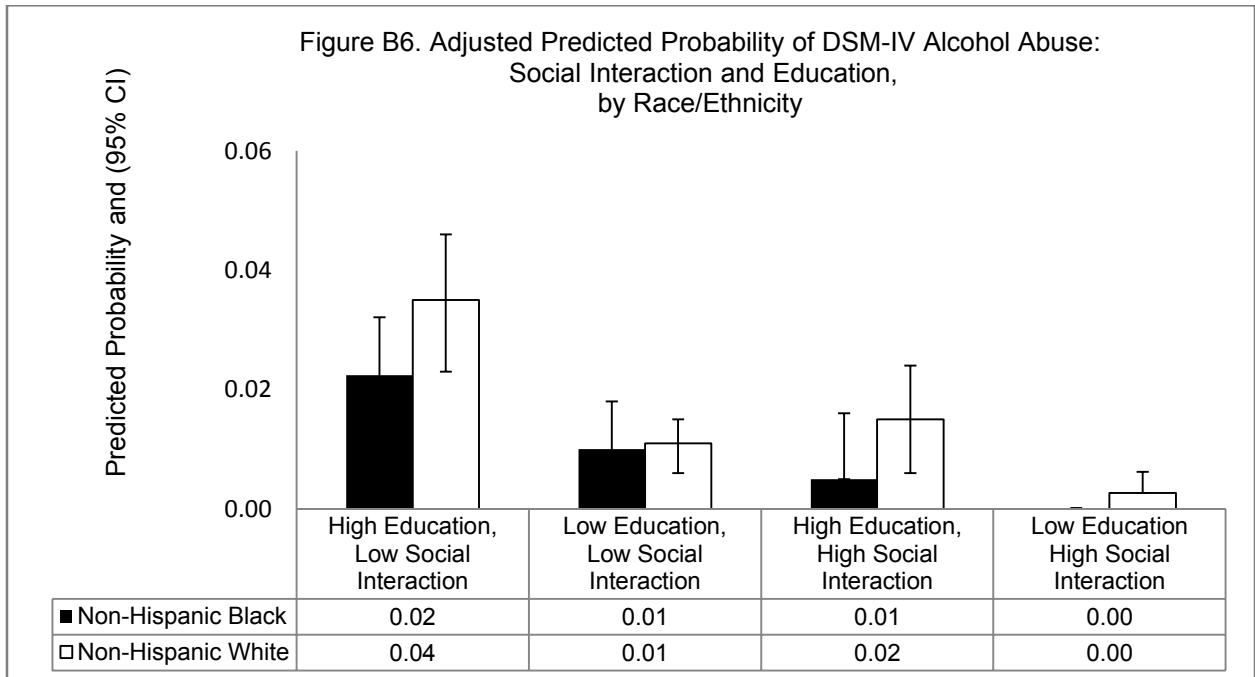


Figure B7. Adjusted Predicted Probability of DSM-IV Alcohol Abuse:  
Social Interaction and Income,  
by Race/Ethnicity

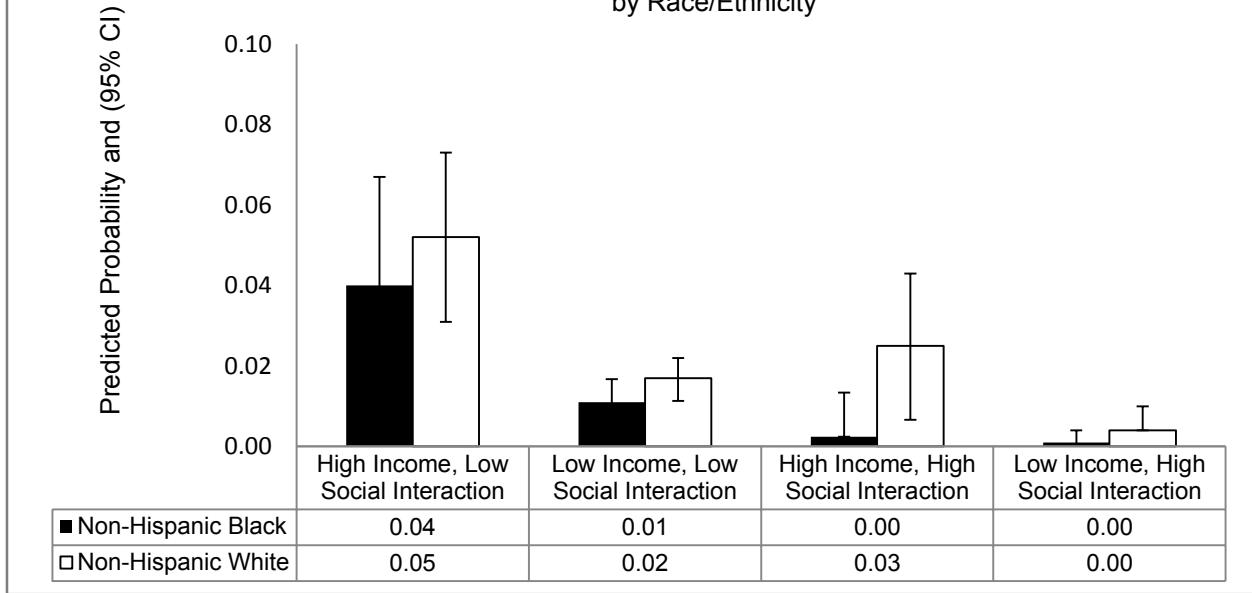


Figure B8a. Adjusted Predicted Probability of DSM-IV Alcohol Abuse:  
Spirituality and Income,  
by Race/Ethnicity

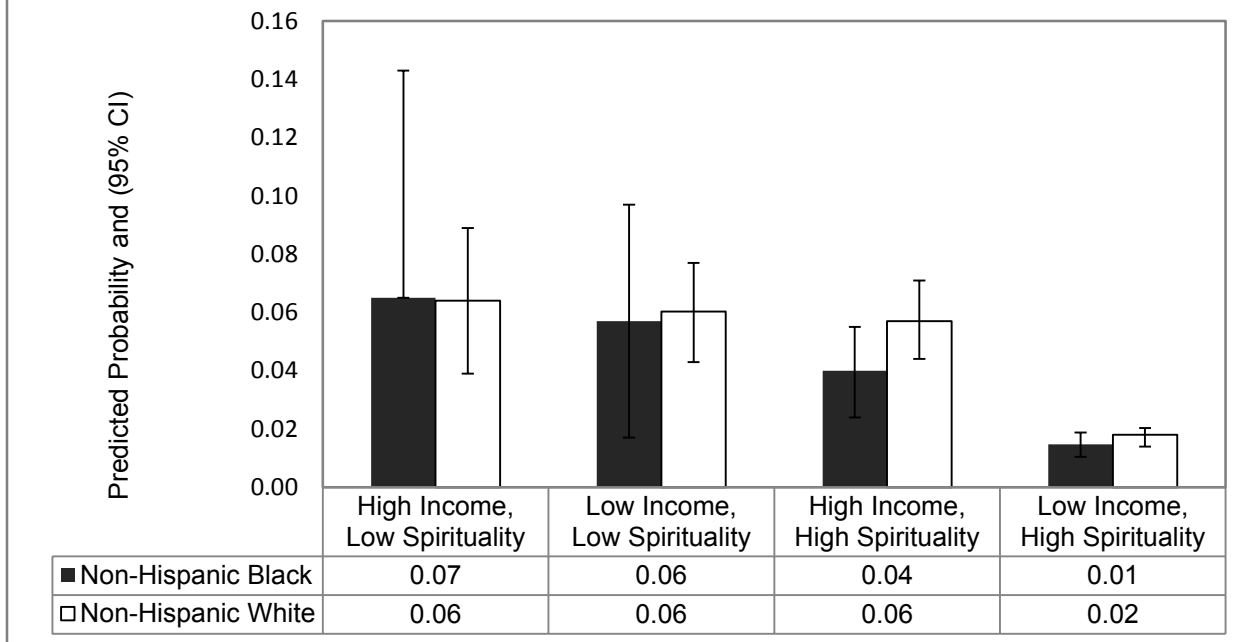


Figure B8b. Adjusted Predicted Probability of Heavy Drinking: Spirituality and Income, by Race/Ethnicity

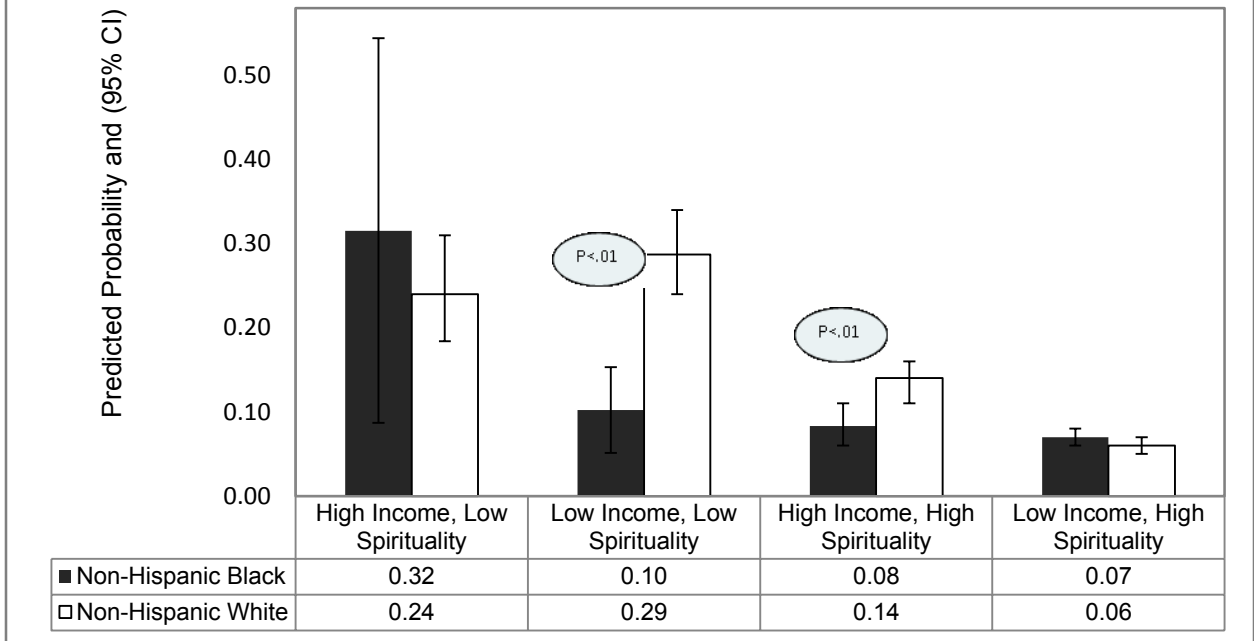
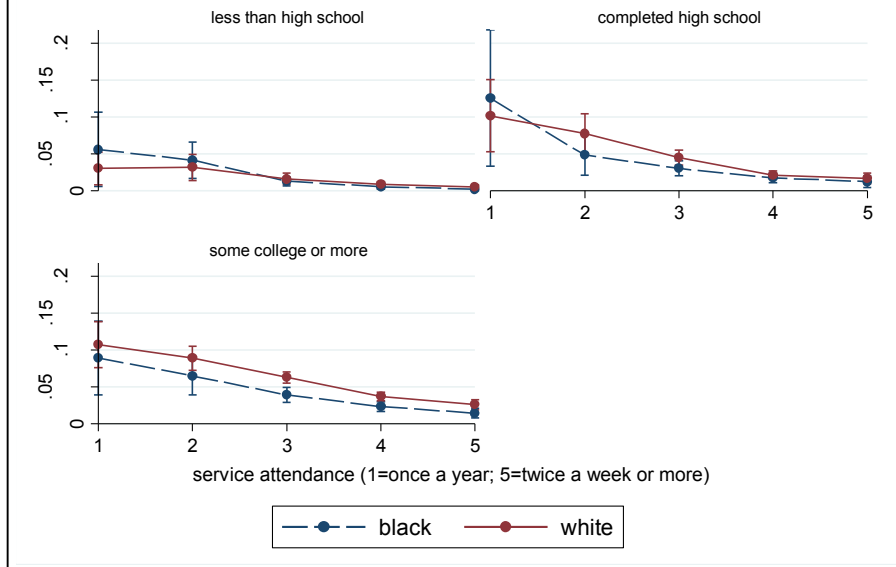


Figure B9. Black-White Differences on DSM-IV Alcohol Abuse, by Education and Service Attendance with 95% confidence intervals



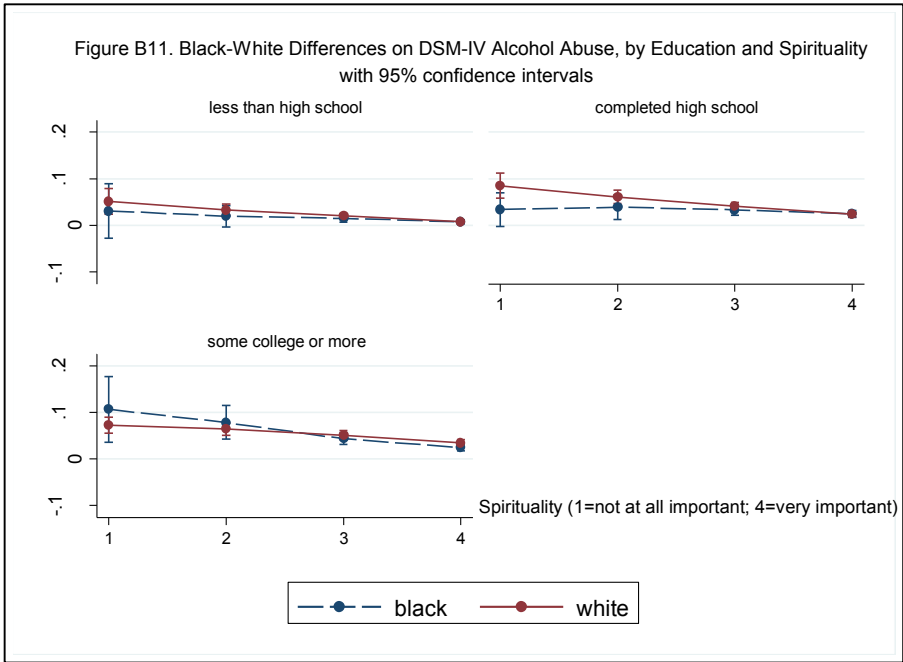
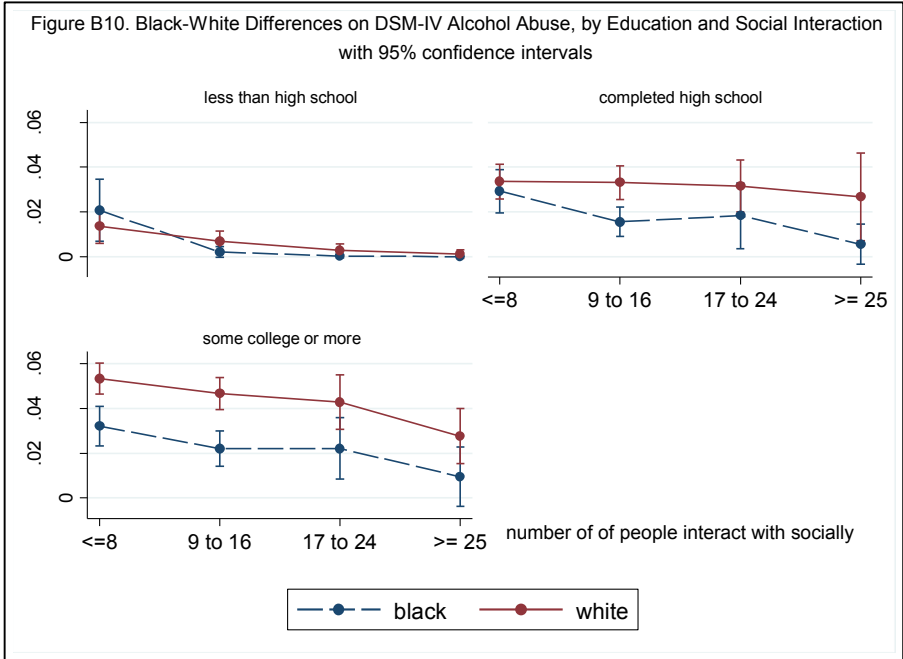


Figure B12. Black-White Differences on DSM-IV Alcohol Abuse, by Income and Service Attendance with 95% confidence intervals

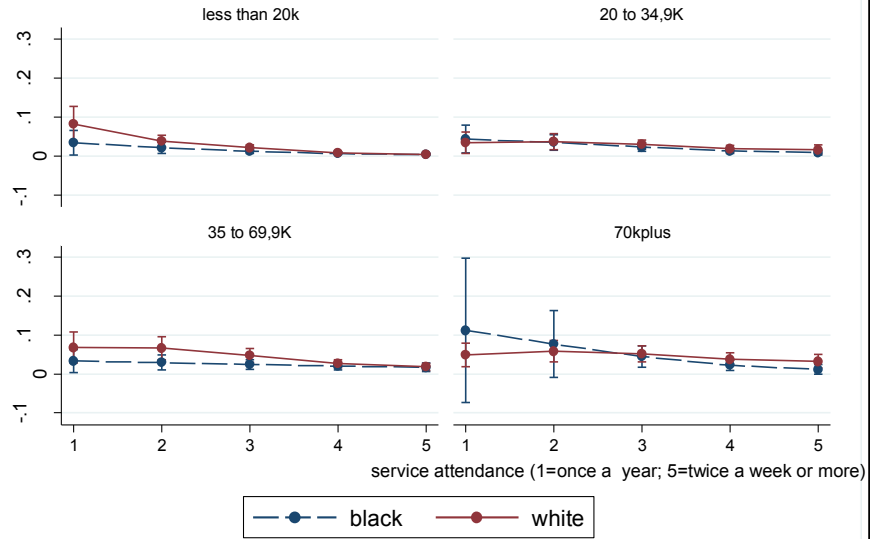


Figure B13. Black-White Differences on DSM-IV Alcohol Abuse, by Income and Social Interaction with 95% confidence intervals

