

1-1-2014

Religiosity-Spirituality And Risky Drinking Over The Transition To College: A Multi-Wave Longitudinal Study

Brian J. Klassen
Wayne State University,

Follow this and additional works at: http://digitalcommons.wayne.edu/oa_dissertations

Recommended Citation

Klassen, Brian J., "Religiosity-Spirituality And Risky Drinking Over The Transition To College: A Multi-Wave Longitudinal Study" (2014). *Wayne State University Dissertations*. Paper 966.

This Open Access Dissertation is brought to you for free and open access by DigitalCommons@WayneState. It has been accepted for inclusion in Wayne State University Dissertations by an authorized administrator of DigitalCommons@WayneState.

**RELIGIOSITY-SPIRITUALITY AND RISKY DRINKING OVER THE TRANSITION
TO COLLEGE: A MULTI-WAVE, LONGITUNDIAL STUDY**

by

BRIAN JEFFERY KLASSEN

DISSERTATION

Submitted to the Graduate School

of Wayne State University,

Detroit, Michigan

in partial fulfillment of the requirements

for the degree

DOCTOR OF PHILOSOPHY

2014

MAJOR: PSYCHOLOGY (Clinical)

Approved by:

Advisor

Date

© COPYRIGHT BY

BRIAN JEFFERY KLASSEN

2014

ALL RIGHTS RESERVED

DEDICATION

To Hendrik Larkins Jacoby-Klassen

ACKNOWLEDGEMENTS

Projects like this, spanning multiple years and many hours, are almost always the work of a group, even though my name is on the final product. First, my gratitude to Emily Grekin, PhD, my advisor for the past seven years, whose time, attention, support, and guidance has not only benefited me, but plenty of other students. Thanks also to the funders of this dissertation, Alcoholic Beverage Medical Research Foundation, for the initial grant to Dr. Grekin and to the American Psychological Association, for allowing me to extend the follow-up period, making this dissertation possible. I also want to acknowledge members Dr. Grekin's lab, for collecting data and being a good audience for my ideas: Dinah Anya, Amy Graham, Erica Hohentanner, Ben Laliberte, Amy Loree, and Kathryn Smith. My thanks to Emily Jacoby: I could not have asked for a more supportive partner to get me through the past few years (although I still have my suspicions that I ended up with a far better person than I deserve). Finally, my appreciation to Hendrik, who both spared a lot of time with his "papa" so I could work, and always seemed ready to offer a silly distraction when I needed it.

TABLE OF CONTENTS

Dedication	ii
Acknowledgements	iii
List of Tables	vi
List of Figures	vii
Chapter 1 Introduction	1
<i>Religiosity-Spirituality and Alcohol Use in Emerging Adulthood</i>	3
<i>Theoretical Models of Religiosity-Spirituality and Alcohol Use</i>	6
<i>Measuring Religiosity-Spirituality</i>	8
<i>Remaining Questions</i>	10
<i>Question 1: Are Religiosity-Spirituality and Risky Drinking Stable Across Time?</i>	11
<i>Question 2: To What Extent Do Third Variables Account For The Relationship Between Religiosity-Spirituality and Risky Drinking?</i>	13
<i>Question 3: What Is The Direction Of The Relationship Between Religiosity- Spirituality and Risky Drinking?</i>	17
<i>Question 4: Do Relationships Between Religiosity-Spirituality and Risky Drinking Extend To Alternative Measures of The Constructs?</i>	18
<i>Current Study: Aims and Hypothesis</i>	19
Chapter 2 Method	21
<i>Participants</i>	21
<i>Measures</i>	22
<i>Procedure</i>	25
Chapter 3 Results	27

<i>Attrition</i>	27
<i>Missing Data</i>	28
<i>Data Cleaning</i>	29
<i>Descriptives</i>	30
<i>Correlations</i>	30
<i>Stability</i>	31
<i>Third Variable Influence</i>	33
<i>Directional Relationships</i>	34
<i>Alternative Measures of Religiosity-Spirituality and Alcohol Use</i>	35
Chapter 4 Conclusions	37
<i>Stability of Religiosity-Spirituality and Binge Drinking</i>	37
<i>Third Variable Influence</i>	38
<i>Directionality</i>	39
<i>Alternative Measures of Religiosity-Spirituality and Alcohol Use</i>	40
<i>Implications</i>	42
<i>Limitations</i>	43
Appendix A: Tables	45
Appendix B: Figures	61
Appendix C: Conduct Disorder Questions	90
Appendix D: Duke Religion Index	91
Appendix E: Daily Spiritual Experiences	92
Appendix F: Positive Religious Coping	93
Appendix G: Negative Religious Coping	94

References	95
Abstract	114
Autobiographical Statement	117

LIST OF TABLES

Table 1: Mean level differences in religiosity-spirituality by ethnicity.....	45
Table 2: Mean level differences in frequency of binge drinking by ethnicity.....	46
Table 3: Mean level differences in quantity-frequency of alcohol consumption by ethnicity.....	47
Table 4: Cronbach’s alpha for religiosity-spirituality scales.....	48
Table 5: Attrition analyses with categorical variables.....	49
Table 6: Attrition analyses with continuous variables.....	50
Table 7: Percentage of missing data by time.....	51
Table 8: Comparison of factor loadings and model fit between the full model and the list-wise deletion model.....	53
Table 9: Comparison of factor loadings between the full model and the list-wise deletion path analysis.....	54
Table 10: Baseline responses to the Duke Religion Index.....	55
Table 11: Frequency of binge drinking at baseline.....	56
Table 12: Descriptives of study variables.....	57
Table 13: Correlations between religiosity-spirituality, covariates and alcohol use variables.....	58
Table 14: Correlations between religious-spiritual behavior, salience, covariates and alcohol use variables.....	59
Table 15: Correlations between Fetzer scales and alcohol use outcomes.....	60

LIST OF FIGURES

Figure 1: A structural equation model demonstrating the stability of generalized religiosity-spirituality and risky drinking over three time points.....	61
Figure 2: Path analysis between general religiosity-spirituality and risky drinking.....	62
Figure 3: A structural equation model demonstrating the stability of religious-spiritual behaviors and risky drinking over three time points.....	63
Figure 4: Path analysis between religious-spiritual behaviors and risky drinking.....	64
Figure 5: A structural equation model demonstrating the stability of religious-spiritual salience and risky drinking over three time points.....	65
Figure 6: Path analysis between religious-spiritual salience and risky drinking.....	66
Figure 7: A structural equation model demonstrating the stability of generalized religiosity-spirituality and risky drinking with race and conduct disorder symptoms as covariates.....	67
Figure 8: A structural equation model demonstrating the stability of religious-spiritual behaviors and risky drinking with race and conduct disorder symptoms covariates.....	68
Figure 9: A structural equation model demonstrating the stability of religious-spiritual salience and risky drinking with race and conduct disorder symptoms as covariates..	70
Figure 10: A structural equation model demonstrating the stability of generalized religiosity-spirituality and alcohol consumption over three time points.....	72
Figure 11: A structural equation model demonstrating the stability of generalized religiosity-spirituality and alcohol consumption with race and conduct disorder symptoms as covariates.....	73
Figure 12: A structural equation model demonstrating the stability of religious-spiritual behaviors and alcohol consumption over three time points.....	75
Figure 13: A structural equation model demonstrating the stability of religious-spiritual salience and alcohol consumption over three time points.....	76
Figure 14: A structural equation model demonstrating the stability of religious-spiritual behaviors and alcohol consumption over three time points with race and conduct disorder symptoms as covariates.....	77

Figure 15: A structural equation model demonstrating the stability of religious-spiritual salience and alcohol consumption over three time points with race and conduct disorder symptoms as covariates.....	79
Figure 16: Path analysis between generalized religiosity-spirituality and quantity-frequency of alcohol consumption.....	81
Figure 17: Path analysis between religious-spiritual behaviors and quantity-frequency of alcohol consumption.....	82
Figure 18: Path analysis between religious-spiritual salience and quantity-frequency of alcohol consumption.....	83
Figure 19: Path analysis between Daily Spiritual Experiences and binge drinking.....	84
Figure 20: Path analysis between Daily Spiritual Experiences and quantity-frequency of alcohol consumption.....	85
Figure 21: Path analysis between Positive Religious Coping and frequency of binge drinking.....	86
Figure 22: Path analysis between Positive Religious Coping and quantity-frequency of alcohol consumption.....	87
Figure 23: Path analysis between Negative Religious Coping and frequency of binge drinking.....	88
Figure 24: Path analysis between Negative Religious Coping and quantity-frequency of alcohol consumption.....	89

CHAPTER 1: INTRODUCTION

Gorsuch (1995), in the first comprehensive review of the relevant literature, described the relationship between being religious and not abusing substances as “clear and consistent” (p. 69). Miller (2002) and others (Humphreys & Gifford, 2006) echoed this conclusion when they described the negative relationship between religiosity-spirituality and risky drinking as one of the most well replicated empirical findings in alcohol research.

Since these review statements, numerous studies have shown strong, negative relationships between religiosity-spirituality and risky alcohol use. A population-based study of nearly 37,000 Canadian adults found that those who regularly attended worship services and who reported that spirituality was important to them were at significantly decreased risk for alcohol and drug use disorders (Baetz, Bowen, Jones, & Koru-Sengul, 2006). In an interview study of nearly 2,000 women, Kendler, Gardner, and Prescott (1997) found that the extent to which religion is important to a person and the extent to which an individual’s religious group adheres to traditional values were negatively related to alcohol dependence. In a follow-up study with a larger, more diverse sample, and more comprehensive measurement of religious and spiritual constructs, Kendler and others (2003) found that several empirically derived facets of religiosity-spirituality were associated with reduced risk for alcohol use disorders. These general findings have been replicated among nationally-representative samples of adolescents (Dew et al., 2008; Miller, Davies, & Greenwald, 2000; Rew & Wong, 2006; Vaugh, deDios, Steinfeldt, & Kratz, 2011) and among samples of treatment-seeking, alcohol dependent individuals. For example, retrospective studies of Alcoholics Anonymous (AA) members have shown that spirituality is positively correlated with a number of desirable clinical outcomes, such as general well-being and length of sobriety (Poage, Ketzenberger, & Olson, 2004; Sandoz, 1999).

Recently, researchers have shown interest in evaluating change in risky alcohol use and religiosity-spirituality through naturalistic, longitudinal studies, especially among clinical populations (Connors, Walitzer, & Tonigan, 2008). To date, six such studies have addressed these issues, and have found that significant increases in religiosity and spirituality coincide with progress in treatment (Krentzman, Cranford, & Robinson, 2013; Piderman, Schneekloth, Pankrantz, Maloney, & Altchuler, 2007; Piderman, Schneekloth, Pankrantz, Stevens, & Altchuler, 2008; Robinson, Cranford, Webb, & Brower, 2007; Robinson, Krentzman, Webb, & Brower 2011; Sterling et al., 2007). For example, Sterling and others (2007) completed a retrospective study in which they divided a sample of seventy-two alcohol dependent individuals who had received treatment into two groups: those who had maintained at least one month of sobriety after treatment and those who had not. Although each group's spirituality increased after concluding treatment, lower post-treatment spirituality was associated with failure to maintain sobriety. Likewise, Robinson and colleagues (2011) found that increases in a number of religiosity-spirituality constructs (private spiritual practices, Daily Spiritual Experiences, forgiveness, Negative Religious Coping, and purpose in life) predicted significantly decreased number of heavy drinking days as well as average number of drinks per day in a sample of treatment-seeking alcohol dependent men. Together, these studies suggest that religiosity-spirituality plays an important –though not necessarily causal– role in recovery from alcohol use problems.

Spurred by the studies described above, clinicians have shown considerable enthusiasm for integrating religious and spiritual concepts into treatment for excessive drinking. Although some empirical data suggest that spiritually-oriented interventions can improve general psychological and spiritual outcomes, such as an increased willingness to forgive others and a

greater reported closeness with God (Richards & Worthington, 2010; Worthington, Hook, Davis, & McDaniel, 2011), there are few studies that specifically examine the ability of spiritually-oriented interventions to reduce risky alcohol use specifically. Those that do report mixed results. For example, the spiritually-focused 12-step facilitation therapy arm of Project MATCH yielded higher abstinence rates among its members than did the Cognitive-Behavioral or Motivational Enhancement arms (Project MATCH research group, 1997). In contrast, Miller, Forcehimes, O’Leary, and LaNoue (2008) conducted two small, randomized clinical trials of a 12-session spiritually-based intervention that failed to increase spirituality or decrease substance use. These mixed results have lead some researchers to question whether adding religiosity-spirituality components to existing substance use treatments is beneficial (Richards & Worthington, 2010). Additionally, some researchers have suggested that low religiosity-spirituality may be an outcome, rather than a predictor of heavy drinking, (Baumeister, 1991; Johnson, Sheets, & Kristeller, 2008; Lambert, Fincham, Marks, & Stillman, 2010; W. Miller, 2002). More specifically, long-term heavy drinking (or failure to maintain sobriety) may alter an individual’s religiosity or worldview, leading to a complex, bi-directional relationship between the two variables. Few studies have directly tested this theory, however.

Religiosity-Spirituality and Problematic Alcohol Use in Emerging Adulthood

Religiosity-spirituality tends to be fairly stable across the lifespan. Children typically adopt the spiritual and religious practices of their parents (Button, Stallings, Rhee, Corely, & Hewitt, 2011; Koenig, McGue, & Iacono, 2008) and these beliefs often persist into adolescence and adulthood (Boomsma, deGues, vanBaal, & Koopmans, 1999; Button, Stallings, Rhee, Corlet, & Hewitt, 2011; Lefkowitz, 2005). For example, Powers and McKinney (2013) found that parental religiosity was strongly related to self-reported religiosity among a group of college

students. Similarly, Koenig and Vaillant (2009), in a lifespan study of nearly 500 men, reported that the frequency of church attendance at age 14 and age 47 were moderately correlated.

Although religiosity-spirituality tends to be stable across the lifespan, there do appear to be certain ‘developmental windows’ during which religiosity-spirituality declines (Barry, Nelson, Davarya, & Urry, 2010). One such developmental window is emerging adulthood. Emerging adulthood refers to a time of developmental transition between adolescence and adulthood, typically between the ages of 18 and 25. The concept of emerging adulthood was created in response to a number of social trends that involved young people delaying traditional rites of passage into adulthood, such as marriage, children, full-time employment, and home ownership (Arnett, 2000; 2005; 2007). Emerging adulthood has been described as a time of “feeling in-between” (Arnett 2005, p. 245) –that is, an emerging adult is someone who is no longer an adolescent, but has not assumed the full roles and identity of adulthood.

Several theoretical frameworks have attempted to explain the process of declining religiosity-spirituality that often occurs during emerging adulthood. For example, social control theory (Smith, 2003) posits that children’s religious-spiritual beliefs and behaviors are largely a function of caregivers, social groups, and institutions that enforce certain community norms. However, during emerging adulthood, these influences begin to wane, presumably because of the increasing autonomy and independence achieved by young adults during this period (Arnett & Jensen, 2002). As a result, emerging adulthood represents a period of decreased social control and resulting change in a number of identity constructs, including religiosity-spirituality. (Button et al., 2011; Ueker, Regnerus, & Valler, 2007; Vaugh, deDios, Steinfeldt, & Kratz, 2011). Similarly, Worthington (1989) noted that childhood and adolescent religiosity could be described adequately by stage-theories (i.e. a modified Piagetian approach), but that once an individual

reached adulthood, their religiosity-spirituality might best be described through a life-event perspective, with the stability of religiosity waxing and waning with significant life events (e.g. graduating college, marriage, children, loss, aging, etc.). In other words, religious-spiritual development tends to happen in a stable, predictable way in children, but the combination of decreased influence of caregivers and culture and increased influence of life-events makes religious-spiritual development harder to predict in adults. Because emerging adulthood is a period that often involves rapidly changing social contexts, important life-events, and evolving identity, some researchers have argued that it is an ideal period for capturing change in religiosity and spirituality, and for examining whether this change plays a causal and/or correlational role in other aspects of development (Dehaan, Yonker, & Affholter 2011; Yonker, Schnabelrauch, & DeHaan, 2012).

Emerging adulthood is also a period that involves changes in alcohol use. Data from nationally representative studies (Chan, Neighbors, Gilson, Larimer, & Marlatt, 2007; Karlamangla, Zhou, Reuben, Greendale, & Moore, 2006) indicate that alcohol use tends to increase rapidly during late adolescence/early adulthood and then steadily decline during the third decade of life, remaining at lowered levels throughout middle and late adulthood. Several factors have been cited to explain the increased levels of alcohol use during emerging adulthood (Arnett, 2005; Brown et al., 2008). First, emerging adulthood is a time of identity exploration, and transition, (e.g., leaving home for the first time, forming new social and romantic relationships, making career choices, etc.). The pressure to develop a stable, authentic sense of self during this time may create anxiety that can be relieved through alcohol use, as suggested by negative affect regulation models of substance use (Ohannessian & Hesselbrock, 2008; Sher & Gotham, 1999). Second, there is evidence that alcohol use at this stage of life may actually serve

positive functions, such as increasing one's social network through attending parties (Buettner & Debies-Carl, 2012; Kuntsche, Knibbe, Gmel, & Engles, 2005; Schulenberg & Mags, 2002). Finally, emerging adults (particularly college students) are often free from traditional 'adult' responsibilities, such as marriage, children and economic independence. At the same time, they are often living independently, and experiencing a great deal of personal freedom. Together, these factors allow for a lifestyle that involves risky alcohol use, with relatively few negative consequences (e.g. they don't need to worry about caring for family, paying bills, arriving at work on time, etc.).

In sum, emerging adulthood represents a unique window of time, characterized by changes in constructs that are fairly stable across the lifespan, such as religiosity-spirituality and risky alcohol use. As such, emerging adulthood presents an ideal opportunity to capture short-term, dynamic relationships between these variables.

Theoretical Models of Religiosity-Spirituality and Alcohol Use

Two broad, theoretical models may help to explain relationships between religiosity-spirituality and risky alcohol use: problem behavior/deviance proneness theory and escaping the self theory.

Jessor and Jessor's (1977) problem behavior theory states that both risky alcohol use and religiosity-spirituality reflect broad, latent tendencies towards either deviant, antisocial behavior (i.e. risky alcohol use, illicit drug use, unsafe sexual behaviors, risk-taking) or pro-social behavior (i.e. involvement with religion, good behavior in school, high academic achievement, etc.). Each latent tendency is stable across time and is negatively related to the other (Donovan & Jessor, 1985). Sher's (1991; Sher & Slutske, 2003) deviance proneness model is quite similar in that it suggests that early pathological involvement in substance use –as well as other

externalizing behaviors— is heavily influenced by stable, genetically-mediated pre-disposing factors, such as impulsivity, disinhibition and boredom susceptibility. A large number of studies have provided support for these theories and have shown that genetically influenced temperament dimensions predict a broad range of both highly correlated problem and prosocial behaviors (Ohannessian & Hesselbrock, 2008; Hittner & Swickert, 2006; Sher & Trull, 1994).

Notably, while problem behavior (Jessor & Jessor, 1977) and deviance proneness theories (Sher, 1991) describe stable tendencies toward either problem or prosocial behavior across the lifespan, they are unable to predict short term, dynamic changes in these constructs (Arnett, 2005; Arnett & Jensen, 2002; Uecker et al., 2007; Worthington, 1989). An alternative theory, which better explains the dynamic relationship between religiosity and risky alcohol use, is Baumeister's (1991) escaping the self theory, which argues that both risky alcohol use and religiosity-spirituality compete with each other to serve a similar need—specifically, to relieve the tension associated with achieving a stable sense of self in a complex world. As many theorists have noted, identity development is a challenging process that is likely to produce anxiety, especially in situations where one becomes self-aware or self-conscious, and this seems to be especially pertinent for young adults (Arnett, 2005).

There are several mechanisms through which risky alcohol use and religiosity-spirituality might decrease the anxiety associated with self-awareness and identity development. For example, Hull's (1987) self-awareness theory posits that alcohol pharmacologically disrupts the psychological processes needed for self-awareness (i.e., the ability to attend to self-relevant environmental cues and engage in self-evaluation). Self-awareness theory has received some empirical support in laboratory studies (Carey, 1995; Chassin, Mann, & Sher, 1988). For example, Hull, Young, and Jouriles (1986) reported that failures (e.g., negative evaluations at

work, disagreement with a spouse, legal trouble, poor academic performance, etc.) tend to elicit more drinking in highly self-conscious individuals, as opposed to individuals who are less self-conscious. Furthermore, alcohol intoxication has been found to decrease both negative affectivity and sensitivity to mistakes in a laboratory task, both of which are central elements in self-awareness theory (Bartholow, Henry, Lust, Sauls, & Wood, 2012). Baumeister argues that religiosity-spirituality also serves to regulate the anxiety produced by self-awareness, in that most world religions and more recent spiritual traditions encourage self-transcendence, self-forgetfulness, and connection with meaning systems that are larger than the individual (Emmons, 2005; Emmons & Paloutzain, 2003; Park, 2013; Baumeister, 1991). Thus, according to Baumeister's theory, religiosity-spirituality and risky alcohol use are two alternative approaches to relieving the anxiety of selfhood.

Measuring Religiosity and Spirituality

Numerous authors have attempted to define and distinguish between religiosity and spirituality, constructs often described as broad and "fuzzy," (Zinnbauer et al, 1997). Though researchers have struggled with how best to define these variables conceptually, there seems to be a growing consensus that religiosity and spirituality are multidimensional, latent constructs – that is, they elude complete measurement through single items or scales and there always remains a substantial, unobserved facet (Miller & Thorsen, 2003). Currently, there exist multiple measures of religiosity-spirituality that tap into diverse and often unrelated components of the construct. (Emmons & Paloutzian, 2003; Gorsuch, 1984; Hill & Pargament, 2003; Johnson & Robinson, 2008). For example, Hill and Hood (1999) catalogued more than 100 separate self-report measures of various aspects of religiosity and spirituality that spanned seventeen major conceptual dimensions.

Researchers have taken various approaches to delineating the components of religiosity-spirituality. Some researchers have taken a conceptual approach, developing measures of religiosity-spirituality that are theoretically related to outcomes. For example, The Fetzer Institute commissioned a panel of experts on the interface between religiosity, spirituality, and health to devise the Brief Multidimensional Measure of Religiousness/Spirituality (BMMRS) along theoretical lines (Fetzer Institute & National Institute on Aging Working Group, 1999). The BMMRS contains 12 separate scales that measure various aspects of religiosity and spirituality, and it is widely used in health outcomes research (Johnson & Robinson, 2008; Johnstone, Yoon, Franklin, Schopp, & Hinkebein, 2009).

Gorsuch (1984) and others (Tsang & McCullough, 2003) have suggested that religiosity-spirituality is hierarchically comprised of a general trait-like disposition that persists over time (i.e. Generalized Religiosity-Spirituality or General Religiosity) as well as a number of more specific behaviors (i.e. prayer, attendance of religious services, the sense of a close relationship with God, etc.) that are influenced by the environment and that wax and wane with time. Other researchers have used factor analytic methods to examine how religiosity-spirituality scales 'hang together' to form latent constructs. Although the results of factor analytic studies depend heavily on the measures included and the population examined; they are, nonetheless, an important first step in determining the basic structure of religiosity and spirituality. Notably, there has been support from a recent community study (Schettino, 2012) as well as a study of Iranian, mostly Muslim, undergraduates (Joshanloo, 2012), for a two-factor solution comprised of (1) religious behaviors and (2) religious salience.

Other studies, however, report more complex findings. For example, in an extension of his 1997 study, which derived two factors (personal devotion and institutional conservatism)

from 10 items, Kendler and colleagues factor analyzed the responses to 78 items measuring religious and spiritual constructs made by nearly 3,000 men and women from a larger twin study. Seven factors emerged: (1) general religiosity, (2) social religiosity, (3) forgiveness, (4) involved God, (5) God as judge, (6) unvengefulness, and (7) thankfulness. Johnson and others (2008) factor analyzed the survey responses of 515 undergraduates and found that a five factor solution including: (1) religious/spiritual involvement, (2) search for meaning, (3) religious struggle, (4) quest, and (5) spiritual well-being accounted for most of the variance. A factor analysis of the 12 scales of the BMMRS with a sample of 150 medical patients reported a six factor solution: (1) positive spiritual experience, (2) negative spiritual experience, (3) forgiveness, (4) religious practices, (5) positive congregational support, and (6) negative congregational support (Johnstone et al., 2009).

Not all studies report finding distinct factors, however. Klassen, Smith and Grekin (2013), using three separate scales from the BMMRS (Daily Spiritual Experiences, Positive Religious Coping and values) and a measure of religious behaviors and salience with over 600 undergraduates, found that the scales correlated too highly with each other to be considered independent measurements of separate constructs, so a latent “General Religiosity-Spirituality” variable was created that accounted for a majority of the variance in each scale. In sum, repeated efforts to gain clarity into the components the comprise religiosity-spirituality have yielded mixed results and it is clear that measurement issues represent a substantial challenge for the field (Gorsuch, 1984; Hill & Pargament, 2003; Johnson & Robinson, 2008).

Remaining Questions

Although the literature reviewed above demonstrates a robust, negative relationship between religiosity-spirituality and risky alcohol use, there remain several gaps. For example,

the relationship between religiosity-spirituality and problematic alcohol use over time is not well understood, especially during developmental transitions (Yonker et al., 2012). Also, issues of directionality and third variable influence are not consistently addressed in the literature (Miller, 2002). Lastly, given the recent conceptualization of religiosity-spirituality as a multidimensional construct, it is not well-known how alternative measures of religiosity-spirituality relate to problematic alcohol use (Johnson & Robinson, 2008). The current study will address these gaps by examining the following four questions.

Question #1: Are Religiosity-Spirituality And Risky Drinking Stable Across Time?

The Stability of Religiosity-Spirituality

Although a great deal of evidence suggests that religiosity-spirituality is stable over the lifespan (Button, et al., 2011; Gorsuch, 1984; Hill, 2005; Koenig & Valliant, 2009; Tsang & McCullough, 2003), there appears to be a developmental window around the time of emerging adulthood (Arnett & Jensen, 2002) where one's beliefs may change, due to the declining influence of caregivers and culture (Kass & Lennox, 2005; Smith, 2003; Worthington, 1989) as well as having experiences that cause adjustments to one's belief system (Allport, 1950). For example, Allport's classic theoretical model posits that, around the time of late adolescence/emerging adulthood, individuals transition from "raw credulity" (a stage in which they uncritically accept the teachings and beliefs of their caregivers) to "doubt" (a stage in which they struggle to integrate their lived experience with their pre-existing beliefs) to "ambiguity" (a stage in which they alternate between faith and doubt). Other theoretical (Smith, 2003; Worthington, 1989) and empirical (Button et al., 2011; Uecker et al., 2007; Vaughn et al., 2011) literature also suggests that emerging adulthood represents a unique window of time characterized by change in religiosity-spirituality and other belief systems and, as such, is an

ideal time to study short-term stability and change within a developmental window.

The Stability of Risky Alcohol Use

Like religiosity-spirituality, the tendency to engage in risky drinking is thought to have a substantial, trait-like component that is stable over time (Jessor & Jessor, 1977; Sher, 1991). In particular, recent empirical work has categorized risky alcohol use as part of a stable, “externalizing spectrum” that also contains other clinical disorders characterized by impulsivity and deficits in self-control, such as conduct disorder, drug abuse, and problem gambling (Kruger, Markon, Patrick, Benning, & Kramer, 2007). Moreover, longitudinal studies typically find strong correlations between separate measures of alcohol-related problems –even when those measurements are years apart (Grekin, Sher, & Wood, 2006; Jackson & Sher, 2000). For example, Jackson and Sher (2003) determined whether or not 378 college students met criteria for a DSM-III-R alcohol use disorder each year for 11 years. Correlations between time points ranged from 0.87 between year 1 and 2, to 0.26 between year 1 and 11. In addition, a number of longitudinal studies have linked age of drinking onset –which typically occurs around late adolescence –with risk for alcohol use problems as an adult (i.e. Cloninger, Sigvardsson, & Bohman, 1988) and it is well established that heavy drinking during adolescence is a strong predictor of heavy drinking during young and middle adulthood (Sher & Rutledge, 2006).

It is important to note that, while rank order stability of drinking remains fairly high across the lifespan (i.e., the heaviest drinkers during adolescence tend to be the heaviest drinkers during middle adulthood), absolute levels of alcohol consumption and risky drinking show clear developmental variation. In particular, epidemiological data collected between 1993 and 2001 show that rates of binge drinking were highest among those aged 18-25, and lowest among those 55 and older (Naimi et al., 2003). In addition, nationally representative data show that rates of

drinking increase throughout adolescence, peak during the 3rd decade of life, and then decrease steadily during mid-adulthood (Chan et al., 2007; Karlamangla et al., 2006). These data have led many researchers to conceptualize risky drinking as a ‘developmental disorder of young adulthood’ (Brown et al., 2008; Sher & Gotham, 1999). It should also be noted that risky drinking is substantially influenced by time-variant environmental factors, such as living arrangement, number of peers who drink, marriage, children, and employment (Dawson, Grant, & Hartford, 1995; Karlamangla et al., 2006; Schulenberg & O’Malley, 1996).

Question #2: To What Extent Do Third-Variables Account For The Relationship Between Religiosity-Spirituality And Risky Drinking?

Miller (2002) and others (Johnson & Robinson, 2008; Spilka, Hood, Hunsberger, & Gorsuch, 2003) have argued that research examining correlates of religious and spiritual concepts has generally done a poor job of taking third variables into account, especially gender, race, and personality (Johnson & Robinson, 2008). Moreover, the few studies that do account for third variables have yielded mixed results. For example, Mason and Spoth (2011) demonstrated that the effects of religiosity-spirituality persist, even when personality factors, such as impulsivity, are taken into account. In contrast, Jenkins and others (2011) found that, when ethnicity and drinking onset were controlled in a sample of approximately 1200 women, the personal importance of one’s religion was not predictive of development of an alcohol use disorder. The current study aims to improve upon the existing literature base by controlling for three theoretically important third variables: gender, race and conduct disorder.

Gender

Women, when compared to men, are more likely to label themselves as “religious.” They are also more likely to regularly attend religious services, and to engage in religious or

spiritual practices such as prayer, or reading holy texts (Barry & Nelson, 2005; Barry, Nelson, Davarya, & Urry, 2010). Women also drink less alcohol than men. Specifically, women tend to begin drinking alcohol later in life and are less likely to binge drink or to meet criteria for an alcohol use disorder than are men (Brennan, Schutte, Moos, & Moos, 2010; Kashdan, Vetter, & Collins, 2005). These gender differences in alcohol consumption have been replicated across a variety of different age groups and cultures. For example, a large, multi-national study of gender and drinking habits in samples from 35 different countries found that men consistently drank more often, and more heavily than women, and that women reported higher rates of abstinence (Wilsnack, Wilsnack, Kristjanson, Vogeltanz-Holm, & Gmel, 2009).

Race

In the United States, non-Caucasians report more involvement in religious behaviors (e.g., church attendance, prayer) and spirituality (e.g., feeling connected to God) than do Caucasians (Klassen, Hussain, & Grekin, 2010; McIntosh, 2013; Taylor, Chatters, & Jackson, 2007). These findings may be explained in part by the minority stress model (Meyer, 2003). More specifically, minority communities suffer disproportionately from the effects of poverty, crime, discrimination, and urban violence (Mays, Cochran, & Barnes, 2007) and, perhaps as a result, membership in minority groups is associated with higher levels of stress and psychological maladjustment (Goldbach, Tanner-Smith, Bagwell, & Dunlap, 2013; Nobles, 2011). Because of these internal and external challenges, individuals in minority groups may be particularly motivated to use religion and spirituality as a positive means of coping (Cotton, Zebracki, Rosenthal, Tsevat, & Drotar, 2006; Skarupski, Fitchett, Evans, & deLeon, 2010; Staton, Webster, Hiller, Rostosky, & Leukefeld, 2003). This theory is supported by a large literature which links experiences of discrimination with increased distress (e.g. Pieterse &

Carter, 2007; Todorova, Falcon, Lincoln, & Price, 2010). Moreover, one recent study (Budescu, 2013) has directly linked greater rates of religious participation in non-majority college students with lower report of stress caused by perceived discrimination.

Caucasians in the United States also report higher rates of alcohol consumption than other races across a variety of large-scale epidemiological studies (Grant et al., 2004). Caucasians typically begin drinking at younger ages (Franklin & Markarian, 2005), report higher rates of binge drinking (Naimi et al., 2003), and have more permissive attitudes towards substance use (Arnett, 2003), than do members of other races. To date, no comprehensive theoretical frameworks have been proposed to explain the higher drinking rates among Caucasians in the U.S. However, there is some evidence that non-Caucasians assume adult roles (marriage, parenthood, employment) earlier than Caucasians and that these roles limit heavy alcohol use in emerging adulthood (Berzin & DeMarco, 2010; Rankin & Kenyon, 2008; Stone, Becker, Huber, & Catalano, 2012). Additionally, African-Americans and individuals of East Asian descent are more likely to have enzymes (ADH1B*3 and ADH1B*2) that alter alcohol metabolism and make heavy drinking feel subjectively uncomfortable (Ehlers et al., 2007; Hendershot et al., 2009).

Conduct Disorder

Conduct Disorder is a psychiatric disorder that consists of a “repetitive and persistent pattern of behavior in which the basic rights of others or major age-appropriate societal norms or rules are violated” (American Psychiatric Association, 2000, p. 93). Symptoms are organized into four categories: (1) aggression to people and animals, (2) destruction of property, (3) deceitfulness or theft, and (4) serious violations of rules. Though conduct disorder is a stand-alone psychiatric diagnosis, its notably high levels of co-occurrence with other diagnoses (e.g.

attention deficit hyperactivity disorder, alcohol abuse and dependence) and behavior problems (e.g. unsafe sex) have led researchers and clinicians to conceptualize conduct disorder as one manifestation of a broader externalizing factor of psychopathology in children and adolescents (Tuvblad, Zheng, Raine, & Baker, 2009; Witkiewitz et al., 2013) that is indicative of impulsivity and deficits in self-control.

Given this conceptualization, it is not surprising that religiosity-spirituality is consistently negatively related to conduct disorder. For example, Simons, Simons & Conger (2004) found that the extent to which children value religion and religious practices was negatively associated with deviant behavior as well as contact with deviant peers. Similarly, the frequency of religious service attendance and prayer were associated with a significantly reduced risk of conduct disorder in a sample of nearly 3,000 British adolescents (Meltzer, Dogra, Vostanis, & Ford, 2011). Aside from the frequency of religious or spiritual behaviors, various coping styles that focus on religious-spiritual strategies for managing stress (e.g. prayer) have been negatively associated with the number of conduct problems in both Caucasian and African-American adolescents (Molock & Barksdale, 2013).

Unlike religiosity, alcohol use is strongly, positively related to conduct disorder. For example, a community study with a 10-year follow-up design found that a diagnosis of conduct disorder was significantly linked to younger age of onset of alcohol and other drug use as well as risky use of these substances (Hopfer et al., 2013). Other studies have established conduct disorder, as well as conduct disorder symptom count, as robust predictors of alcohol-related problems and risky drinking in general population (Jenkins et al., 2011; Knop et al., 2009; Pardini, White, & Stouthammer, 2007), clinical (Molina et al., 2002) and college student samples (Cavazos-Rehg et al., 2007).

Question #3: What Is The Direction Of The Relationship Between Religiosity-Spirituality And Risky Drinking?

The majority of the data on relationships between religiosity-spirituality and risky alcohol use are cross-sectional, and, therefore, cannot provide information about causality or directionality (DeHaan et al., 2011; Yonker et al. 2012). However, as the literature has advanced, researchers have begun to ask more sophisticated questions about the ebb and flow of these two constructs over time. Following Baumeister (1991), Miller (2002) provided a useful framework for disentangling the longitudinal relationship between religiosity-spirituality and risky drinking. In keeping with other, classic explanations of co-morbidity, he provided the following potential explanations: (1) religiosity-spirituality predicts risky drinking, (2) risky drinking predicts religiosity-spirituality, and (3) religiosity-spirituality and risky drinking share a complex, bi-directional relationship.

Miller's (2002) first hypothesis –that religiosity predicts drinking –has typically been supported in the literature. For example Koenig, Haber, and Jacob (2011) found that childhood religious affiliation had significant effects on a variety of alcohol use outcomes, well into adulthood, for a sample of 931 men. Similarly, in a prospective study of at-risk drinkers, Borders, Curran, Mattox, and Booth (2010) found that more frequent religious service attendance and prayer were associated with lower risk of developing an alcohol use disorder. Other studies have yielded similar findings in samples of adolescents (Brechting et al., 2010) and college students (Lambert et al., 2010)

Miller's second hypothesis –that risky alcohol use could influence religiosity-spirituality –has received far less attention (Connors et al., 2008; Hill & Pargament, 2003). To date, only four studies have examined this question. First, Mason and Windle (2002), in a sample of 1,175

adolescents, found in exploratory analyses that a composite quantity-frequency alcohol use variable negatively predicted religious-spiritual salience and religious service attendance six months later, with age and gender controlled. Second, Johnson and others (2008) examined change in spiritual and religious struggle in undergraduates over a two-year period. They found that spiritual and religious struggle predicted alcohol-related problems, but that alcohol-related problems did not predict spiritual and religious struggle. Third, Lambert and others (2010), in a series of studies, showed that greater frequency of prayer predicted decreased alcohol use three months later, but that alcohol use did not predict frequency of prayer. Finally, in a sample of approximately 700 adolescents, early initiation of substance use predicted a faster rate of religious salience decline, across the seven years of the study (Mason & Spoth, 2011).

In sum, these studies suggest that religiosity-spirituality is a consistent, negative predictor of risky drinking. In contrast, findings regarding risky drinking as a predictor of religiosity-spirituality are mixed. More studies need to be done to fully understand directional relationships between these constructs.

Question #4: Do Relationships Between Religiosity-Spirituality And Risky Drinking Extend To Alternative Measures Of The Constructs?

As noted earlier, religiosity-spirituality is a complex, multi-faceted construct. Despite this, most studies of religiosity and risky alcohol use have examined only single components of religiosity (e.g., general religiosity). As a result, it is difficult to know whether certain facets of religiosity (e.g., Daily Spiritual Experiences, Negative Religious Coping, religious salience, religious behaviors, etc.) are more related to risky alcohol use than others. Alcohol use is also a multi-faceted behavior and different forms of drinking may have different meanings, particularly for emerging adults. For example, binge drinking may reflect risk taking or sensation seeking

and may be more strongly related to religiosity than a simple quantity/frequency measure of alcohol use. The current study will attempt to address these issue by taking a multi-measure approach and examining multiple facets of both religiosity and alcohol use.

The Current Study: Aims and Hypotheses

The overarching goal of the current study was to examine longitudinal relationships between religiosity-spirituality and alcohol use in a large sample of college students. Data were collected at three timepoints; the summer before freshman year (time 1), the winter of freshman year (time 2) and the winter of sophomore year (time 3). Although primary analyses focused on religiosity-spirituality (defined as generalized religiosity-spirituality) and risky drinking (defined as frequency of binge drinking), exploratory analyses examined relationships between alternative measures of both religiosity-spirituality and alcohol use. Specific study aims were as follows:

Aim 1: Determine the extent to which religiosity-spirituality and binge drinking are stable over the transition to college

H1: Religiosity-spirituality will show a moderate degree of stability.

H2: The frequency of binge drinking will show a moderate degree of stability.

Aim 2: Determine the extent to which third variables account for the relationship between religiosity-spirituality and binge drinking

H1: The relationship between religiosity-spirituality and frequency of binge drinking will remain statistically significant after controlling for gender, race, and conduct disorder symptoms.

Aim 3: Determine the direction of the relationship between religiosity-spirituality and binge drinking

H1: Religiosity-spirituality will prospectively predict the frequency of binge drinking.

H2: Frequency of binge drinking will prospectively predict religiosity-spirituality.

Aim 4: Determine whether the relationships between religiosity-spirituality and alcohol use extend to alternative measures of each construct.

H1: Individual components of religiosity (religious salience, religious behaviors, Daily Spiritual Experiences, Negative Religious Coping, and Positive Religious Coping) will be related to alcohol use.

H2: Alternative measures of alcohol use (frequency of binge drinking, alcohol quantity and frequency) will be related to religiosity-spirituality.

CHAPTER 2: METHOD

Participants

Six hundred twenty three incoming college freshmen (mean age = 17.9, standard deviation = 0.67; 57.7% female; 45.9% Caucasian) were recruited in one of two ways: Three hundred ninety nine participants (65%) were recruited from an optional new student orientation event, held the summer before their freshman year. Students at the event were divided into groups of 20 to complete a series of activities. During this time, they viewed a video message from the principle investigator, inviting them to participate in a study of college student substance use. Those who agreed to participate filled out paper and pencil questionnaires, and provided their contact information for future follow-up assessments. In order to expand our sample, the Dean of Students provided e-mail addresses for an additional 350 students who did not attend orientation. Two hundred twenty four (63.1%) of those students chose to participate in the study and were e-mailed electronic versions of the baseline questionnaires. Orientation attenders and non-attenders did not significantly differ in terms of race, gender, or alcohol use; orientation attenders reported higher levels of religious-spiritual behaviors, $t(599)=2.46$, $p<.01$, and religious salience, $t(600)=3.81$, $p<.01$, than did orientation non-attenders. Data is not available on students who chose not to participate.

Participants were ethnically diverse: 45.9% ($n=284$) identified as Caucasian, 25.0% ($n=155$) as African-American, 13.2% ($n=82$) as Asian, 6.8% ($n=42$) as Arab/Chaldean, 5.2% ($n=32$) as Hispanic/Latino, 3.7% ($n=23$) as "Other," 0.2% ($n=1$) as American-Indian, and 0.6% ($n=4$) did not respond. Participants were largely full-time students (97.8%), although a substantial proportion reported current (36.1%) or desired (42.9%) part-time employment. The majority of the sample reported being un-married (98.7%) and without children (98.4%).

Measures

Race was measured categorically with one question: “What is your race?” Respondents had seven response options: African-American, American-Indian, Arab/Chaldean, Asian, Caucasian, Hispanic/Latino, and Other. Consistent with previous approaches to this variable (Grekin et al., 2006; Jackson & Sher, 2003; Sher & Rutledge, 2007), race was re-coded dichotomously, such that 0=Caucasian and 1=Non-Caucasian. Follow-up analyses offered some support for this distinction. Across all three study waves, Caucasians reported significantly less religiosity-spirituality than all other racial groups, except Hispanic/Latino at time 2 and Hispanic/Latino and Other at time 3. See Table 1. Although Caucasians tended to report higher rates of alcohol use (in terms of frequency of binge drinking and quantity/frequency of alcohol consumption) than other racial groups, these were often not statistically significant differences, though Caucasians binge drank significantly more than African-Americans at time 1 and Asian-Americans at time 3. See Tables 2 and 3.

Conduct Disorder Symptoms were measured with ten-items that corresponded directly to the symptoms listed in the Diagnostic and Statistical Manual-4th edition (DSM-IV; APA 2000). Respondents answered either “*Yes*” or “*No*” to each item (e.g., “Before the age of 15, did you ever deliberately damage someone’s property?”) See the appendix for a full copy of the measure. Conduct disorder symptoms were analyzed as a continuous variable with scores ranging from 0 to 10.

Risky Drinking, for the purposes of this study was defined as frequency of binge drinking (consuming four or more drinks for women or five or more drinks for men in a two hour period; Courtney & Polich, 2009). Frequency of binge drinking was assessed with a single item: “In the past three months, how many times have you had four (if you are a woman) five (if you are a

man) or more drinks within a two-hour period.” Participants responded on a ten-item, continuous scale ranging from 0 (*I did not do this*) to 10 (*Everyday*).

Quantity and Frequency of Alcohol Consumption were assessed using the following two questions; (1) “In the past year, how often have you had a beverage containing alcohol?” and (2) “In the past year, when you drank, how many drinks did you usually have on one occasion?” (NIAAA, 2003). Responses to these items were multiplied to create a past-year quantity/frequency variable. Quantity-Frequency (QF) of alcohol use was selected as an alternative alcohol use outcome because it captures a broader spectrum of alcohol use than binge drinking, allowing relationships between religiosity-spirituality and more normative, less-risky types of drinking to be examined.

Religiosity-Spirituality was assessed with the five-item Duke Religion Index (DRI; Koenig, Meador, & Parker, 1997). The DRI was constructed to assess both the frequency of religious behavior (2 items: church attendance and prayer) as well as the salience of one’s religious and spiritual beliefs (3 items; e.g.: “I try to carry over my religion into all areas of my life”). There are six response options for the religious behavior items ranging from 0 (*Rarely or Never*) to 5 (*More than once per week* for religious service attendance) or (*More than once per day* for prayer, meditation, etc.). Five response options were available for the religious salience items, ranging from 0 (*Definitely not true of me*) to 4 (*Definitely true of me*).

Evidence for reliability and validity of the Duke Religion Index has been reported in college samples (Storch et al., 2004; Storch, Strawser, & Storch, 2004), and the measure has been used in studies examining alcohol use (Piderman, Schneekloth, Pankratz, Stevens, & Alchuler, 2008). In the current study, total scores for the Duke Religion Index (i.e., the sum of all five items) were used in primary analyses and ranged from 0 to 22. Exploratory analyses

were also conducted examining religious behavior (range 0 to 10) and salience of religious beliefs (range 0 to 12) as separate variables. See Table 4 for scale reliabilities for the current study, and see the appendix for a full copy of the measure.

Three short form scales from the brief multidimensional measure of religiousness and spirituality (BMMRS) were also used to assess religion-spirituality (Fetzer Institute, 1999; Idler et al., 2003). These measures were included at time 2 and time 3, but not time 1. The Daily Spiritual Experiences Scale (Underwood & Teresi, 2002) measures the extent to which individuals regularly feel connected with God, or other transcendent concepts such as nature (e.g. “I find strength and comfort in my religion”). The scale consists of six items, with response options ranging from 1 (*Never or almost never*) to 6 (*Many times per day*). The Negative Religious Coping scale (Pargament et al., 1998) measures the extent to which an individual perceives stressful situations in his/her life as punishment from God; for example: “I feel that stressful situations are God’s way of punishing me for my sins or lack of spirituality.” The three items of the scale have response options that range from 1 (*Not at all*) to 4 (*A great deal*). The Positive Religious Coping scale (Pargament et al., 1998) measures an individual’s tendency to use his/her religious or spiritual resources adaptively when coping with stress (e.g. “I work together with God as partners”). The scale consists of three items with response options ranging from 1 (*Not at all*) to 4 (*A great deal*). All three short form scales have demonstrated high correlations with their original long forms as well as adequate psychometric properties in the general public (Idler et al., 2003), in young adult samples (Harris et al., 2008) and in college student samples (Masters et al., 2009). See Table 4 for scale reliabilities for the current study, and see the appendix for full copies of each measure.

Procedure

This study was approved by the Wayne State University Institutional Review Board (IRB). As noted above, 65% of participants ($n=399$) were recruited from an optional new student orientation event, which was held one month before the beginning of the academic year (See Participants section). All incoming freshmen at this orientation event were invited to participate in a study on college student substance use. Those who chose to participate, were asked to complete a packet of paper and pencil questionnaires assessing lifetime and past-year substance use, as well as hypothesized correlates of substance use (religiosity-spirituality, personality, trauma history, etc.). The remaining 35% of participants ($n=224$) were randomly selected from a list of all non-orientation attenders, provided by the dean of students. These non-orientation attenders were e-mailed the baseline questionnaires and asked to complete them electronically. The baseline questionnaires took approximately 15 minutes to complete. Participants were not paid for the baseline assessment, but were told that they would have opportunities to complete similar surveys for pay in the future, if they provided contact information.

Six months after the baseline data collection (in February of the freshmen year), all participants were e-mailed a link to an electronic follow-up survey. The follow-up survey took approximately 25 minutes to complete and participants who completed all or part of it were e-mailed a \$15 gift certificate to amazon.com.

Twelve months later (in February of the sophomore year), all participants were e-mailed a link to a second electronic follow-up survey. The second follow-up survey took approximately 20 minutes to complete and participants who completed all or part of it were e-mailed a \$20 gift certificate to amazon.com.

Study participants who did not respond to requests to complete the follow-up surveys received four e-mail reminders, one phone call, and one letter mailed to their address of record requesting their participation in the study for both the first and second follow-up.

CHAPTER 3: RESULTS

Attrition

Of the individuals who elected to participate at baseline ($N=623$), three hundred eighty nine (62.4%) completed the first follow-up assessment, and three hundred twenty eight (52.6%; 84.3% of the first-follow up) completed the second follow-up assessment. Two hundred sixty four (42.4%) students in the sample completed both follow-up assessments, one hundred ninety one (30.7%) completed one of the two follow-ups, and one hundred sixty eight (27.0%) completed neither follow-up.

Attrition analyses were performed using chi-square for categorical predictor variables and one-way analysis of variance (ANOVA) for continuous predictor variables. See Table 5. Participants were classified as completing no follow-up ($n=168$), one follow-up ($n=191$), or both follow-ups ($n=264$), and compared by relevant categorical variables such as gender (male=0 and female=1), race (coded as Caucasian=0 and non-Caucasian=1), and whether or not they reported abstaining from alcohol (coded as abstainer=0 and non-abstainer=1) and continuous variables at baseline such as total number of conduct disorder symptoms, frequency of binge drinking, quantity and frequency of alcohol consumption, and total score on the Duke Religion Index. See Table 6.

Attrition analyses for categorical variables indicated differential drop-out. Females, $\chi^2(2) = 9.25, p < .05$, and Caucasians, $\chi^2(12) = 40.33, p < .01$, were more likely than males and non-Caucasians, respectively, to complete both waves of the study. Abstention from alcohol was unrelated to attrition, $\chi^2(2) = 4.21, p > .05$, such that drinkers and non-drinkers completed the study at similar rates.

Attrition analyses of continuous variables indicated differential drop-out as well. The

total number of conduct disorder symptoms, $F(2,616)=4.21$, $p<.05$, and the total score on the Duke Religion Index, $F(2,587)=5.06$ $p<.01$, were related to the number of waves completed so that those with fewer conduct disorder symptoms and higher total scores on the Duke Religion Index were significantly more likely to remain in the study. Frequency of binge drinking as well as quantity and frequency of alcohol consumption at baseline were unrelated to attrition.

Because the results of the attrition analysis suggest that, as the study continued, males, non-Caucasians, those higher in conduct disorder symptoms, and those lower in religiosity-spirituality scores tended to drop out at an increased rate, analyses involving gender, race, conduct disorder, and religiosity-spirituality may be impacted by restricted range and should be interpreted with caution.

Missing Data

The amount of missing data varied, depending on the variable examined. See Table 7. Conduct disorder symptoms and time 1 binge drinking were missing the least amount of data, with 6 cases each, or 1 percent. In contrast, time 3 quantity-frequency of alcohol use was missing data for 370 individuals, or 59.4%. As Table 8 demonstrates, missing data was mostly a function of individuals being lost to follow-up, rather than selectively completing measures. For example, at time 1, for the 623 individuals who completed the baseline survey, completion rates for study measures ranged from 99.0% to 99.4%. For time 2, completion rates for the 391 individuals who completed the survey ranged from 94.0% to 99.0%; lastly, at time 3, among the 328 individuals who completed the survey, completion rates ranged from 77.1% (for quantity-frequency of alcohol use) to 95.1% (for the Duke Religion Index, Daily Spiritual Experiences and Positive Religious Coping).

A missing value analysis conducted with SPSS yielded mixed results. Specifically,

Little's Missing Completely At Random (MCAR) test was non-significant, $\chi^2(163) = 132.88$, $p = 0.96$, suggesting that the missing values can be assumed to be missing completely at random. However, time 1 Duke Religion Index scores were found to be significantly related to the missingness of time 2 frequency of binge drinking, $t(53) = 4.50$, $p < .01$, and the calculated estimated means of missing scores differed considerably, depending on the variable.

Because of the amount of missing data, and inconclusive missing value analysis, models using the primary variables were run with MPlus's missing data algorithm, which yielded models with 620 observations, and also by using listwise deletion, which yielded models with 210 observations. Analysis of each set of models determined that missing value imputation did not significantly impact results, as in no case did beta weights change substantially when values were filled versus when they were not. Furthermore, no paths changed from significance to non-significance when listwise deletion was used. Therefore, missing value imputation was judged to have little significant impact on the results, and so was used in subsequent analyses with MPlus. For comparison purposes, results from both the Mplus analyses and the listwise deletion analyses are presented in Tables 8 and 9.

Data Cleaning

Normality

Skewness and kurtosis were calculated for the primary variables to assess their normality. Using the convention that significant skewness is present if the absolute value of the ratio between the skewness statistic and standard error is equal to or greater than two, conduct disorder symptoms (12.80), time 1 binge drinking (34.00), time 2 binge drinking (24.14), and time 3 binge drinking (12.07) were found to be significantly and positively skewed. Following Tabachnick and Fidell (2007), logarithmic transformation substantially improved skewness for

conduct disorder symptoms (1.46) and time 3 binge drinking (0.66), though time 1 (18.16) and time 2 (16.37) binge drinking remained abnormal. Time 1 through time 3 scores on the Duke Religion Index had normal distributions, and were not transformed (1.50, 2.46, and 1.93, respectively).

Outliers

Outliers were identified through standardizing each score. Cases that were three standard deviations outside the mean were labeled as outliers (Tabachnick & Fidell, 2007). Conduct disorder symptoms had two outliers, while both time 1 and time 2 binge drinking had one outlier. There were no outliers on the Duke Religion Index. Outliers were retained, as they did not exert a significant effect on the analyses.

Descriptives

There was substantial variability in measures assessing baseline religious-spiritual behaviors and salience and alcohol use. See Table 10. For example, at time 1, 23.3% of the sample reported religious service attendance “*once a week*” while 15.2% responded “*never*.” At time 1, the majority of respondents (56.9%) had drunk alcohol at some point in their life, but almost half (49.1%) stated that they had not drunk alcohol within the past year. At time 1, the majority of students ($n= 476$; 76.4%) reported that they did not binge drink in the past year. Of those remaining students that endorsed binge drinking at least once in the past year ($n=141$; 23.6%), the majority binge drank “*once or twice*” ($n= 78$; 55.3%). See Table 11. Descriptives for all study variables appear on Table 12.

Correlations

Bivariate correlations were examined between the three covariates (gender, race and conduct disorder symptoms), religiosity-spirituality (total Duke Religion Index score as well as

religious behaviors and religious salience subscale scores) and alcohol use outcomes (frequency of binge drinking, and quantity-frequency). See Tables 13, 14, and 15. Although it is not displayed in the correlation tables, it is important to note that the religiosity-spirituality variables (behavior and salience) were highly correlated with each other at time 1 ($r(588)=0.69, p<.01$), time 2 ($r(375)=0.76, p<.01$), and time 3 ($r(312)=0.78, p<.01$). Alcohol outcomes (frequency of binge drinking and quantity/frequency) were also highly correlated with each other at time 1 ($r(617)=0.87, p<.01$) time 2 ($r(387)=0.79, p<.01$) and time 3, ($r(252)=0.90, p<.01$).

Stability

General Religiosity-Spirituality and Frequency of Binge Drinking

To determine the stability of both religiosity-spirituality and binge drinking over the transition to college, a structural equation model with two correlated latent variables was specified. The two latent variables were constructed from total Duke Religion Index (DRI) and binge drinking frequency scores from each of the three measurement occasions. See Figure 1. Model fit was excellent, $RMSEA=0.05$ (90% confidence interval 0.00 – 0.10), $CFI=0.99$, $TLI=0.99$. All factor loadings were statistically significant at $p<.01$, and ranged from 0.79 to 0.94 for religiosity-spirituality, and from 0.56 to 0.77 for frequency of binge drinking. In addition, the latent variables were able to account for a substantial proportion of the variance in each of their three indicators. Specifically, 82.8% of the variance for time 1 DRI, 84.7% for time 2 DRI, and 62.0% for time 3 DRI was accounted for by the latent religiosity-spirituality factor. In addition, 46.9% of the variance for time 1 binge drinking, 59.7% for time 2 binge drinking and 31.4% for time 3 binge drinking was accounted for by the frequency of binge drinking latent variable.

Relationships between measurement occasions in a path analyses were also examined to explore the stability of religiosity-spirituality and binge drinking (see Figure 2). Time 1 was

allowed to predict time 2 and time 3, and time 2 was allowed to predict time 3 for both religiosity-spirituality and frequency of binge drinking. Again, model fit was excellent, $RMSEA=0.02$ (90% confidence interval 0.00 – 0.09), $CFI=1.00$, $TLI=0.99$, and all paths were significant at $p<.01$. Relationships across measurement occasions for religiosity-spirituality ranged from 0.34 to 0.84, while relationships across measurement occasions for frequency of binge drinking ranged from 0.14 to 0.53.

In order to determine whether the stability of religiosity-spirituality differed across different components of the construct, the models described above were re-run using the two subscales of the Duke Religion Index; religious-spiritual behaviors and religious salience.

Religious-Spiritual Behaviors and Frequency of Binge Drinking

A structural equation model with latent variables representing religious-spiritual behaviors and frequency of binge drinking demonstrated excellent fit, $RMSEA =0.06$ (90% confidence interval 0.04—0.09), $CFI=0.98$, $TLI=0.96$. See Figure 3. All factor loadings in the model were statistically significant at $p<.01$, and ranged from 0.77 to 0.90 for religious-spiritual behaviors and from 0.56 to 0.78 for frequency of binge drinking. Each latent variable accounted for an adequate amount of variance in each of the measurement occasions. Specifically, the latent variable accounted for 71.9% of the variance in religious-spiritual behaviors at time 1, 81.8% at time 2, and 58.6% at time 3. Similarly the latent variable accounted for 46.8% of the variance in binge drinking at time 1, 60.2% at time 2, and 31.2% at time 3. Relationships between measurement occasions in the path analysis between religious-spiritual behaviors and frequency of binge drinking (see Figure 4) ranged from 0.25 to 0.77 for religious-spiritual behaviors and from 0.15 to 0.53 for frequency of binge drinking. Model fit was excellent, $RMSEA=0.04$ (90% confidence interval 0.00 –0.10) $CFI=1.00$, $TLI=0.98$.

Religious-Spiritual Salience and Frequency of Binge Drinking

A model with latent variables representing religious-spiritual salience and frequency of binge drinking was also specified. See Figure 5. The model demonstrated excellent fit, $RMSEA=0.04$ (90% confidence interval 0.00 – 0.06), $CFI=0.99$, $TLI=0.99$. All factor loadings were statistically significant at $p<.01$. Factor loadings ranged from 0.83 to 0.97 for religious-spiritual salience, and from 0.56 to 0.78 for frequency of binge drinking. Additionally, the latent variables accounted for an adequate percentage of variance in each of the measurement occasions: 69.0% at time 1, 94.7% at time 2, and 90.3% at time 3 for religious-spiritual salience, and 46.2% at time 1, 61.2% at time 2, and 30.9% at time 3 for frequency of binge drinking. In the path analysis, relationships between measurements of religious-spiritual salience ranged from 0.13 to 0.82, while relationships for binge drinking ranged from 0.12 to 0.54. Model fit was excellent, $RMSEA=0.00$ (90% confidence interval 0.00–0.07) $CFI=1.00$, $TLI=1.00$. See Figure 6.

Correlations between latent Religiosity-Spirituality and latent Binge Drinking

The correlation between the latent religiosity-spirituality variable and the latent frequency of binge drinking variable was $-.30$. The correlations between the latent religious behaviors and religious salience variables and the latent binge drinking variable were $-.25$ and $-.27$, respectively. See Figures 1, 3, and 5.

Third Variable Influence

To determine the extent to which the relationship between latent religiosity-spirituality and frequency of binge drinking is explained by third variables, a model was constructed in which two potential covariates –conduct disorder symptoms and race –pointed at the two correlated latent variables, religiosity-spirituality and frequency of binge drinking. See Figure 7. Because gender's relationships with religiosity-spirituality and frequency of binge drinking

failed to reach significance, it was dropped from the analyses.

Model fit was excellent, $RMSEA=0.05$ (90% confidence interval 0.03 –0.07), $CFI=0.98$, $TLI=0.96$. Although the correlation between religiosity-spirituality and frequency of binge drinking dropped substantially when conduct disorder symptoms and race were taken into account, it remained statistically significant, $r=-.18$, $p<.01$. A similar pattern of results was observed in models using the Duke Religion Index subscales (religious behaviors and religious salience) in that correlations between the latent variables decreased, but remained statistically significant when race and conduct disorder symptoms were added to the model. See Figures 8 and 9.

Directional Relationships

To examine the directionality of the relationship between religiosity-spirituality and frequency of binge drinking, a path analysis –using all three measurement occasions– was constructed with total Duke Religion Index scores and frequency of binge drinking (see Figure 2). Model fit was excellent, $RMSEA=0.02$ (90% confidence interval 0.00 –0.09), $CFI=1.00$, $TLI=0.99$. There were significant cross-sectional relationships between religiosity-spirituality and binge drinking. Specifically, the two variables were negatively correlated at time 1, $r=-0.19$, $p<.01$, and time 3, $r=-0.14$, $p<.01$, but not time 2, $r=-.04$, $p>.05$. There was also a significant prospective relationship between time 2 religiosity-spirituality and time 3 binge drinking ($\beta=-.15$, $p<.01$). Notably, however, time 1 religiosity-spirituality did not predict time 2 binge drinking. Additionally, binge drinking did not predict religiosity-spirituality at any of the measurement waves.

Similar results were obtained when examining directional paths between binge drinking and the two Duke Religion Index subscales; religious-spiritual behaviors and religious-spiritual

saliency (see Figures 4 and 6). Specifically, for both subscales, time 2 religiosity prospectively predicted time 3 binge drinking, but time 1 religiosity did not predict time 2 binge drinking and binge drinking did not predict religiosity-spirituality at any measurement wave.

Alternative Measures of Religiosity-Spirituality and Alcohol Use

Quantity-frequency of alcohol use was substituted for frequency of binge drinking in the first model described above (with two correlated latent variables). See Figure 10. The model showed excellent fit ($RMSEA=0.02$ (90% confidence interval: 0.00 – 0.05), $CFI=1.00$, $TLI=1.00$), factor loadings were strong and statistically significant at $p<.01$, and the latent variables were able to account for a substantial proportion of the variance in each of their three respective indicators. Specifically, 64.3% of the variance was accounted for in time 1 quantity-frequency, 29.4% in time 2, and 56.9% in time 3. The correlation between the latent quantity/frequency variable and the latent generalized religiosity-spirituality variable was $-.32$, but this correlation decreased to $-.22$ when race and conduct disorder were added to the model. See Figure 11.

Models were also run with the two subscales of the Duke Religion Index –religious behaviors and religious saliency– with quantity-frequency of alcohol use, with similar results. See Figures 12 and 13. Likewise, the correlation between Duke Religion Index subscales and quantity-frequency of alcohol use decreased somewhat when conduct disorder symptoms and race were added as covariates, but these correlations did not fall into non-significance. See Figures 14 and 15.

Path analysis results using generalized religiosity-spirituality and quantity-frequency of alcohol use were very similar to those obtained with binge drinking. See Figure 16. Specifically, time 2 religiosity prospectively predicted time 3 quantity-frequency, but time 1

religiosity did not predict time 2 quantity frequency and quantity-frequency did not predict religiosity-spirituality at any measurement wave. Similar results were obtained substituting religious-spiritual behaviors and salience, respectively. See Tables 17 and 18.

Analyses were also run to examine relationships between alcohol use outcomes and alternative measures of religiosity-spirituality (i.e. measures of Daily Spiritual Experiences, Negative Religious Coping and Positive Religious Coping taken from the BMMRS). More specifically, cross-lagged stability models (i.e. Lambert et al., 2010) were constructed to examine relationships between alcohol use outcomes and the BMMRS variables measured at waves two and three (see Table 12 for descriptive information and Table 15 for bivariate correlations; data on BMMRS variables were not obtained at time 1). Daily Spiritual Experiences and Positive Religious Coping were cross-sectionally and prospectively associated with both frequency of binge drinking and quantity-frequency of alcohol use (see Figures 19 and 20 for Daily Spiritual Experiences and Figures 21 and 22 for Positive Religious Coping). Negative Religious Coping was not cross-sectionally or prospectively associated with either alcohol use outcome (see Figures 23 and 24).

CHAPTER 4: CONCLUSIONS

Stability of Religiosity-Spirituality and Binge Drinking

Several lines of evidence converged to show that –consistent with predictions– generalized religiosity-spirituality demonstrated a moderate to high degree of stability across the transition from high school to college. First, a latent variable approach that emphasized the stability of the construct adequately explained the data; indeed, all model fit statistics would be considered excellent or good, given current standards (Hu & Bentler, 1999; Raykov & Marcoulides, 2007). Second, all three time-specific indicators of the latent religiosity-spirituality variable had statistically significant factor loadings. Third, the latent religiosity-spirituality variable was able to account for a majority of the variance in each measurement of religiosity-spirituality. Lastly, in the path analysis, regression paths between religiosity-spirituality at different time points demonstrated that religiosity-spirituality at time 1 was a moderately strong predictor of religiosity-spirituality at times 2 and 3.

Consistent with our predictions, frequency of binge drinking also demonstrated a moderate degree of stability across the first two years of college. Similar to generalized religiosity-spirituality, each measurement of binge drinking loaded strongly on the latent variable, and the latent variable accounted for a substantial percentage of variance in each measurement. Furthermore, in the path analysis, frequency of binge drinking at time 1 significantly predicted frequency of binge drinking at time 2 (6 months later) and time 3 (two years later), though regression coefficients were small.

Overall, findings regarding the stability of religiosity-spirituality and risky drinking support conceptualizations (Jessor & Jessor, 1977; Sher, 1991) that emphasize their stability over time, even over the ‘developmental window’ of emerging adulthood and the transition to college.

Simply put, these variables did not demonstrate significant change over the two years of the study. Our findings reflect the presence of a strong, latent generalized religiosity-spirituality factor that is assumed to be stable across time, as has been reported numerous times in the literature both in the general population (Gorsuch, 1984; Hill, 2005; Kendler et al., 2003; Johnson & Robinson, 2008; Tsang & McCullough, 2003) and in college student populations (Klassen et al., 2013; Storch et al., 2004). This finding is inconsistent with literature that emphasizes variability in both religiosity-spirituality (Arnett & Jensen, 2002) and risky drinking (Arnett, 2005; Brown et al., 2008) during emerging adulthood. It is possible that the theorized causes of change in religiosity-spirituality and risky drinking during emerging adulthood (e.g. growing autonomy, decreasing influence of caregivers, development of new social networks, etc.) are not as influential in this sample. Lastly, it is possible that the finding of a stable general religiosity factor may have been an artifact of the measures used and the number of items analyzed (Johnson & Robinson, 2008). In other words, studies that find multiple religiosity-spirituality factors typically use many more items than the present study, which used seventeen items from three scales. For example, Johnson and others (2008) obtained five factors from 127 items taken from twenty-four scales.

Third Variable Influence

Consistent with expectations, correlations between generalized religiosity-spirituality and frequency of binge drinking decreased, but remained significant, even after accounting for race and conduct disorder symptoms in the model. This finding demonstrates that the longitudinal relationship between religiosity-spirituality and alcohol use is not entirely attributable to third variables, such as race or prosociality (i.e. low conduct disorder). Rather religiosity-spirituality appears to have an effect above and beyond these explanations. Thus, generalized religiosity-

spirituality is an important target in and of itself for further study and possible prevention and intervention efforts regarding risky alcohol use during this developmental period.

Directionality

Findings regarding the direction of the relationship between religiosity-spirituality and binge drinking were mixed. As predicted, religiosity-spirituality at time 2 predicted frequency of binge drinking at time 3, although the magnitude of this relationship was small (Cohen, 1988). This finding is consistent with other literature in this area (Mason & Windle, 2002; Vaughan et al., 2011; Yonker et al., 2012) and suggests that high religiosity-spirituality may act as a protective factor against risky alcohol use among emerging adults (Brechting et al., 2010; Lambert et al., 2010).

Notably, religiosity-spirituality at time 1 (baseline – measured prior to the freshman year) failed to predict frequency of binge drinking at time 2. Although this finding is somewhat surprising, it may reflect the fact that one's religiosity and spirituality prior to beginning university is often a function of one's caregivers and culture (Arnett & Jensen, 2002; Button et al., 2011; Kendler & Myers, 2009; Ueker et al., 2007, Vaugh et al., 2011). With the transition to university comes more freedom and less responsibility to caregivers (Arnett, 2000; 2007). As a result, reports of religious-spiritual behaviors and beliefs after the transition to college may be a more accurate measure of actual values; and therefore may be more predictive of future behavior. Support for this hypothesis comes from a recent lifespan study of nearly 2000 male twins, which found that correlations between church attendance and alcohol consumption grew as participants aged (i.e. from -0.2 between ages 12-14 to -0.5 in adulthood; Kendler & Myers, 2009). These results and others (Button et al., 2011) suggest that, as individuals age, religious behaviors become more reflective of personal values and lived experience.

Interestingly, although religiosity-spirituality predicted binge drinking, frequency of binge drinking did not predict religiosity-spirituality. Although this finding is consistent with the bulk of the data in this area (Borders et al., 2010; Johnson et al., 2008; Lambert et al., 2010; Mason & Spoth, 2011), there remains variability in the literature and some studies have, in fact, found that risky drinking is a predictor of religiosity-spirituality. For example, Mason and Windle (2002) found that early initiation of alcohol use predicted a faster rate of decline for religious salience. Notably, however, the participants in Mason and Windle's study were between the ages of 15 and 16, an age when even small amounts of alcohol use could reflect antisociality (Cloninger et al., 1988; Hopfer et al., 2013; Molina et al., 2002; Pardini et al., 2007) and possibly, a resulting avoidance of prosocial, religious behavior (Jessor & Jessor, 1977). In contrast, the majority of studies in the area have focused on college students, a group for whom alcohol use is fairly normative and not necessarily reflective of deviance (Arnett, 2005; Buettner & Debis-Carl, 2012; Schulenberg et al., 1996). Additionally, it may be that problematic drinking affects specific, lower-order, facets of religiosity-spirituality that were not measured in this study, such as forgiveness, doubt, and perceived social support from one's religious community, among others (Mason & Windle, 2002; Robinson et al., 2007; 2011). Ultimately, however, very little is known about how, when, why and for whom risky drinking might predict changes in religiosity-spirituality, and more research is needed to clarify these issues.

Alternative Measures of Religiosity-Spirituality and Alcohol Use

Religious-Spiritual Behaviors, Salience, and Quantity-Frequency

Although conceptually different, the alternative measures of religiosity-spirituality (behaviors and salience) and alcohol use (quantity-frequency of alcohol consumption) were difficult to distinguish empirically. Religious-spiritual behaviors and salience were highly

correlated across the study's timepoints, as were frequency of binge drinking and quantity-frequency of alcohol use. Therefore, when these variables were substituted in the statistical models and analyzed, the results were very similar to the primary analyses.

Interestingly, religious behaviors and salience were not found to substantially differ in their stability across the study. Given their high correlation with each other, even across all three study waves, this is not surprising. However, this finding is inconsistent with literature that demonstrates religious behaviors (e.g. religious service attendance, prayer, etc.) typically decline as individuals enter adulthood (Argue et al., 1999), but the importance placed on one's religion or spirituality tends to remain stable (Lefkowitz, 2005; Uecker et al., 2007). The high correlation between behavior and salience is probably due to the strong generalized religiosity factor that emerged from these data. Factors that may contribute to this generalized religiosity factor (e.g. a broad, stable, genetically-influenced tendency toward prosociality) have been reviewed above.

Measures from the Brief Multidimensional Measure of Religiosity-Spirituality (BMMRS)

Although the BMMRS is widely used in health outcomes research (Fetzer Institute, 1999; Harris et al., 2008; Idler et al., 2003; Johnstone et al., 2009; Masters et al., 2009), it has been infrequently used in alcohol research (Johnson & Robinson, 2008), despite some notable exceptions (Krentzman et al., 2013; Robinson et al., 2007; 2011). This study is one of the few to examine associations between alcohol use and BMMRS scales, in this case Daily Spiritual Experiences, Positive Religious Coping, and Negative Religious Coping. Results were generally consistent with expectations. Specifically, Daily Spiritual Experiences and Positive Religious Coping cross-sectionally and prospectively predicted both frequency of binge drinking and quantity-frequency of alcohol use, though associations were small in magnitude (Cohen, 1988). Negative Religious Coping, contrary to expectations, was not related to either binge drinking or

quantity-frequency of alcohol use. Although Negative Religious Coping has been associated with psychological distress (Bjorck & Thurman, 2007; Chan & Rhodes, 2013), it has rarely been examined in regards to alcohol use and more research is needed to delineate the relationship between these constructs and potential mediating variables (e.g., distress, fear of punishment, etc.).

Implications

Given their stability in the current study, religiosity-spirituality and risky alcohol use may be most appropriately conceptualized with theories such as problem behavior theory (Jessor & Jessor, 1977) and deviance proneness theory (Sher, 1991) that emphasize their persistence over time. As others have found (Sher & Rutledge, 2007), pre-college measurements of specific behaviors (e.g. risky alcohol use/religiosity-spirituality) that are assumed to be expressions of larger latent constructs (e.g. externalizing psychopathology/general religiosity) have considerable value in predicting future behavior in college. Such measurements may be important for identifying high-risk groups (e.g. those with pre-college histories of risky drinking or other externalizing behavior problems) so that prevention and intervention resources may be more targeted. Moreover, theories that describe relationships between these constructs as dynamic and bi-directional, such as Baumeister's (1991) escaping the self, may not be broadly applicable, though they still may have merit with specific groups, such as early adolescents or those at high-risk for alcohol use disorders (Mason & Windle, 2002).

Lastly, it is important to note that the relationship between religiosity-spirituality and alcohol use decreased, but remained statistically significant after race and conduct disorder symptoms were introduced into the model. This suggests that the correlation between religiosity-spirituality and alcohol use is partially, though not completely explained, by race or a

tendency towards prosociality (i.e. low conduct disorder symptoms). Thus, the findings of this study (along with others) suggest that religiosity is an independent, predictor of alcohol use and binge drinking that accounts for unique variance in the construct (Brechtling et al., 2010; Johnson et al., 2008; Lambert et al., 2010).

Limitations

Despite this study's strengths, there are a number of weaknesses that need to be considered. First and foremost is the degree of attrition, particularly between baseline and the first follow-up that occurred six months later. A substantial amount of data was lost to follow-up, despite generous incentives for participation as well as reminder e-mails and phone calls from study staff. Moreover, there was some selective attrition, as males, non-Caucasians, and students low in religiosity were more likely to drop out of the study. As discussed previously, the majority of missing data was due to non-participation, rather than selective completion of survey measures, and most students who participated in an assessment wave completed the entire survey. While certainly not ideal, these response rates are not unusual for studies that use e-mailed surveys (Sheehan, 2001). In a study of health behaviors in undergraduates, 36% responded to an e-mailed survey with a small monetary incentive (Barnett et al., 2013). Furthermore, response rates reported in the present study are in line with or better than other studies that gather data longitudinally through e-mailed surveys. For example, Converse, Wolfe, Huang & Oswald (2008) reported that although 61.3% of their sample responded to an e-mailed request to complete a survey, only 15% responded to follow-up requests.

Another potential limitation of the study concerns generalizability. Wayne State students may be different from 'traditional' college students in a number of ways. The current sample matches the definition of a 'traditional' college sample in terms of age, and marital status (i.e.,

between the ages of 18-22 and unmarried), but the rates of either part-time or full-time employment were high compared to other college samples. Furthermore, rates of abstinence (49.1%) were higher and rates of past-year binge drinking were lower (23.6%) in this sample than in other, similar studies. For example, Cranford, McCabe and Boyd (2006) reported that 63.6% of their college sample had engaged in binge drinking in the past year. Thus, the generalizability of these findings to other college samples should not be assumed.

Finally, although the Duke Religion Index (Koenig et al., 1997) is a well-validated and frequently used measure, some researchers have argued that single scales are inadequate for measuring the complex, multidimensional constellation of constructs that make up the broader concept of religiosity-spirituality (Miller & Thorsen, 2003). This study may have benefited from additional measures of religiosity-spirituality –such as forgiveness, doubt, life meaning, and perceived social support from religious or spiritual communities –but the measures were limited because of time and space issues. The concept of general religiosity is widely used in the literature, however (Gorsuch, 1984; Klassen et al., 2013; Kendler, et al., 2003; Tsang & McCullough, 2003), and dividing religiosity-spirituality into the overlapping, yet separate, domains of behaviors and salience is also frequently done (Baetz et al., 2006; Johnson & Robinson, 2008).

APPENDIX A: TABLES

Table 1. Mean level differences in religiosity-spirituality by ethnicity

	Time 1			Time 2			Time 3		
	<i>N</i>	Mean	<i>SD</i>	<i>N</i>	Mean	<i>SD</i>	<i>N</i>	Mean	<i>SD</i>
African-American	137	13.56	5.50	76	14.66	4.63	51	17.82	5.99
Arab-American	40	14.37	5.25	32	14.13	6.58	27	17.11	6.92
Asian	80	14.58	5.71	57	14.89	5.10	58	16.90	6.37
Caucasian	273	9.00	6.29	173	9.23	6.39	143	12.40	6.72
Hispanic/Latino	31	11.07	5.62	15	9.33	5.69	12	14.25	5.63
Other	23	12.44	4.83	21	13.14	6.78	20	14.80	6.53
Total	584	11.42	6.34	374	11.85	6.43	311	14.76	6.87

Note. At time 1, a one-way ANOVA found that $F(5,583)=20.11, p<.01$. Post-hoc tests revealed that Caucasians had significantly ($p<.05$) lower religiosity-spirituality scores than African-Americans, Arab-Americans, and Asians. At time 2, a one-way ANOVA $F(5,373)=14.91, p<.01$ found that Caucasians were significantly less religious-spiritual than all other ethnic groups, except Hispanic/Latino. Similar to time 1, Caucasians were significantly less religious-spiritual than African-Americans, Arab-Americans, and Asians at time 3, $F(5,310)=7.99, p<.01$. Religiosity-spirituality is the total score from the Duke Religion Index (Koenig et al., 1997).

Table 2. Mean level differences in frequency of binge drinking by ethnicity

	Time 1			Time 2			Time 3		
	<i>N</i>	Mean	<i>SD</i>	<i>N</i>	Mean	<i>SD</i>	<i>N</i>	Mean	<i>SD</i>
African-American	153	0.14	0.40	65	0.32	0.99	47	1.21	1.61
Arab-American	42	0.24	0.58	28	0.50	1.71	23	1.17	1.56
Asian	82	0.26	0.84	50	0.22	0.82	52	0.75	1.55
Caucasian	280	0.67	1.35	142	0.75	1.48	129	1.62	1.53
Hispanic/Latino	32	0.75	1.30	10	0.50	0.71	11	1.18	0.41
Other	24	0.63	1.56	20	0.50	1.00	19	1.68	1.46
Total	613	0.46	1.10	315	0.53	1.23	281	1.34	1.54

Note. At time 1, a one-way ANOVA found that $F(5,612)=6.38$, $p<.01$. Post-hoc tests revealed that African-Americans binge drank significantly less than the highest drinking groups, Caucasians and Hispanic/Latino. At time 2, there was no significant difference in frequency of binge drinking between groups, $F(5,314)=1.96$, $p>.05$. Post-hoc tests demonstrated that Asians binge drank significantly less than Caucasians at time 3, $F(5,280)=2.78$, $p<.05$.

Table 3. Mean level differences in quantity-frequency of alcohol consumption by ethnicity

	Time 1			Time 2			Time 3		
	<i>N</i>	Mean	<i>SD</i>	<i>N</i>	Mean	<i>SD</i>	<i>N</i>	Mean	<i>SD</i>
African-American	153	2.76	6.56	80	0.56	3.47	42	3.71	4.97
Arab-American	42	1.69	4.23	29	1.21	3.37	18	8.78	11.85
Asian	82	2.35	7.33	63	0.51	2.73	51	3.90	7.81
Caucasian	282	6.29	10.92	179	1.84	5.33	114	9.69	12.01
Hispanic/Latino	32	7.31	9.64	17	0.94	2.74	10	6.60	6.69
Other	24	5.46	10.62	16	1.13	3.07	18	9.25	11.36
Total	615	4.60	9.29	385	1.23	4.33	252	7.39	10.40

Note. At time 1, a one-way ANOVA found that $F(6,608)=4.76$, $p<.01$, such that Caucasians and Hispanic/Latinos, and Other consumed significantly more than the other ethnic groups. At time 2, however, no significant differences were found, $F(6,378)=1.25$, $p=0.28$. At time 3, significant differences among ethnic groups were observed, $F(6,245)=3.25$, $p<.01$, such that Caucasians, Arab-Americans, and Other drank more than the other ethnic groups.

Table 4. Cronbach's alpha for religiosity-spirituality scales

	Number of Items	Time 1	Time 2	Time 3
Duke Religion Index	5	.89	.90	.92
Religious-Spiritual Behaviors	2	.76	.76	.80
Religious-Spiritual Saliency	3	.89	.89	.92
Daily Spiritual Experiences	6	-	.97	.97
Negative Religious Coping	3	-	.67	.66
Positive Religious Coping	3	-	.91	.92

Note. Duke Religion Index (Koenig et al., 1997). Daily Spiritual Experiences (Underwood & Teresi, 2002). Negative and Positive Religious Coping (Pargament et al., 1998). Religious-spiritual behaviors and saliency are taken from the Duke Religion Index.

Table 5. Attrition analyses with categorical variables

		Number of Follow-up Completed			Chi-Square	
		None	One	Two	<i>df</i>	χ^2
Gender	Male	87	77	98	2	9.45**
	Female	80	114	164		
Ethnicity	Caucasian	76	83	125	12	40.33**
	Latino	11	9	12		
	African-American	58	56	41		
	Arab/Chaldean	7	16	19		
	American Indian	0	0	1		
	Asian	9	23	50		
	Other	5	4	14		
Drinker	No	70	91	101	2	4.21
	Yes	96	99	163		

Note. Drinker = lifetime history of alcohol consumption. * $p < .05$. ** $p < .01$.

Table 6. Attrition analyses with continuous variables

	Follow-up completed	<i>N</i>	Mean	<i>SD</i>	ANOVA	
					<i>df</i>	<i>F</i>
Conduct Disorder Symptoms	None	165	1.84	1.90		
	One	190	1.45	1.43	2, 616	4.21*
	Two	262	1.40	1.51		
Binge Drinking	None	164	.54	1.26		
	One	189	.44	1.04	2, 616	.73
	Two	264	.41	1.04		
Duke Religion Index	None	150	10.29	6.28		
	One	184	11.14	6.25	2, 587	5.06**
	Two	254	12.29	6.33		
Quantity-Frequency	None	166	5.92	11.04		
	One	189	4.07	8.26	2, 618	2.29
	Two	264	4.16	8.66		

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

Table 7. Percentage of missing data by time

			Race	CD	DRI	DSE	NEG	POS	Binge	QF
	Missing	<i>N</i>	4	6	35	-	-	-	6	4
	Overall	%	0.6	1	5.6	-	-	-	1.0	0.6
Time 1	Missing	<i>N</i>	4	6	35	-	-	-	6	4
	by Wave (<i>N</i> =623)	%	0.6	99	5.6	-	-	-	1.0	0.6
	Missing	<i>N</i>	-	-	248	255	247	245	235	236
	Overall	%	-	-	39.8	40.9	39.6	39.3	37.7	37.9
Time 2	Missing	<i>N</i>	-	-	16	23	15	13	3	4
	by Wave (<i>N</i> =391)	%	-	-	4.1	5.9	3.8	3.3	0.8	1.0
	Missing	<i>N</i>	-	-	311	311	311	312	340	370
	Overall	%	-	-	49.9	49.9	49.9	50.1	54.6	59.4
Time 3	Missing	<i>N</i>	-	-	16	16	16	17	45	75
	by Wave (<i>N</i> =328)	%	-	-	4.9	4.9	4.9	5.2	13.7	22.9

Note. Percentages from missing overall rows were derived from *N*=623. Race was coded as 0=Caucasian, 1=Non-Caucasian. CD=Conduct disorder symptoms. DRI=Duke Religion Index (Koenig et al., 1997). DSE=Daily Spiritual Experiences (Underwood & Teresi, 2002). Neg=Negative Religious Coping (Pargament et al., 1998). POS=Positive Religious Coping

(Pargament et al., 1998). Binge=frequency of binge drinking. QF=quantity X frequency of alcohol consumption (NIAAA, 2003).

Table 8. Comparison of factor loadings and model fit between the full model and list-wise deletion model

		Model without covariates		Model with covariates	
		Full model (<i>N</i> =620)	List-wise deletion (<i>N</i> =210)	Full model (<i>N</i> =620)	List-wise deletion (<i>N</i> =210)
DRI	Time 1	0.91	0.94	0.91	0.95
	Time 2	0.92	0.91	0.92	0.91
	Time 3	0.78	0.81	0.79	0.80
Binge	Time 1	0.69	0.73	0.70	0.74
	Time 2	0.77	0.83	0.74	0.80
	Time 3	0.56	0.57	0.60	0.59
	<i>r</i>	-0.27	-0.30	-0.18	-0.21
Model Fit Statistics	<i>CFI</i>	0.99	0.99	0.98	0.97
	<i>TLI</i>	0.99	0.99	0.96	0.95
	<i>RMSEA</i>	0.04	0.05	0.05	0.08

Note. DRI=Duke Religion Index (Koenig et al., 1997). All standardized factor loadings and correlations are statistically significant at $p<.01$.

Table 9. Comparison of factor loadings between the full model and list-wise deletion path analysis

		Full Model (<i>N</i> =623)	List-wise deletion model (<i>N</i> =210)
Duke Religion Index	Time 1-Time 2	0.84	0.85
	Time 2-Time 3	0.44	0.36
	Time 1-Time 3	0.34	0.44
Frequency of Binge Drinking	Time 1-Time 2	0.53	0.61
	Time 2-Time 3	0.35	0.39
	Time 1-Time 3	0.14	0.12*
DRI - Binge	Time 1-Time 2	-0.04*	-0.03*
	Time 2-Time 3	-0.15	-0.13
Binge - DRI	Time 1-Time 2	-0.01*	-0.01*
	Time 2-Time 3	-0.01*	0.00*

Note. DRI=Duke Religion Index (Koenig et al., 1997). All standardized factor loadings are statistically significant at $p < .01$, except where marked with *.

Table 10. Baseline responses to the Duke Religion Index (Koenig et al., 1997)

	Never	Once a year or less	A few times a year	A few times a month	Once a week	More than once a week
Item 1	15.2	11.4	20.5	16.1	23.3	10.1
	Rarely or never	A few times a month	Once a week	Two or more times a week	Daily	More than once a day
Item 2	41.6	13.5	7.7	8.5	14.8	10.3
	Definitely not true	Tends not to be true	Unsure	Tends to be true	Definitely True of me	
Item 3	9.5	5.6	26.2	19.3	35.3	
Item 4	16.5	12.4	15.9	26.3	24.6	
Item 5	19.7	13.8	14.0	25.7	22.5	

Note. All values appear as percentages. Item 1 is “How often do you attend religious services or meetings”. Item 2 is “How often do you spend time in private religious activities, meditation, or reading holy texts”. Item 3 is “In my life, I experience God or the Divine”. Item 4 is “My religious beliefs are what really lie behind my whole approach to life”. Item 5 is “I try to carry my religion over into all my other dealing in life.”

Table 11. Frequency of binge drinking at baseline

Response	<i>n</i>	Percentage
Never	476	76.4
Once or twice	78	12.5
Three to eleven times	28	4.5
Once a month	15	2.4
Two or three times a month	8	1.3
Once a week	5	0.8
Twice a week	6	1.0
Everyday	1	0.2

Note. Responses were to the question “In the past three months, how many times have you had four (if you are a woman) five (if you are a man) or more drinks within a two-hour period?”

Table 12. Descriptives for Study Variables

	<i>N</i>	Mean	<i>SD</i>	Skewness		Kurtosis	
				Statistic	<i>SE</i>	Statistic	<i>SE</i>
Conduct Disorder	617	1.53	1.61	1.28	0.10	2.10	0.20
Time 1 DRI	588	11.42	6.34	-0.15	0.10	-1.04	.20
Time 2 DRI	375	11.86	6.42	-0.32	0.13	-1.05	0.25
Time 3 DRI	312	14.79	6.88	-0.27	0.14	-1.15	0.28
Time 2 DSE	368	21.14	10.18	-0.15	0.13	-1.34	0.25
Time 3 DSE	312	20.64	10.42	0.18	0.14	-1.37	0.28
Time 2 Neg Coping	376	5.34	2.31	1.13	0.13	0.83	0.25
Time 3 Neg Coping	312	6.96	2.16	-1.19	0.14	1.10	0.28
Time 2 Pos Coping	378	7.47	3.06	-0.06	0.12	-1.27	0.25
Time 3 Pos Coping	311	4.48	3.22	0.09	0.14	-1.36	0.28
Time 1 Binge	617	0.46	1.10	3.40	0.10	13.94	0.20
Time 2 Binge	388	0.43	1.13	3.37	0.12	12.37	0.25
Time 3 Binge	283	1.34	1.54	1.81	0.15	3.71	0.29
Time 1 QF	619	4.60	9.29	3.22	0.10	13.44	0.20
Time 2 QF	387	1.34	4.79	4.42	0.12	22.47	0.25
Time 3 QF	253	7.34	10.38	2.14	0.15	6.13	0.31

Note. DRI is the Duke Religion Index (Koenig et al., 1997). DSE is the Daily Spiritual Experiences Scale (Underwood & Teresi, 2002). Negative and Positive Religious Coping are from Pargament et al., 1998. QF is quantity and frequency (NIAAA, 2003).

Table 13. Correlations between religiosity-spirituality, covariates, and alcohol use variables

	Time 1 DRI	Time 2 DRI	Time 3 DRI
Gender	0.09*	0.03	0.09
Race	0.33**	0.32**	0.22**
Conduct Disorder	-0.10*	-0.05	-0.08
Time 1 Binge	-0.20**	-0.19**	-0.09
Time 2 Binge	-0.14**	-0.14**	-0.07
Time 3 Binge	-0.22**	-0.21**	-0.21**
Time 1 QF	-0.21**	-0.16**	-0.13*
Time 2 QF	-0.10	-0.08	-0.03
Time 3 QF	-0.29**	-0.27**	-0.27**

Note. Race is coded 0=Caucasian, 1=non-Caucasian. QF is quantity-frequency of alcohol consumption (NIAAA, 2003). DRI is the total score of the Duke Religion Index (Koenig et al., 1997). * $p < .05$. ** $p < .01$.

Table 14. Correlations between religious-spiritual behavior, salience, covariates, and alcohol use variables

	Time 1	Time 2	Time 3	T1 QF	T2 QF	T3 QF
	Binge	Binge	Binge			
Gender	-0.08	-0.03	-0.05	-0.07	-0.07	-0.11
Race	-0.13**	-0.11*	-0.13*	-0.15**	-0.11*	-0.16*
Conduct Disorder	0.12**	0.12*	0.29**	0.15**	0.07	0.24**
Time 1 Behavior	-0.18**	-0.15**	-0.21**	-0.20**	-0.11*	-0.26**
Time 2 Behavior	-0.16**	-0.09	-0.16*	-0.14**	-0.02	-0.21**
Time 3 Behavior	-0.05	-0.04	-0.22**	-0.09	0.00	-0.25**
Time 1 Salience	-0.18**	-0.11*	-0.19**	-0.18**	-0.08	-0.28**
Time 2 Salience	-0.19**	-0.16**	-0.23**	-0.16**	-0.12*	-0.28**
Time 3 Salience	-0.11*	-0.08	-0.18**	-0.15**	-0.04	-0.26**

Note. Race is coded 0=Caucasian, 1=non-Caucasian. QF is quantity-frequency of alcohol consumption (NIAAA, 2003). Behavior and Salience are items taken from the Duke Religion Index (Koenig et al., 1997). * $p < .05$. ** $p < .01$.

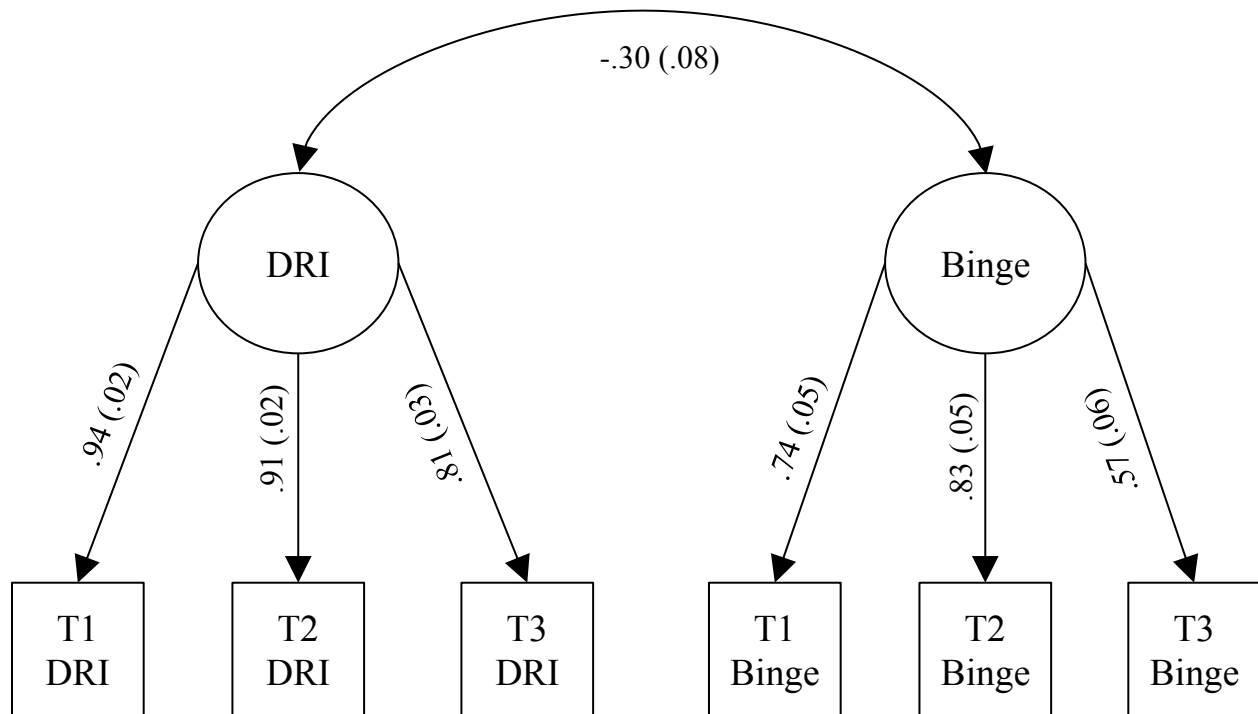
Table 15. Correlations between Fetzer scales and alcohol use outcomes

	Time 2 Binge	Time 3 Binge	Time 2 QF	Time 3 QF
Time 2 DSE	-0.16**	-0.25**	-0.12*	-0.25**
Time 3 DSE	0.06	-0.18**	0.05	-0.24**
Time 2 Negative Coping	-0.02	-0.04	-0.06	-0.05
Time 3 Negative Coping	0.04	-0.02	-0.03	0.04
Time 2 Positive Coping	-0.16**	-0.24**	-0.13*	-0.26**
Time 3 Positive Coping	0.07	-0.18**	0.04	-0.24**

Note. DSE is the Daily Spiritual Experiences scale (Underwood & Teresi, 2002), and positive and Negative Religious Coping are from Pargament and others (1998). QF is quantity-frequency of alcohol consumption (NIAAA, 2003). * $p < .05$. ** $p < .01$.

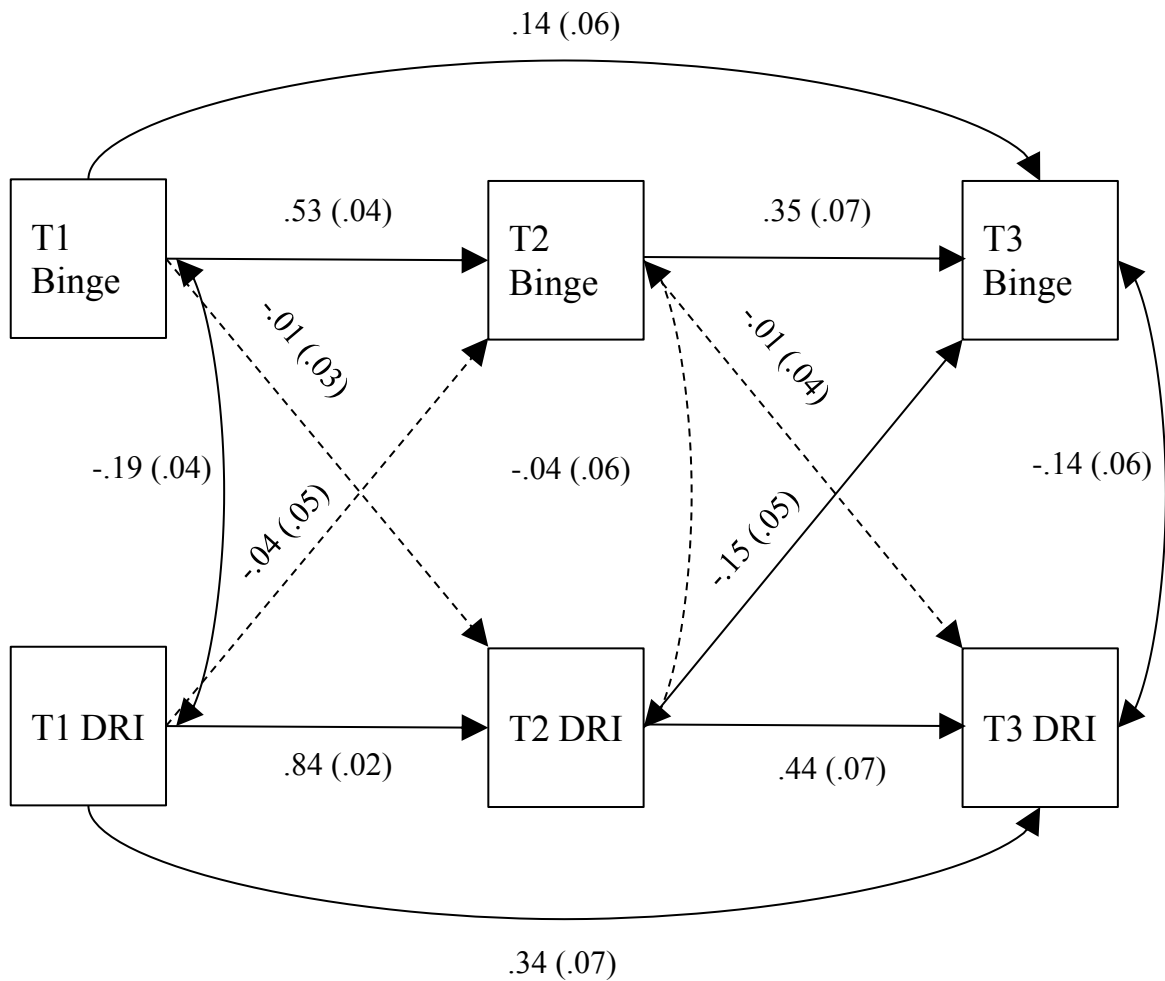
APPENDIX B: FIGURES

Figure 1. A structural equation model demonstrating the stability of generalized religiosity-spirituality and risky drinking over three time points



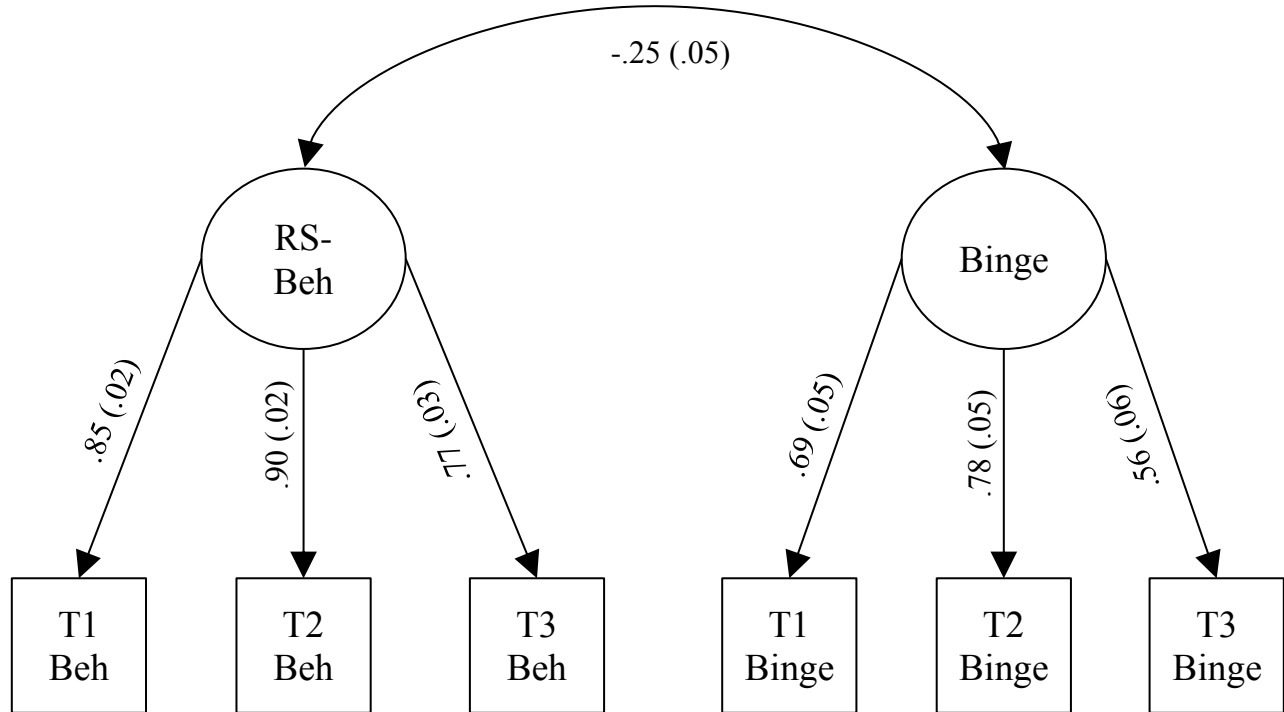
Note. RMSEA = .05 (90% Confidence Interval: 0.00 - 0.10); CFI = 0.99; TLI= 0.99. Factor loadings appear as standardized beta weights with standard error in parenthesis. All factor loadings and correlations are significant at $p < .01$. DRI=Duke Religion Index, the total score (Koenig et al., 1997). Binge = frequency of binge drinking.

Figure 2. Path analysis between general religiosity-spirituality and risky drinking



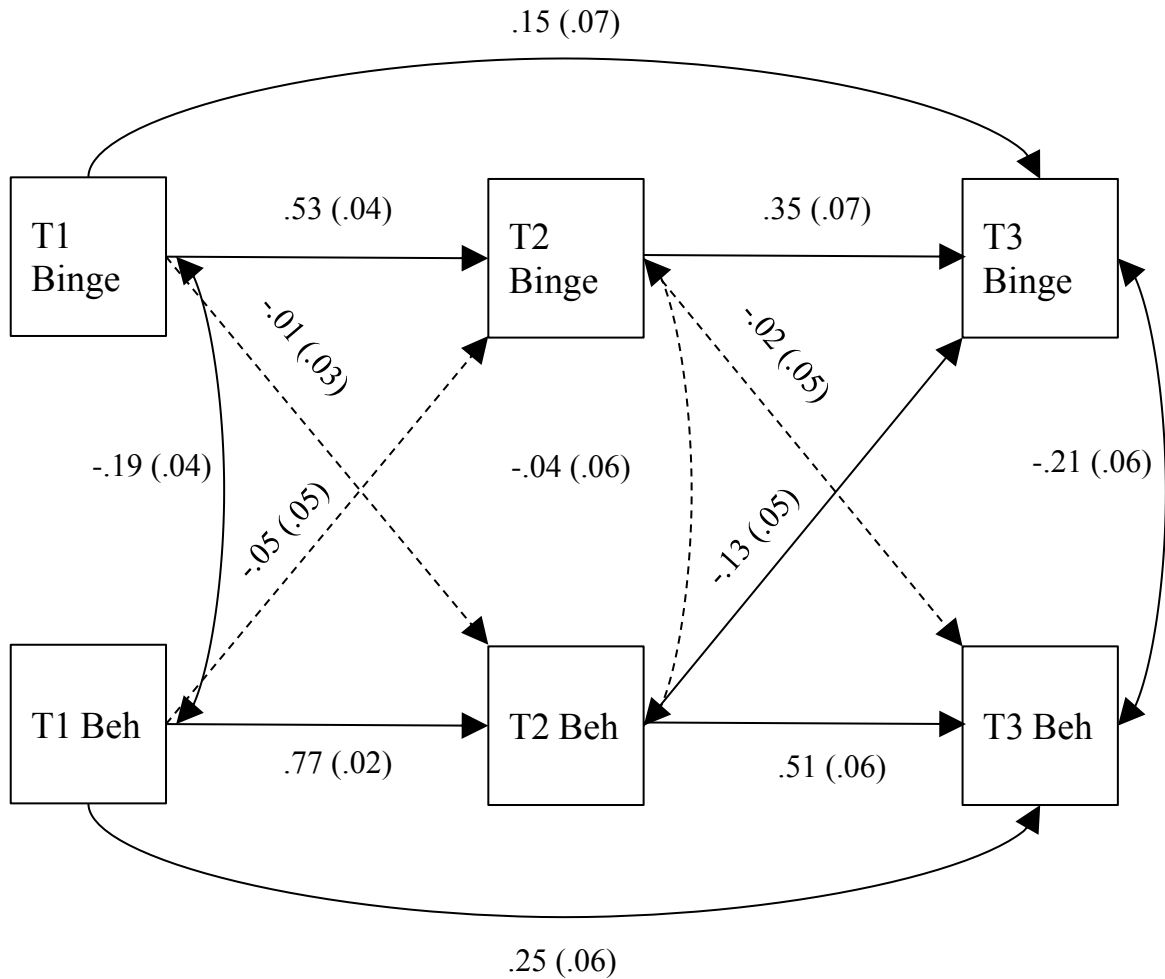
Note. *RMSEA* = .02 (90% Confidence Interval: .00 - .09); *CFI* = 1.00; *TLI* = 0.99. Regressions paths are show with standardized beta weights and standard error in parenthesis. All regression paths and correlations are significant at $p < .01$, except those appearing with a dashed line. DRI = Duke Religion Index (Koenig et al., 1997). Binge = frequency of binge drinking

Figure 3. A structural equation model demonstrating the stability of religious-spiritual behaviors and risky drinking over three time points



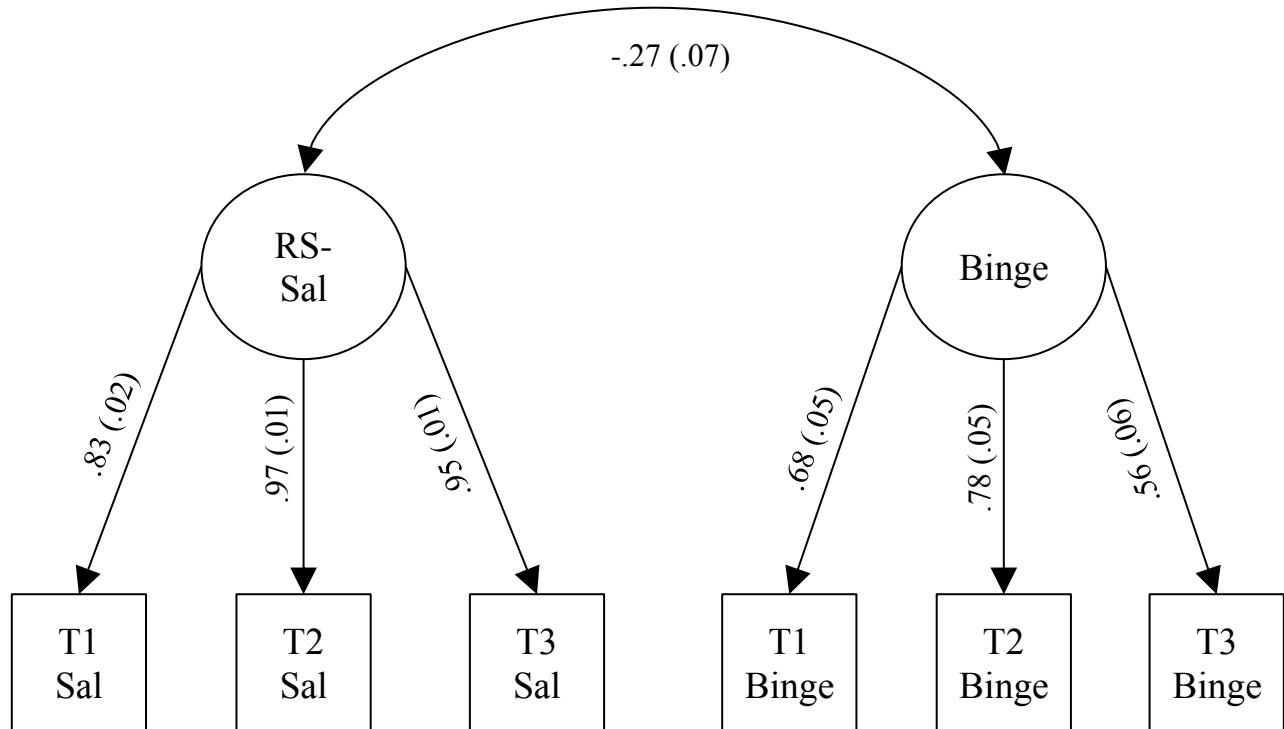
Note. $RMSEA = .06$ (90% Confidence Interval: 0.04 - 0.09); $CFI = 0.98$; $TLI = 0.96$. Factor loadings appear as standardized beta weights with standard error in parenthesis. All factor loadings and correlations are significant at $p < .01$. RS Beh=items from the Duke Religion Index that measure religious-spiritual behaviors (Koenig et al., 1997). Binge=frequency of binge drinking.

Figure 4. Path analysis between religious-spiritual behaviors and risky drinking



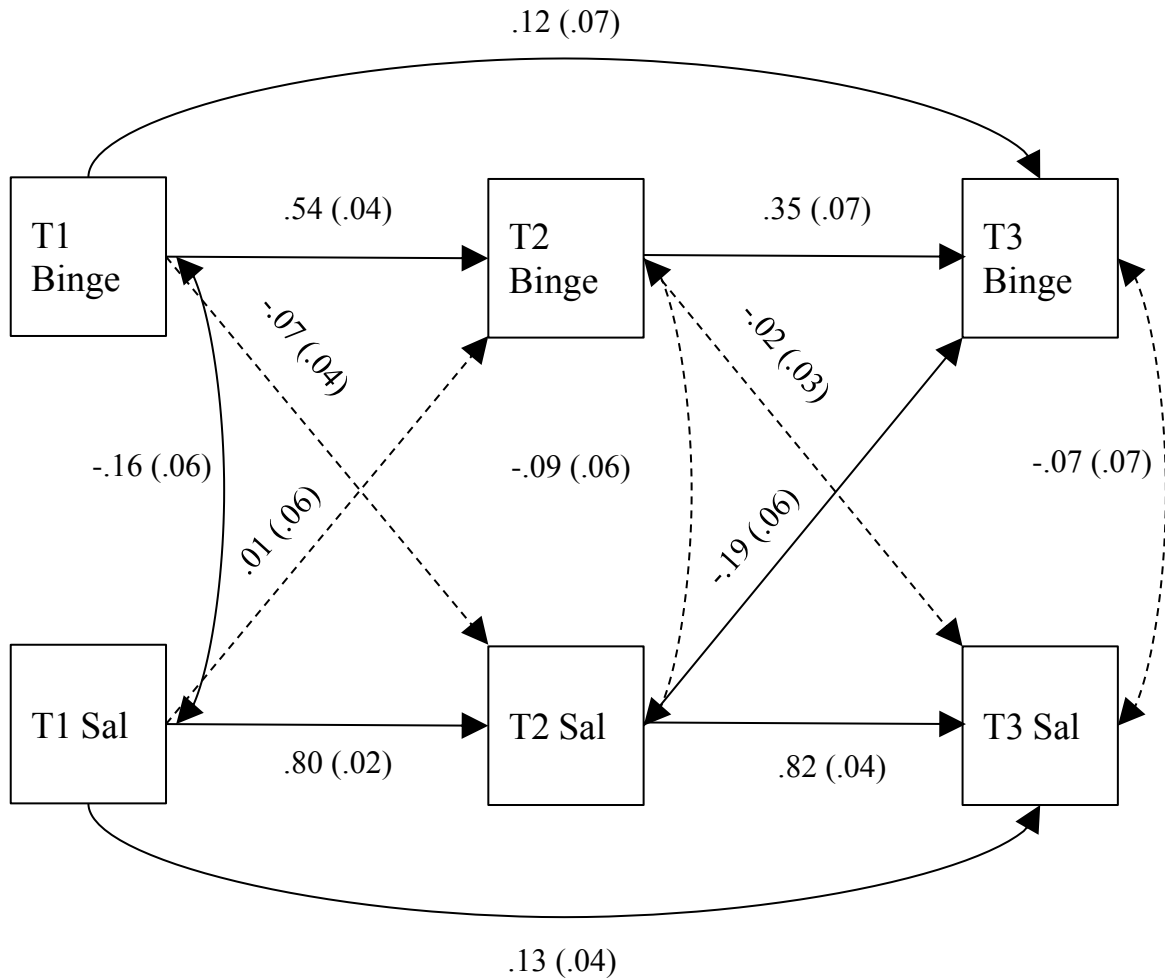
Note. $RMSEA = 0.04$ (90% Confidence Interval: 0.00 - 0.10); $CFI = 1.00$; $TLI = 0.98$. Regressions paths are show with standardized beta weights and standard error in parenthesis. All regression paths and correlations are significant at $p < .01$, except those appearing with a dashed line. Beh=items from the Duke Religion Index, that measure religious-spiritual behaviors (Koenig et al., 1997). Binge=frequency of binge drinking.

Figure 5. A structural equation model demonstrating the stability of religious-spiritual salience and risky drinking over three time points



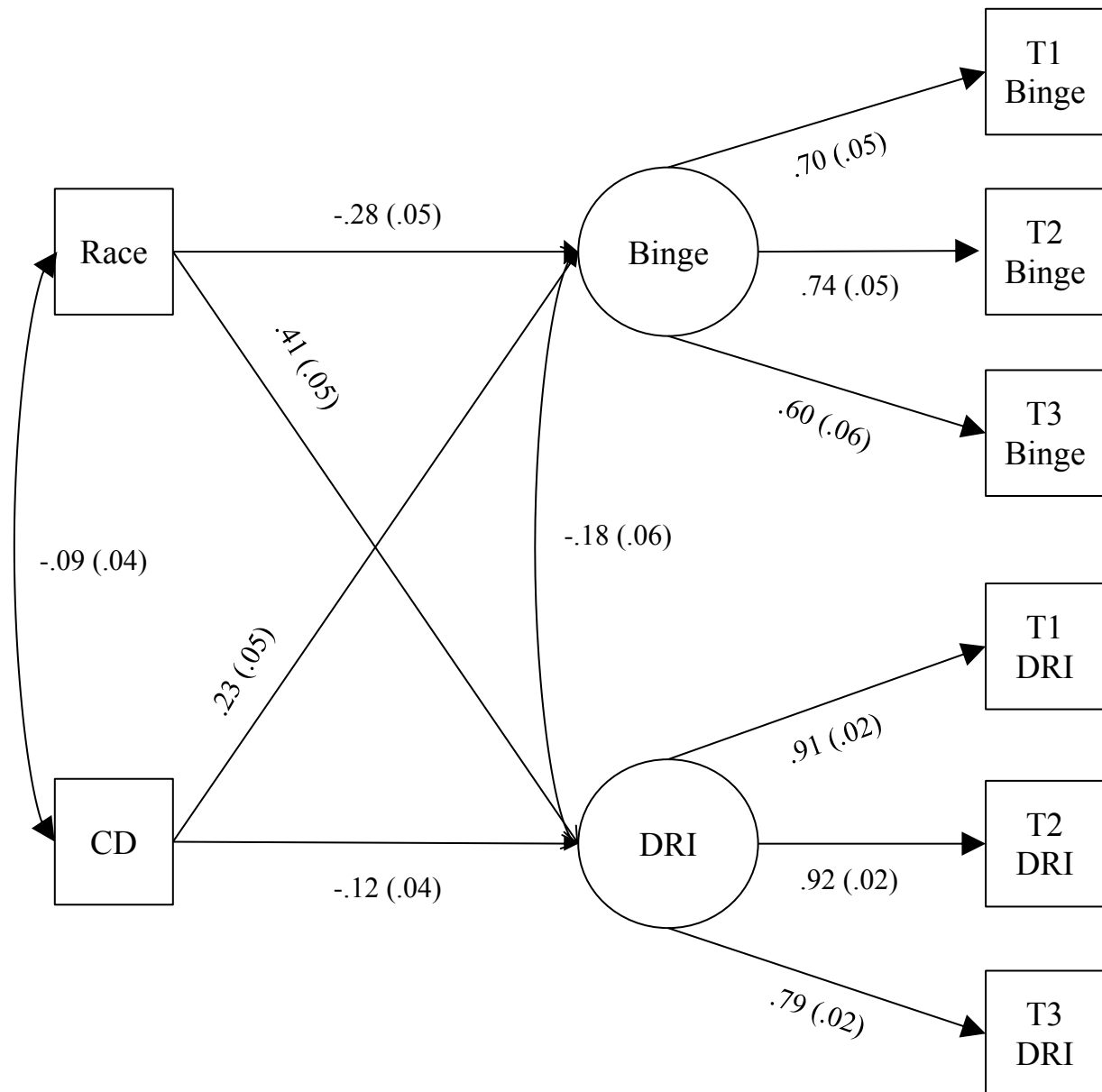
Note. $RMSEA = .04$ (90% Confidence Interval: 0.00 - 0.06); $CFI = 0.99$; $TLI = 0.99$. Factor loadings appear as standardized beta weights with standard error in parenthesis. All factor loadings and correlations are significant at $p < .01$. Sal=items from the Duke Religion Index that measure religious-spiritual salience (Koenig et al., 1997). Binge=frequency of binge drinking.

Figure 6. Path analysis between religious-spiritual salience and risky drinking



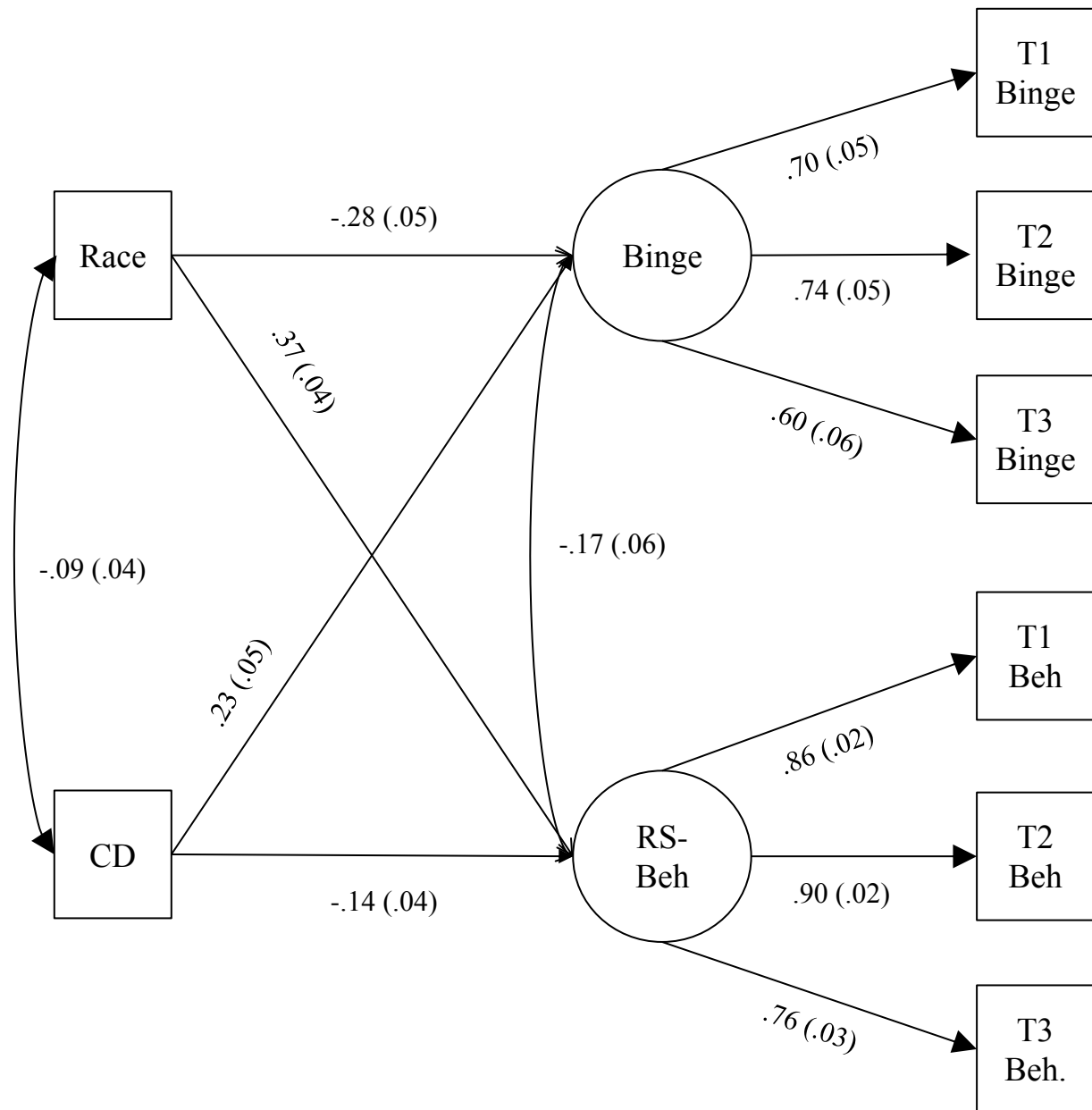
Note. *RMSEA* = 0.00 (90% Confidence Interval: 0.00 - 0.07); *CFI* = 1.00; *TLI* = 1.00. Regressions paths are show with standardized beta weights and standard error in parenthesis. All regression paths and correlations are significant at $p < .01$, except those appearing with a dashed line. Sal=items from the Duke Religion Index that measure religious-spiritual salience (Koenig, et al., 1997). Binge=frequency of binge drinking.

Figure 7. A structural equation model demonstrating the stability of generalized religiosity-spirituality and risky drinking with race and conduct disorder symptoms as covariates



Note. *RMSEA* = .05 (90% Confidence Interval: .03 - .07); *CFI* = .98; *TLI* = 0.96. Factor loadings appear as standardized beta weights with standard error in parenthesis. All factor loadings, regression paths, and correlations are significant at $p < .01$. CD = Conduct Disorder Symptoms. DRI = the total score from the Duke Religion Index (Koenig et al, 1997).

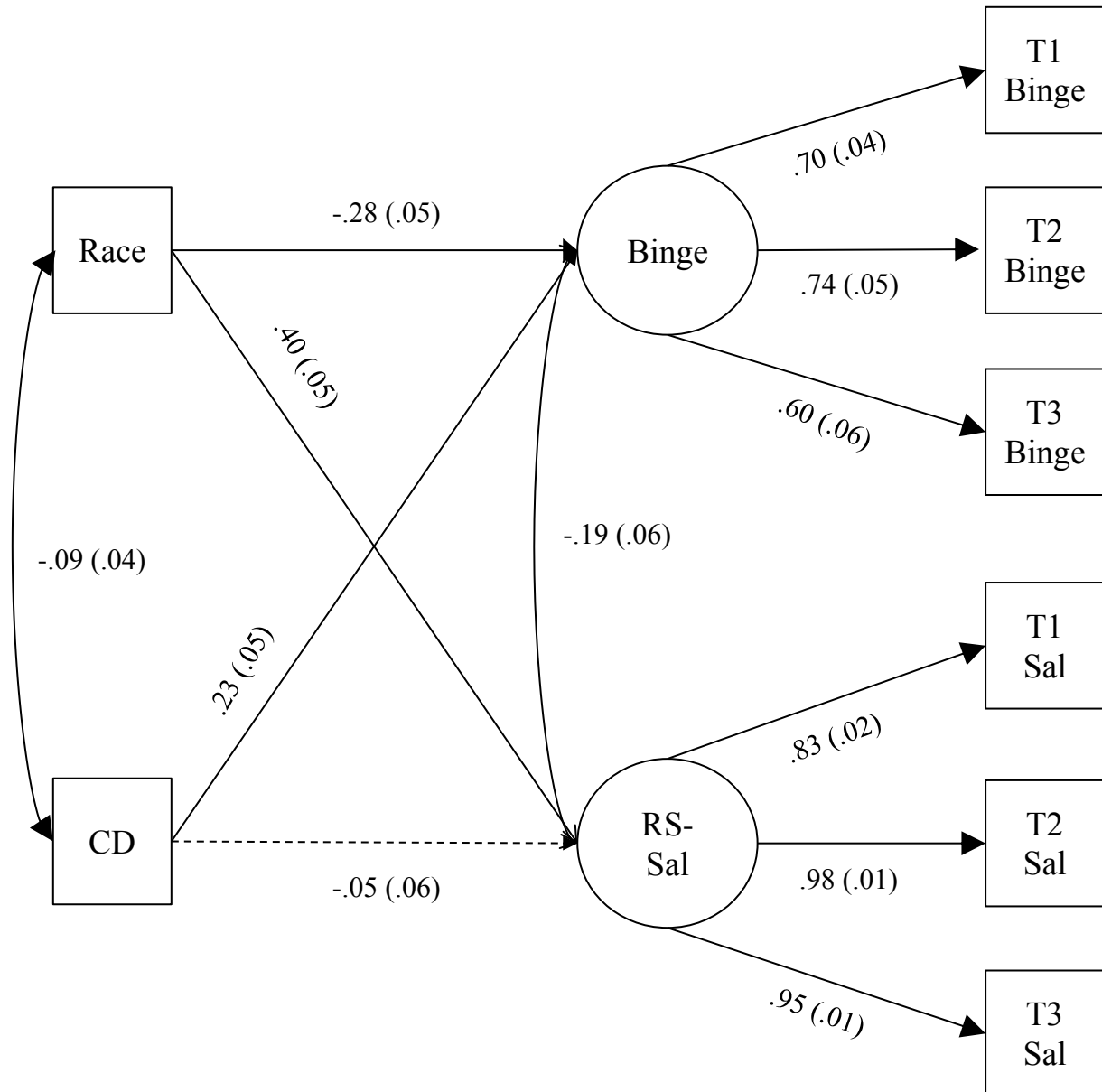
Figure 8. A structural equation model demonstrating the stability of religious-spiritual behaviors and risky drinking with race and conduct disorder symptoms as covariates



Note. RMSEA = 0.06 (90% Confidence Interval: 0.05 – 0.08); CFI = 0.96; TLI = 0.93. Factor loadings appear as standardized beta weights with standard error in parenthesis. All factor loadings, regression paths, and correlations are significant at $p < .01$. CD = Conduct Disorder

Symptoms. RS-Beh=Religious-Spiritual Behavior from the first two items of the Duke Religion Index (Koenig et al., 1997).

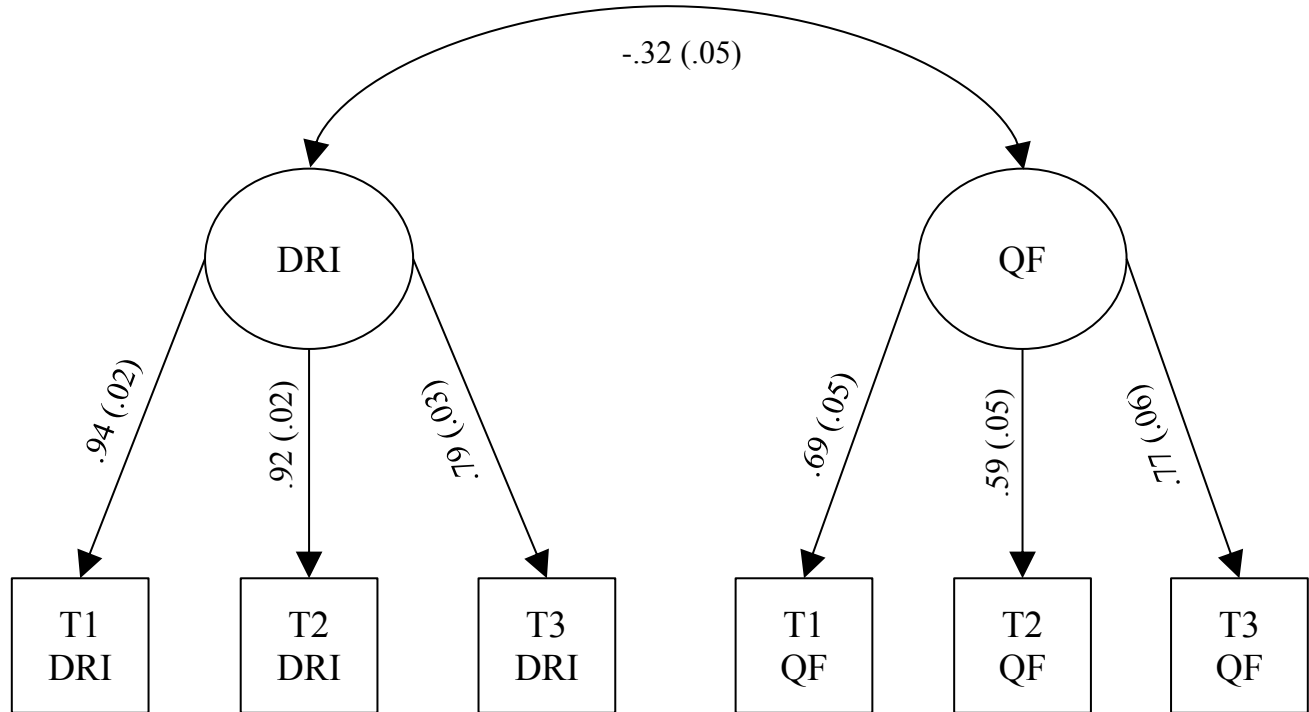
Figure 9. A structural equation model demonstrating the stability of religious-spiritual salience and risky drinking with race and conduct disorder symptoms as covariates



Note. $RMSEA = 0.05$ (90% Confidence Interval: $0.03 - 0.07$); $CFI = 0.98$; $TLI = 0.96$. Factor loadings appear as standardized beta weights with standard error in parenthesis. All factor loadings, regression paths, and correlations are significant at $p < .01$, except when marked with a

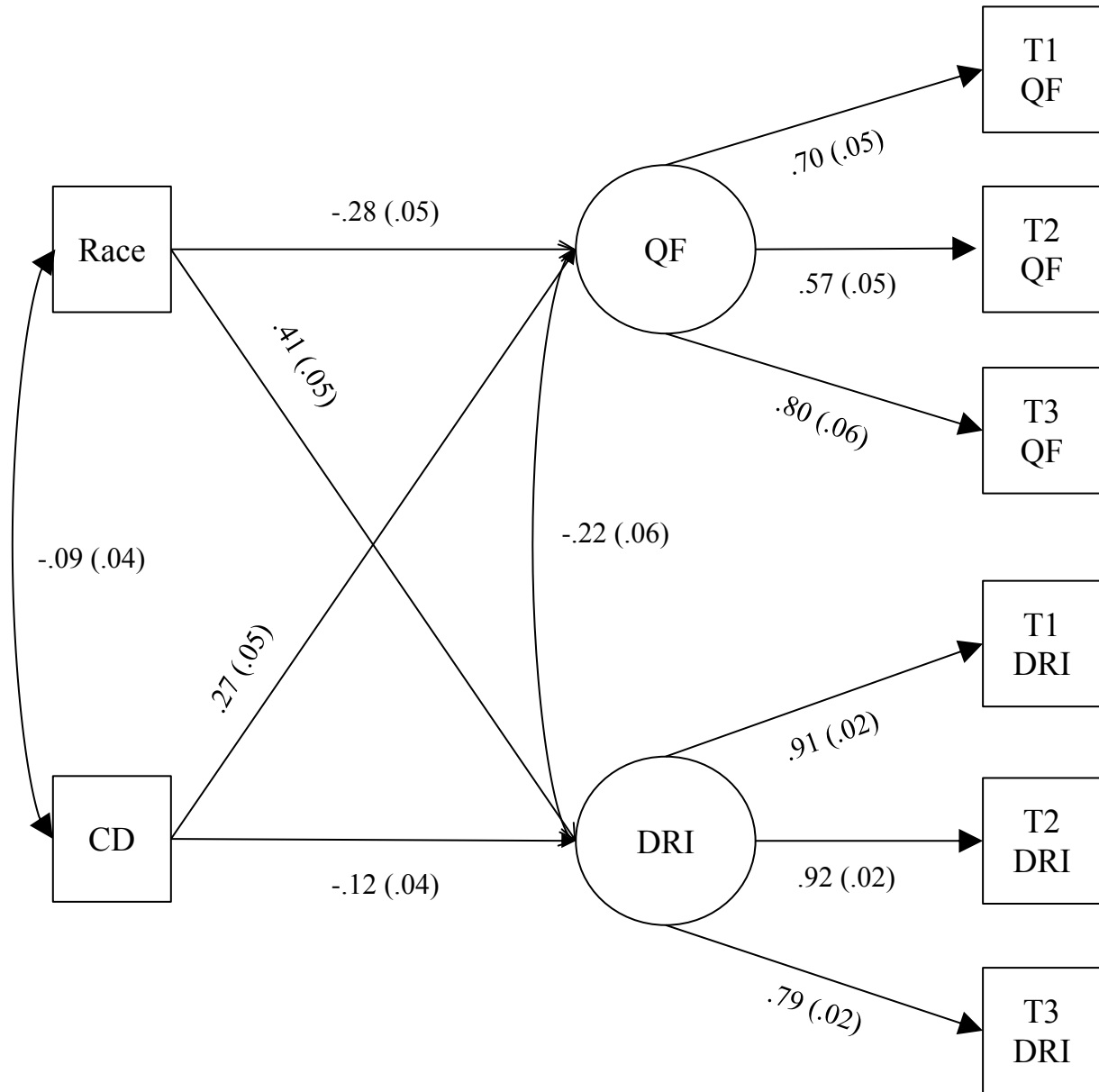
dashed line. CD =Conduct Disorder Symptoms. RS-Sal=Religious-Spiritual Saliency, from the last three items of the Duke Religion Index (Koenig et al., 1997).

Figure 10. A structural equation model demonstrating the stability of generalized religiosity-spirituality and alcohol consumption over three time points



Note. $RMSEA = .02$ (90% Confidence Interval: 0.00 - 0.05); $CFI = 1.00$; $TLI = 1.00$. Factor loadings appear as standardized beta weights with standard error in parenthesis. All factor loadings and correlations are significant at $p < .01$. DRI=Duke Religion Index, the total score (Koenig et al., 1997). QF=quantity x frequency of alcohol use (NIAAA, 2003).

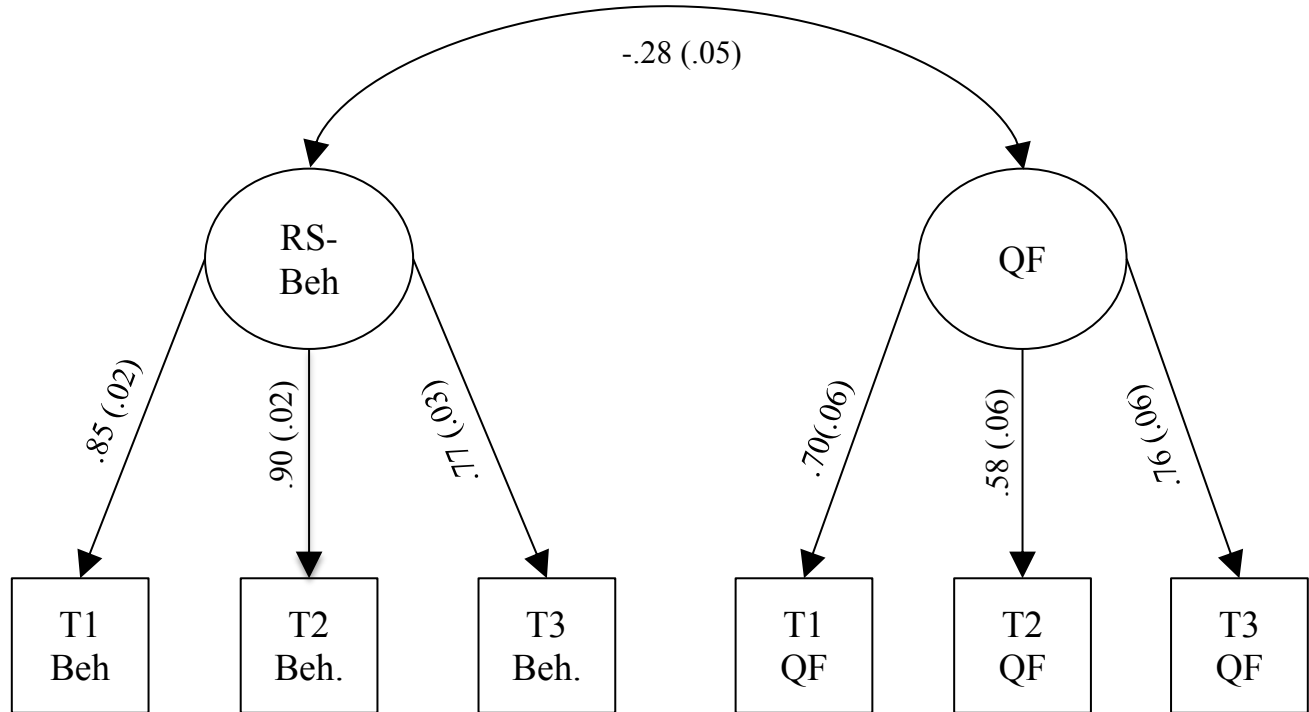
Figure 11. A structural equation model demonstrating the stability of generalized religiosity-spirituality and alcohol consumption with race and conduct disorder symptoms as covariates



Note. $RMSEA = 0.02$ (90% Confidence Interval: $0.00 - 0.04$); $CFI = 1.00$; $TLI = 0.99$. Factor loadings appear as standardized beta weights with standard error in parenthesis. All solid lines are significant at $p < .01$. CD = Conduct Disorder Symptoms. DRI = the total score from the Duke

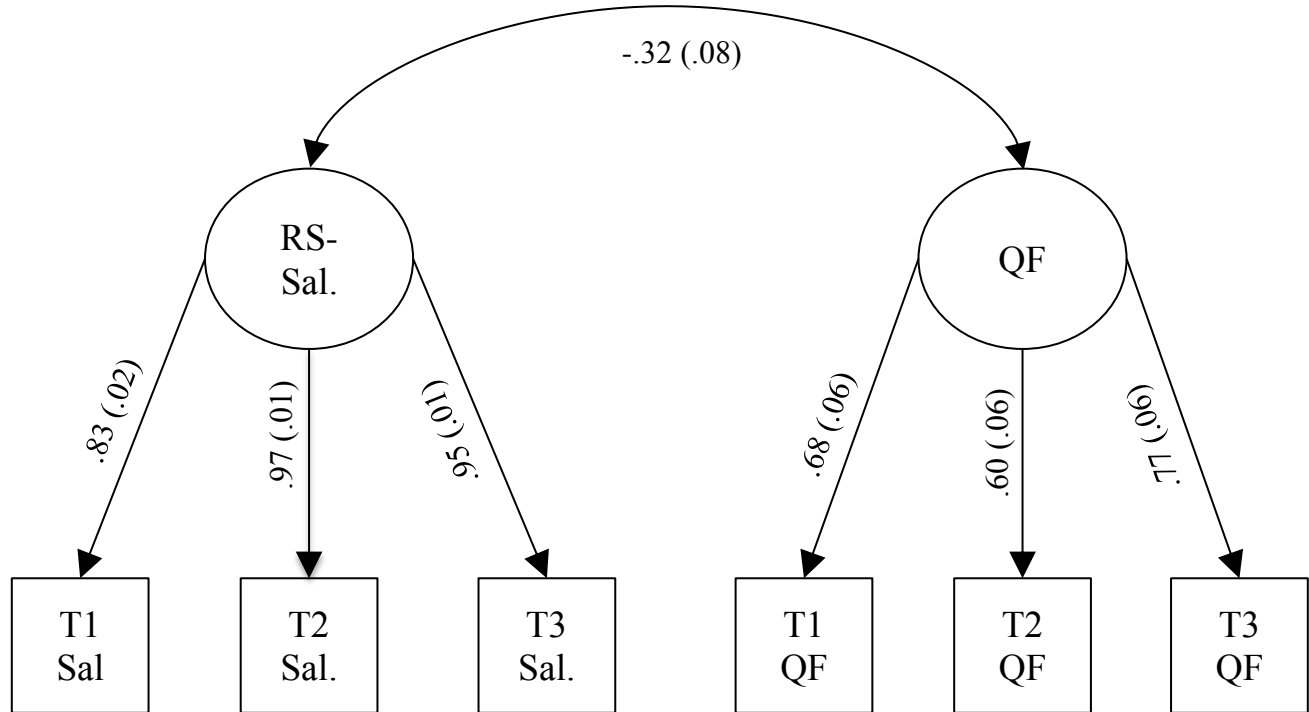
Religion Index (Koenig et al., 1997). $QF = \text{quantity} \times \text{frequency}$ of alcohol consumption (NIAAA, 2003).

Figure 12. A structural equation model demonstrating the stability of religious-spiritual behaviors and alcohol consumption over three time points



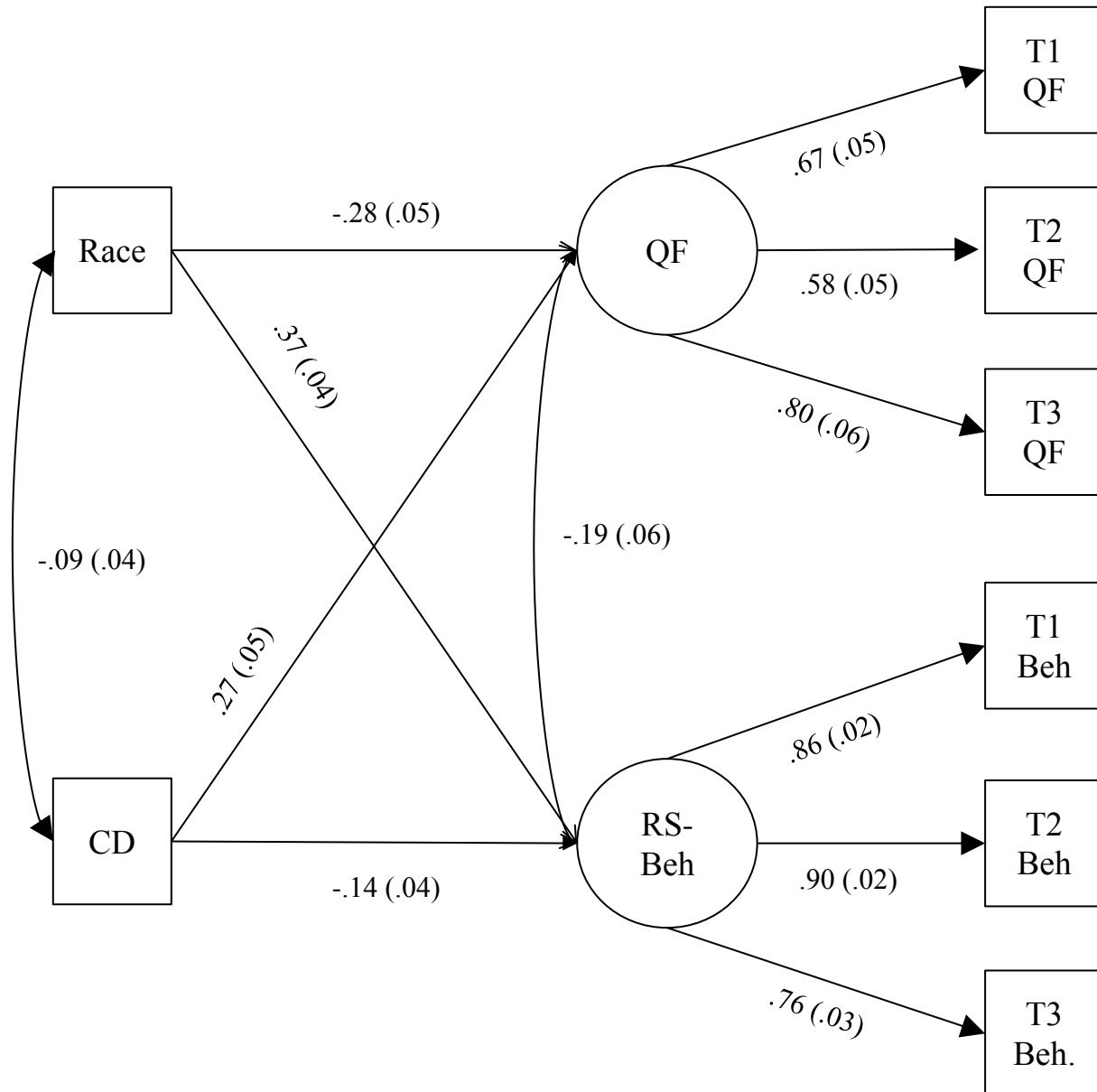
Note. RMSEA = .04 (90% Confidence Interval: 0.02 - 0.07); CFI = 0.99; TLI = 0.98. Factor loadings appear as standardized beta weights with standard error in parenthesis. All factor loadings and correlations are significant at $p < .01$. Beh = items from the Duke Religion Index (Koenig et al., 1997) that measure religious-spiritual behaviors. QF = quantity x frequency of alcohol consumption (NIAAA, 2003).

Figure 13. A structural equation model demonstrating the stability of religious-spiritual salience and alcohol consumption over three time points



Note. *RMSEA* = .04 (90% Confidence Interval: 0.00 - 0.07); *CFI* = 0.99; *TLI* = 0.99. Factor loadings appear as standardized beta weights with standard error in parenthesis. All factor loadings and correlations are significant at $p < .01$. Sal=items from the Duke Religion Index (Koenig et al, 1997) that measure religious-spiritual salience. QF=quantity x frequency of alcohol consumption (NIAAA, 2003).

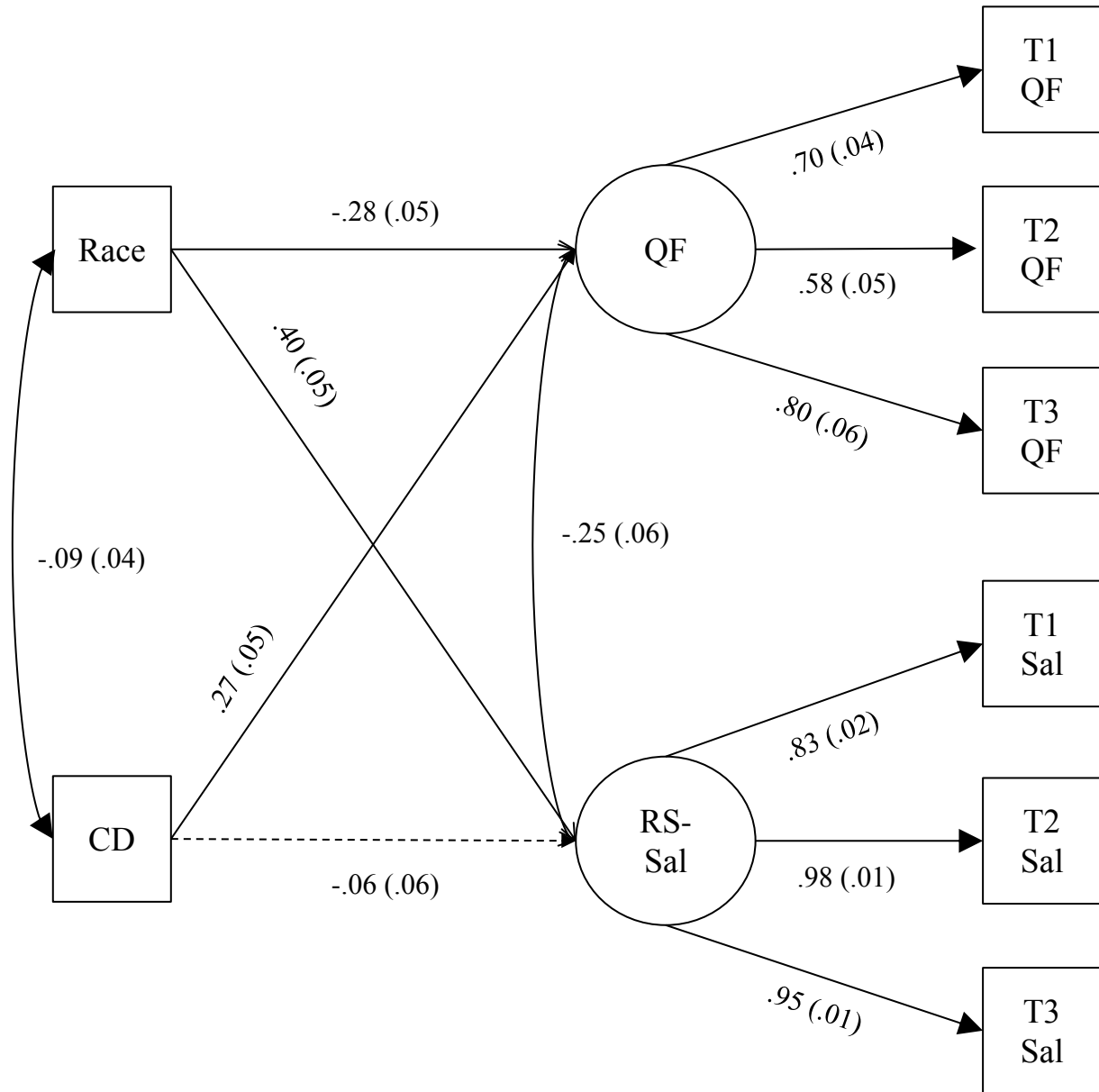
Figure 14. A structural equation model demonstrating the stability of religious-spiritual behaviors and alcohol consumption with race and conduct disorder symptoms as covariates



Note. $RMSEA = 0.04$ (90% Confidence Interval: $0.02 - 0.06$); $CFI = 0.98$; $TLI = 0.97$. Factor loadings appear as standardized beta weights with standard error in parenthesis. All solid lines are significant at $p < .01$. CD = Conduct Disorder Symptoms. RS-Beh = items from the Duke

Religion Index (Koenig et al., 1997) that measure religious-spiritual behaviors. QF=quantity x frequency of alcohol consumption (NIAAA, 2003)

Figure 15. A structural equation model demonstrating the stability of religious-spiritual salience and alcohol consumption over three time points with race and conduct disorder symptoms as covariates

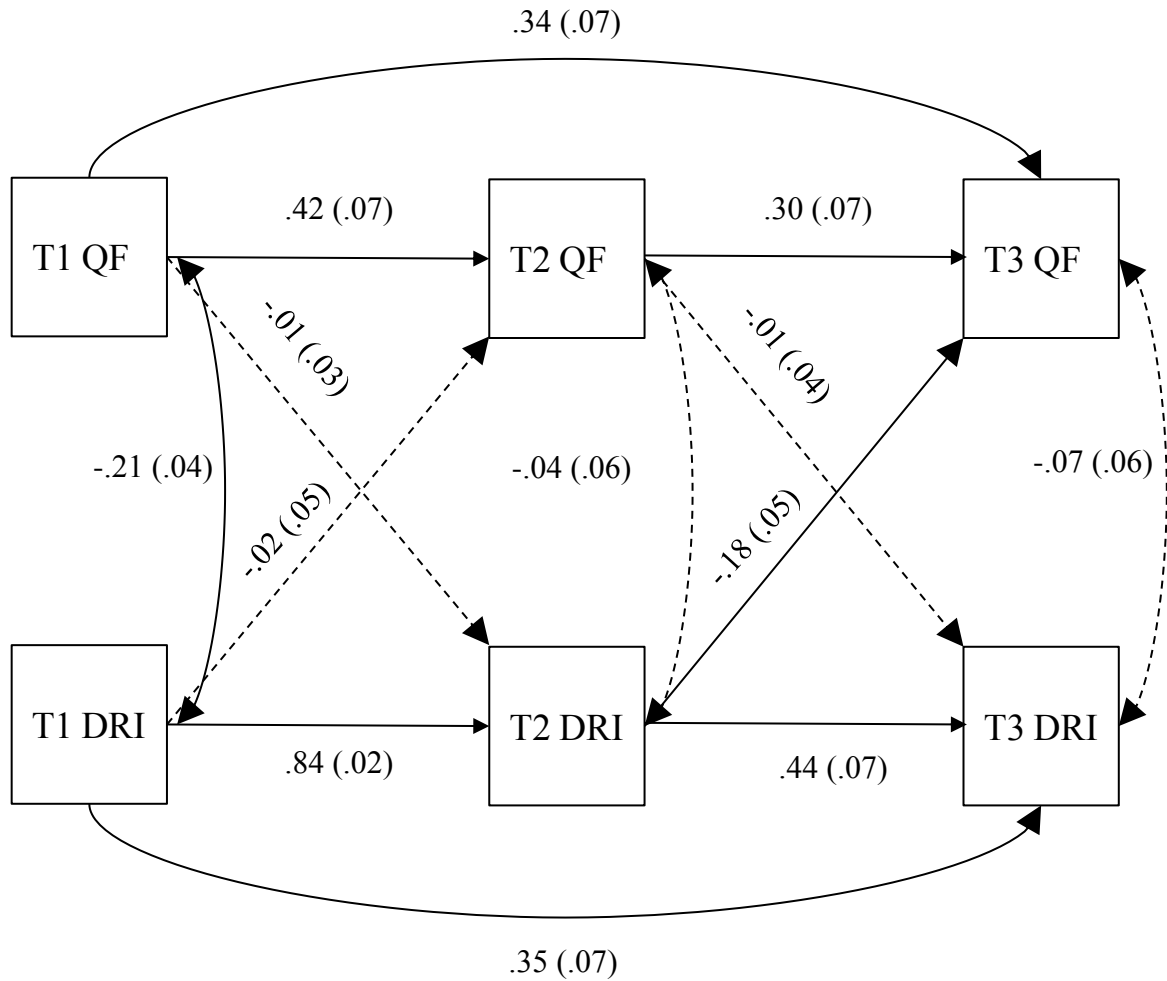


Note. *RMSEA* = 0.03 (90% Confidence Interval: 0.00 – 0.05); *CFI* = 0.99; *TLI* = 0.98. Factor loadings appear as standardized beta weights with standard error in parenthesis. All solid lines are significant at $p < .01$. CD = Conduct Disorder Symptoms. RS Sal = the total score of items from

the Duke Religion Index (Koenig et al., 1997) that measure religious-spiritual salience.

QF=quantity x frequency of alcohol consumption (NIAAA, 2003).

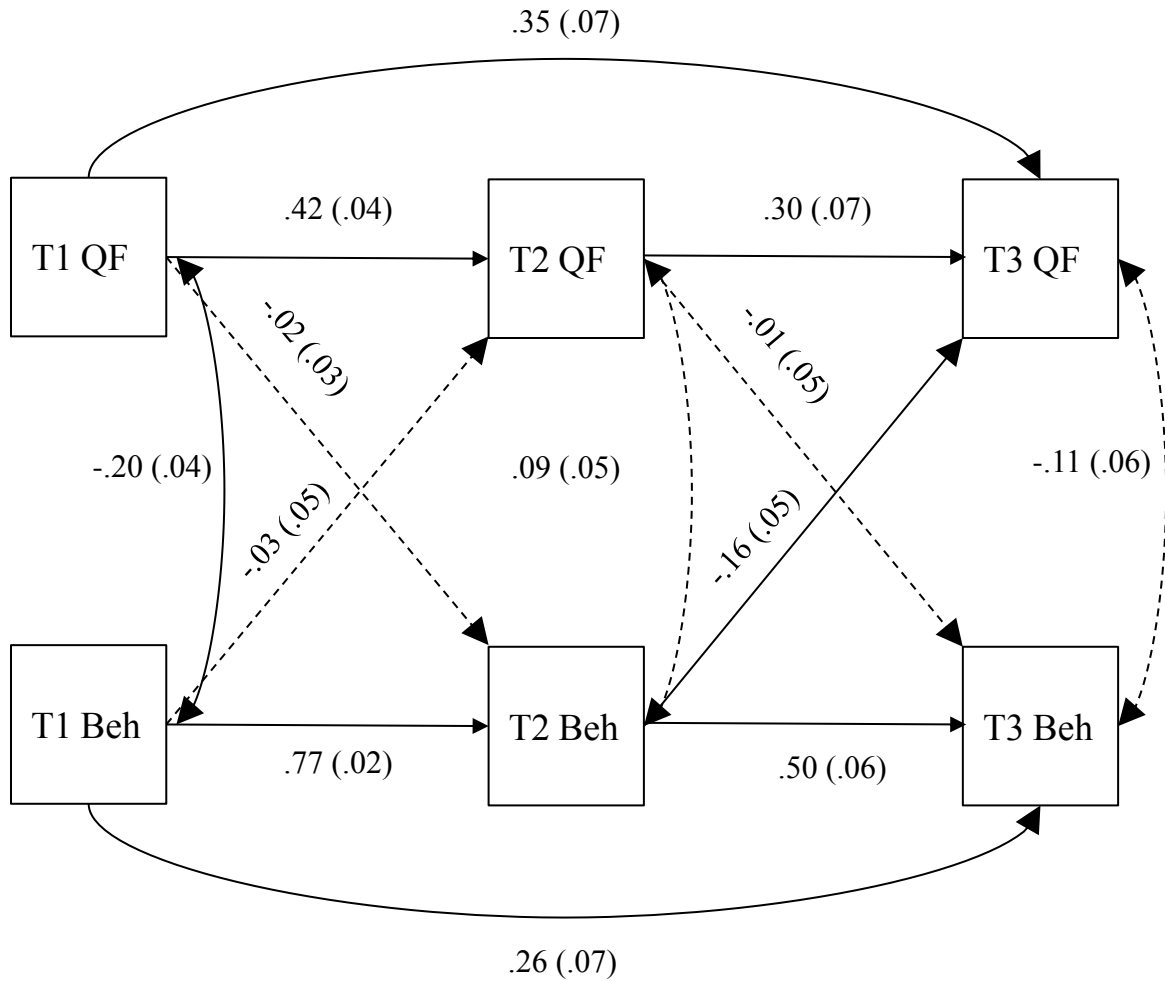
Figure 16. Path analysis between generalized religiosity-spirituality and quantity-frequency of alcohol consumption



Note. *RMSEA* = 0.03 (90% Confidence Interval: 0.00 - 0.09); *CFI* = 1.00; *TLI* = 0.99.

Regressions paths are show with standardized beta weights and standard error in parenthesis. All regression paths and correlations are significant at $p < .01$, except those appearing with a dashed line. DRI = Religiosity-spirituality, the total score from the Duke Religion Index (Koenig, et al., 1997). QF=quantity x frequency of alcohol consumption (NIAAA, 2003).

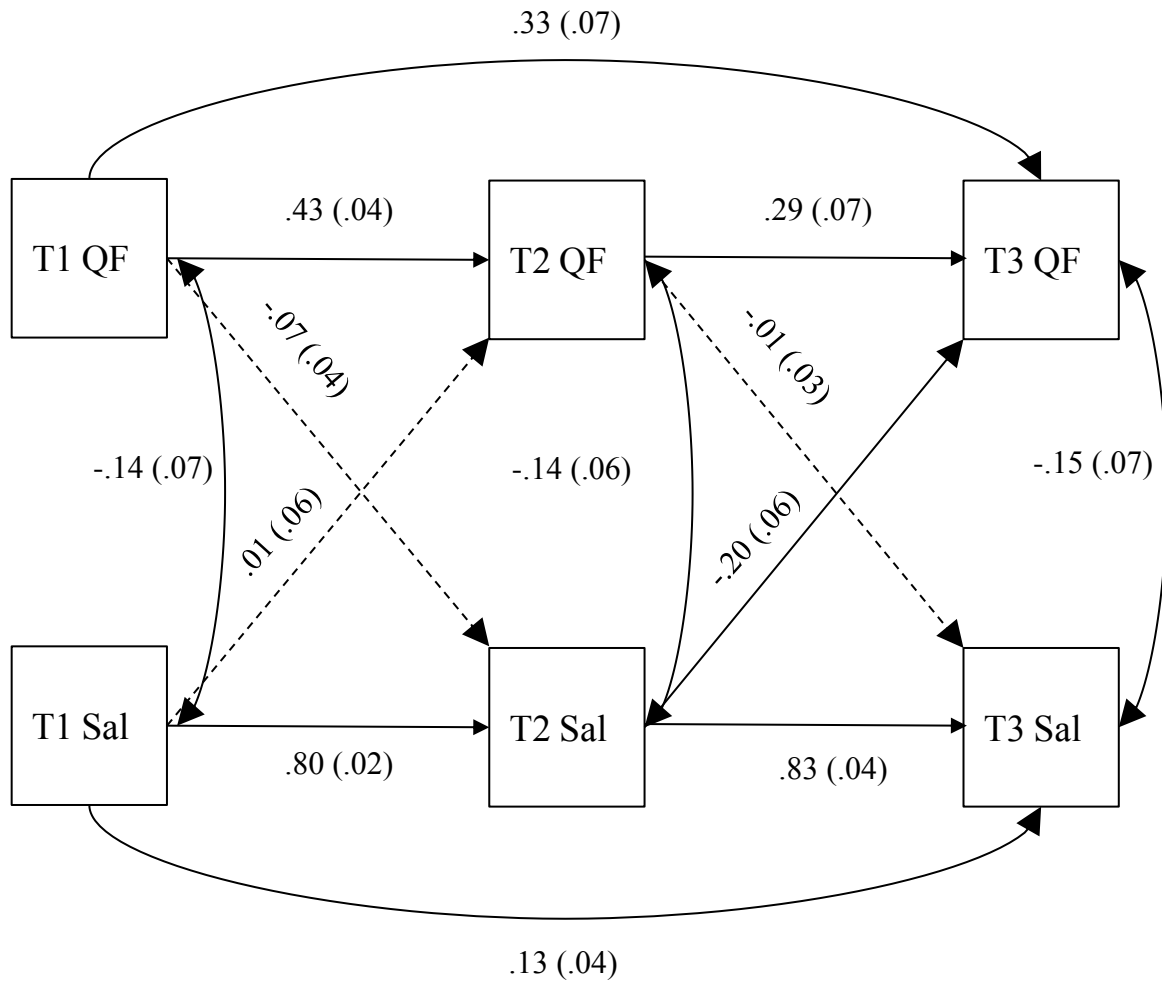
Figure 17. Path analysis between religious-spiritual behaviors and quantity-frequency of alcohol consumption



Note. *RMSEA* = 0.00 (90% Confidence Interval: 0.00 - 0.06); *CFI* = 1.00; *TLI* = 1.00.

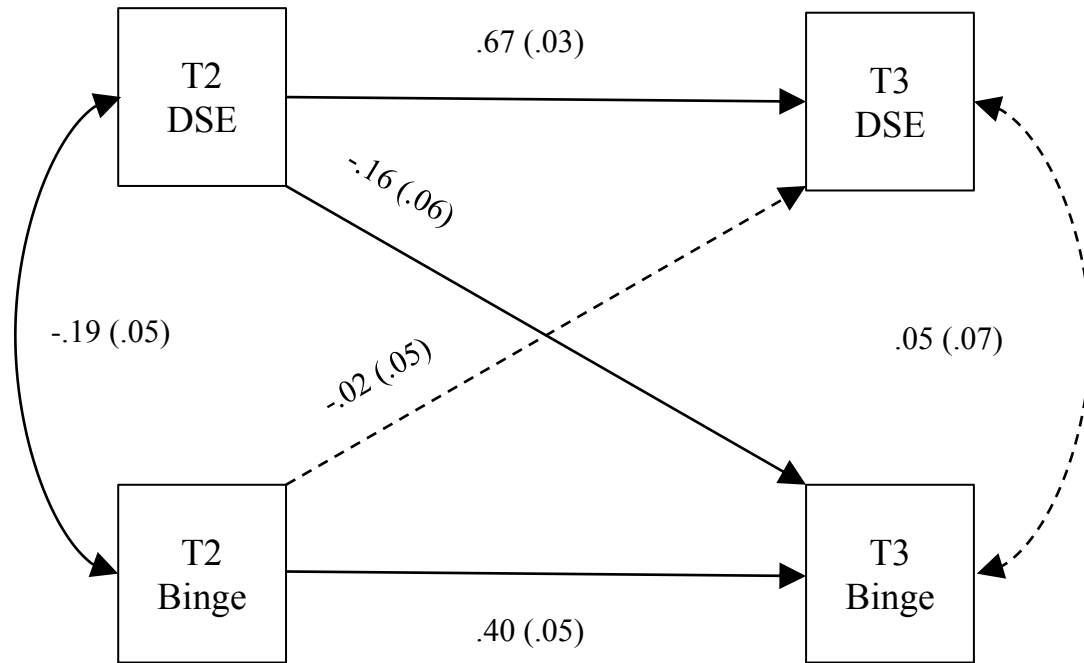
Regressions paths are show with standardized beta weights and standard error in parenthesis. All regression paths and correlations are significant at $p < .01$, except those appearing with a dashed line. Beh=items from the Duke Religion Index (Koenig et al., 1997) that measure religious-spiritual behaviors. QF = quantity x frequency of alcohol consumption (NIAAA, 2003).

Figure 18. Path analysis between religious-spiritual salience and quantity-frequency of alcohol consumption.



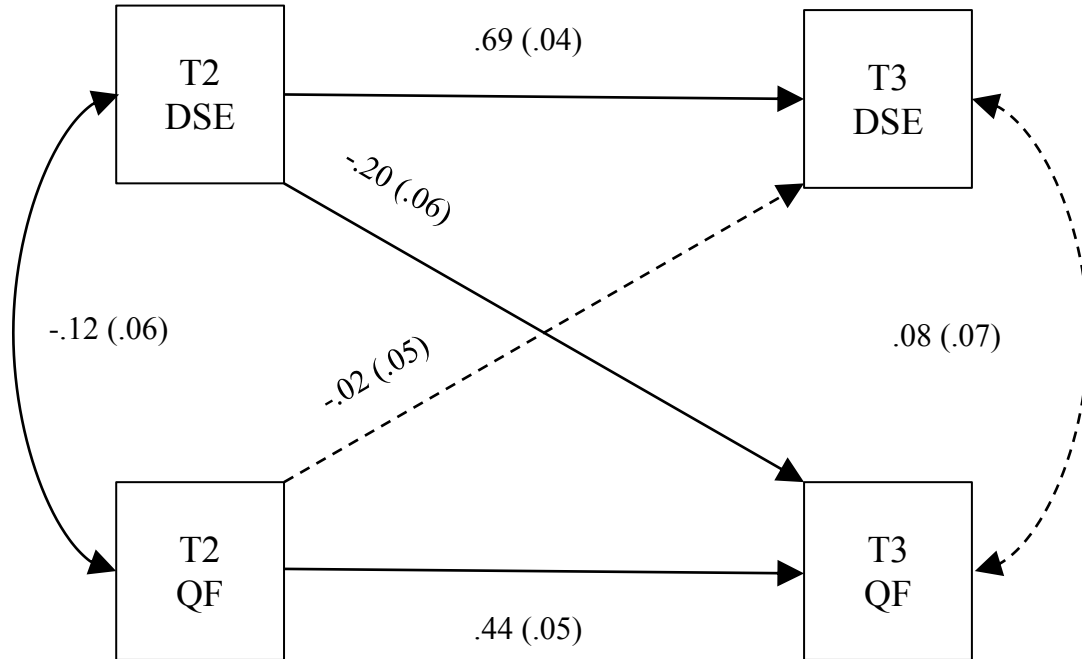
Note. *RMSEA* = 0.00 (90% Confidence Interval: 0.00 - 0.06); *CFI* = 1.00; *TLI* = 1.00. Regressions paths are show with standardized beta weights and standard error in parenthesis. All regression paths and correlations are significant at $p < .01$, except those appearing with a dashed line. Sal= the total score of items from the Duke Religion Index (Koenig et al., 1997) that measure religious-spiritual salience. QF=quantity x frequency of alcohol consumption (NIAAA, 2003).

Figure 19. Path analysis between Daily Spiritual Experiences and binge drinking



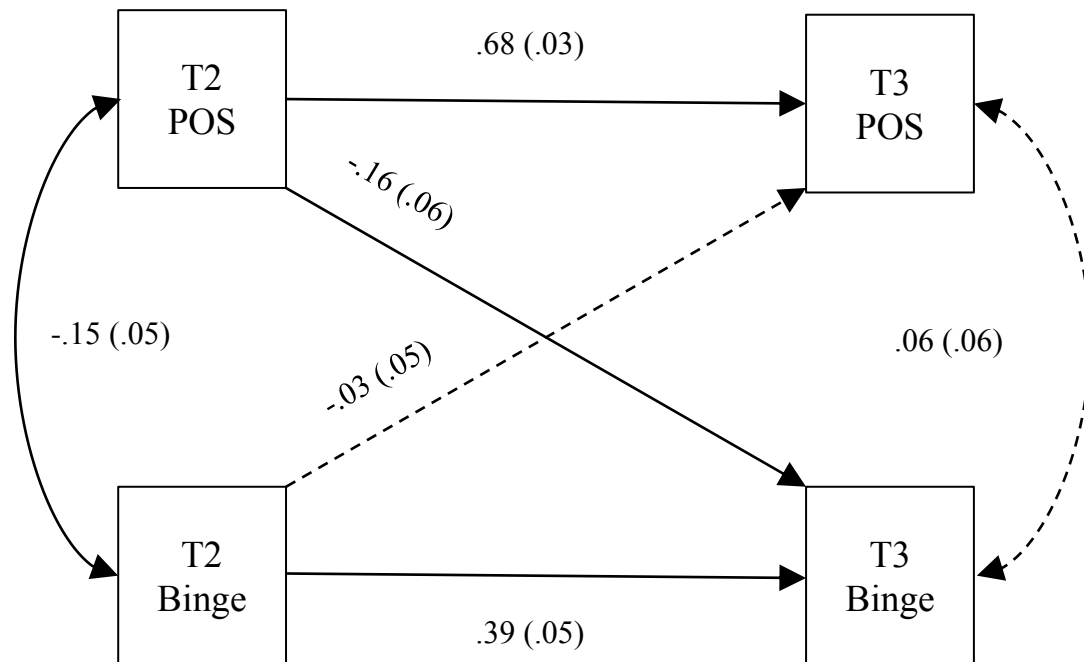
Note. $RMSEA=0.00$ (90% Confidence Interval 0.00 – 0.00); $CFI=1.00$; $TLI=1.00$. DSE is the Daily Spiritual Experiences scale (Underwood & Teresi, 2002), the total score. Solid lines mark significant ($p<.01$) relationships, and non-significant ($p>.05$) relationships are marked with a dashed line.

Figure 20. Path analysis between Daily Spiritual Experiences and quantity-frequency of alcohol consumption



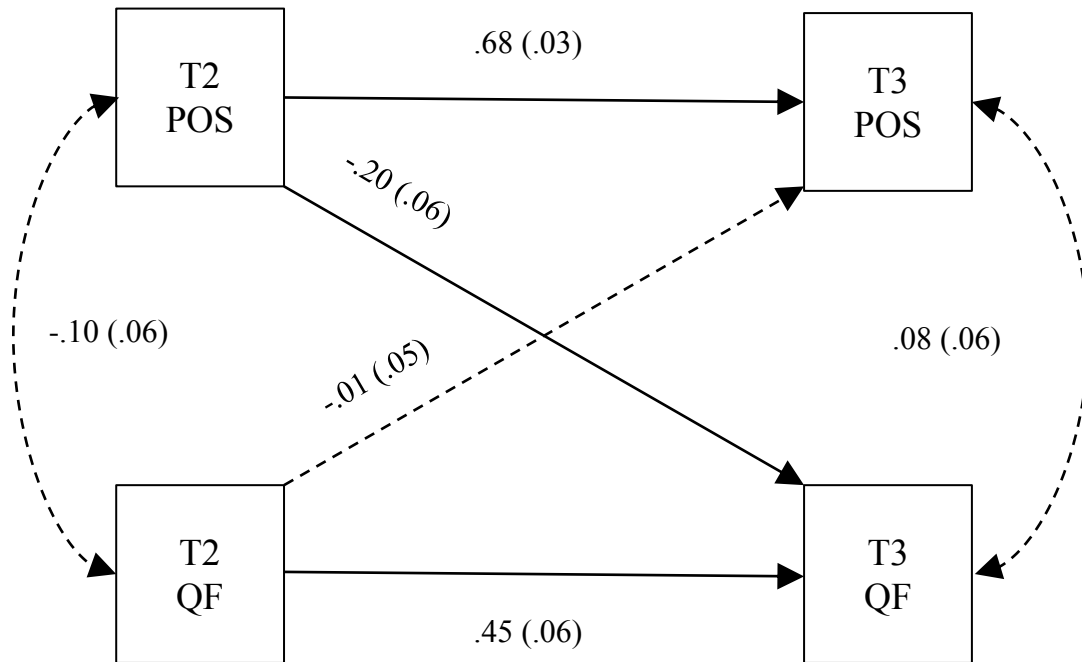
Note. $RMSEA=0.00$ (90% Confidence Interval 0.00 – 0.00); $CFI=1.00$; $TLI=1.00$. DSE is the Daily Spiritual Experiences Scale (Underwood & Teresi, 2002), the total score. QF=quantity x frequency of alcohol consumption (NIAAA, 2003). Solid lines mark significant ($p<.01$) relationships, and non-significant ($p>.05$) relationships are marked with a dashed line.

Figure 21. Path analysis between Positive Religious Coping and frequency of binge drinking



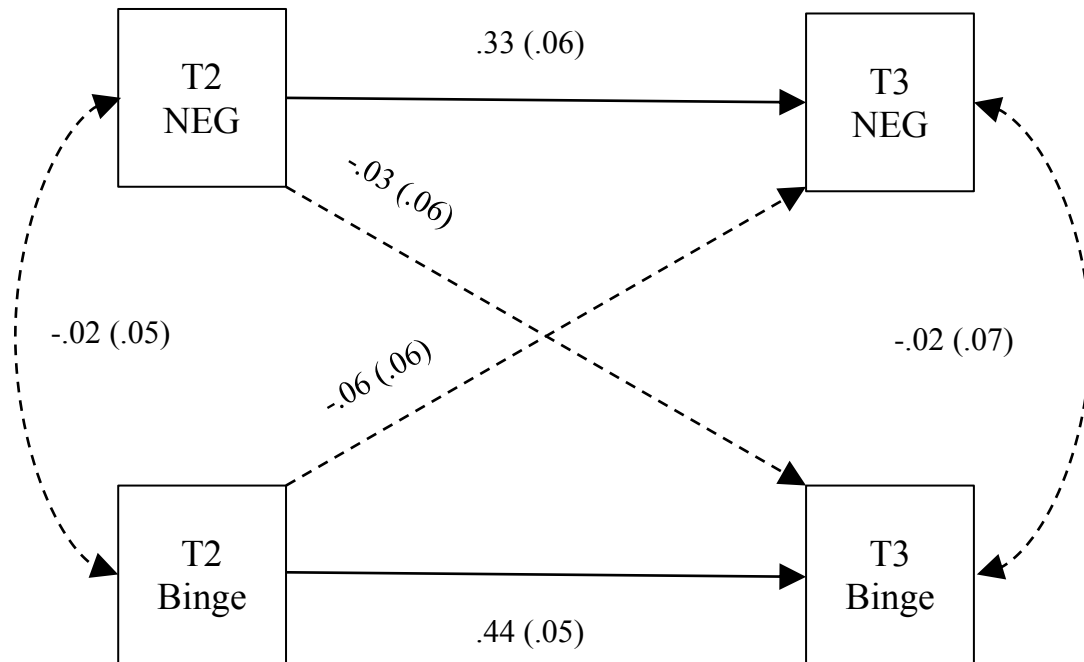
Note. $RMSEA=0.00$ (90% Confidence Interval 0.00 – 0.00); $CFI=1.00$; $TLI=1.00$. POS is the Positive Religious Coping scale (Pargament et al., 1998), the total score. Solid lines mark significant ($p < .01$) relationships, and non-significant ($p > .05$) relationships are marked with a dashed line.

Figure 22. Path analysis between Positive Religious Coping and quantity-frequency of alcohol consumption



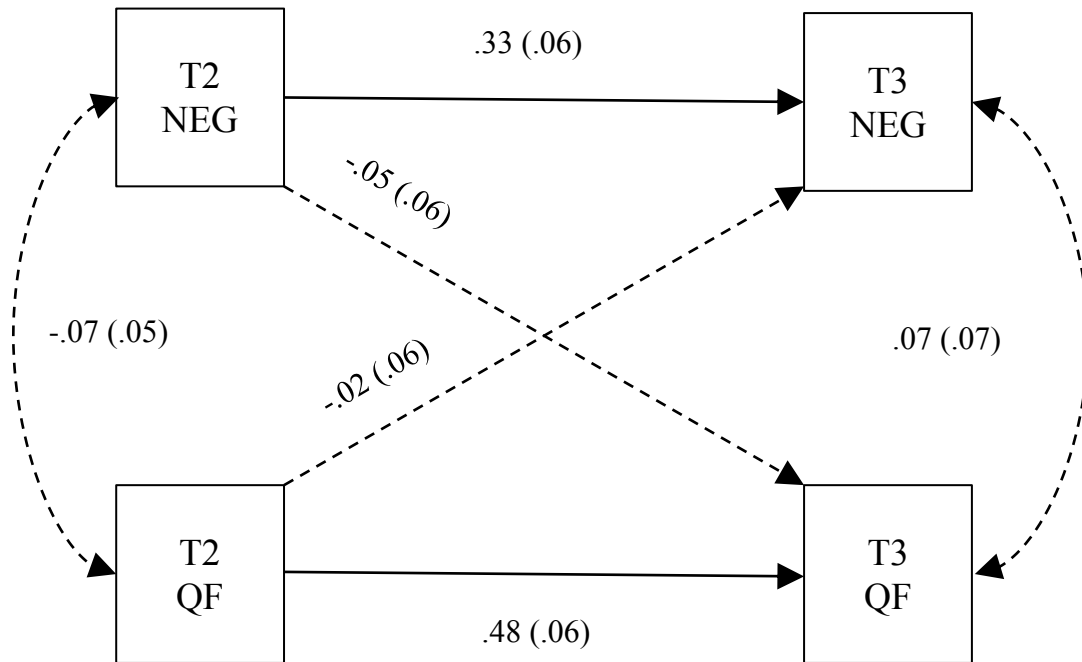
Note. $RMSEA=0.00$ (90% Confidence Interval 0.00 – 0.00); $CFI=1.00$; $TLI=1.00$. POS is the Positive Religious Coping scale (Pargament et al., 1998), the total score. QF=quantity x frequency of alcohol consumption (NIAAA, 2003). Solid lines mark significant ($p<.01$) relationships, and non-significant ($p>.05$) relationships are marked with a dashed line.

Figure 23. Path analysis between Negative Religious Coping and frequency of binge drinking



Note. $RMSEA=0.00$ (90% Confidence Interval 0.00 – 0.00); $CFI=1.00$; $TLI=1.00$. NEG is the Negative Religious Coping Scale (Pargament et al., 1998), the total score. Solid lines mark significant ($p<.01$) relationships, and non-significant ($p>.01$) relationships are marked with a dashed line.

Figure 24. Path analysis between Negative Religious Coping and quantity-frequency of alcohol consumption.



Note. *RMSEA*=0.00 (90% Confidence Interval 0.00 – 0.00); *CFI*=1.00; *TLI*=1.00. NEG is the Negative Religious Coping Scale (Pargament et al., 1998), the total score. QF=quantity x frequency of alcohol consumption (NIAAA, 2003). Solid lines mark significant ($p < .01$) relationships, and non-significant ($p > .05$) relationships are marked with a dashed line.

APPENDIX C: CONDUCT DISORDER QUESTIONS

Before the age of 15, did you ever...

	YES	NO
...bully, threaten or intimidate others?		
...often start physical fights?		
...use a weapon that could cause serious physical injury (e.g. a bat, knife or gun?)		
...do things to others that were physically cruel?		
...do things to animals that were physically cruel?		
...steal something while physically confronting someone?		
...force someone into sex?		
...deliberately set fires that caused serious damage?		
...deliberately destroy others' property?		
...break into someone's house, building or car?		
...often lie to obtain goods or favors, or to avoid obligations?		
...steal things that were valuable without confronting someone (e.g. shoplifting)?		
...stay out at night despite parental prohibitions? (before age 13)		
...run away from home?		
...go missing from school? (before age 13)		

APPENDIX D: DUKE RELIGION INDEX

How often do you attend religious services or meetings?

More than once a week	A few times a year
Once a week	Once a year or less
A few times per month	Never

How often do you spend your time in private religious activities such as prayer, meditation or reading holy texts?

More than once a week	A few times a year
Once a week	Once a year or less
A few times a month	Never

In my life, I experience the presence of God, or the divine.

Definitely True	Tends to be true	Unsure	Tends NOT to be true	Definitely NOT true
-----------------	------------------	--------	----------------------	---------------------

My religious beliefs are what really lie behind my whole approach to life.

Definitely True	Tends to be true	Unsure	Tends NOT to be true	Definitely NOT true
-----------------	------------------	--------	----------------------	---------------------

I try to carry my religion over into all my other dealings in life.

Definitely True	Tends to be true	Unsure	Tends NOT to be true	Definitely NOT true
-----------------	------------------	--------	----------------------	---------------------

APPENDIX E: DAILY SPIRITUAL EXPERIENCES

Please indicate how often you have had the following experiences:

	Many times per day	Everyday	Most days	Some days	Once in a while	Never
I feel God's presence						
I find strength and comfort in my religion or spirituality						
I felt deep inner peace or harmony						
I desire to be in closer union with God						
I feel God's love for me directly, or through others						
I am spiritually touched by the beauty of creation						

APPENDIX F: POSITIVE RELIGIOUS COPING

Think about how you try to understand and deal with major problems in your life. To what extent is each involved with the way you cope?

	A great deal	Quite a bit	Somewhat	Not at all
I think about how my life is part of a larger spiritual force				
I work together with God as partners to get through hard times				
I look to God for strength, support and guidance in crises				

APPENDIX G: NEGATIVE RELIGIOUS COPING

Think about how you try to understand and deal with major problems in your life. To what extent is each involved with the way you cope?

	A great deal	Quite a bit	Somewhat	Not at all
I feel that stressful situations are God's way of punishing me for my sins or lack of spirituality				
I wonder whether God has abandoned me				
I try and make sense of the situation and decide what to do without relying on God				

REFERENCES

- Allport, G.W. (1950). *The individual and his religion*. London: Macmillan.
- American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed., text rev.). Washington, DC: Author.
- Argue, A., Johnson, D. R., & White, L. K. (1999). Age and religiosity: Evidence from a three-wave panel analysis. *Journal For The Scientific Study Of Religion, 38*(3), 423-435.
doi:10.2307/1387762
- Arnett, J. (2000). Emerging adulthood: A theory of development from the late teens through the twenties. *American Psychologist, 55*(5), 469-480. doi:10.1037/0003-066X.55.5.469
- Arnett, J., & Jensen, L. (2002). A congregation of one: Individualized religious beliefs among emerging adults. *Journal Of Adolescent Research, 17*(5), 451-467.
doi:10.1177/0743558402175002
- Arnett, J. (2005). The developmental context of substance use in emerging adulthood. *Journal Of Drug Issues, 35*(2), 225-235.
- Arnett, J. (2007). Emerging adulthood: What is it, and what is it good for?. *Child Development Perspectives, 1*(2), 68-73. doi:10.1111/j.1750-8606.2007.00016.x
- Baetz, M., Bowen, R., Jones, G., & Koru-Sengul, T. (2006). How spiritual values and worship attendance relate to psychiatric disorders in the Canadian population. *The Canadian Journal Of Psychiatry / La Revue Canadienne De Psychiatrie, 51*(10), 654-661.
- Barnett, T. E., Shensa, A., Kim, K. H., Cook, R. L., Nuzzo, E., & Primack, B. A. (2013). The predictive utility of attitudes toward hookah tobacco smoking. *American Journal Of Health Behavior, 37*(4), 433-439. doi:10.5993/AJHB.37.4.1
- Barry, C.M., & Nelson, L.J. (2005). The role of religion in the transition to adulthood for young

- emerging adults. *Journal of Youth and Adolescence*, 34, 245-255.
- Barry, C.M., Nelson, L., Davarya, S., & Urry, S. (2010). Religiosity and spirituality during the transition to adulthood. *International Journal of Behavioral Development*, 34, 311-324.
- Bartholow, B. D., Henry, E. A., Lust, S. A., Sauls, J., & Wood, P. K. (2012). Alcohol effects on performance monitoring and adjustment: Affect modulation and impairment of evaluative cognitive control. *Journal Of Abnormal Psychology*, 121(1), 173-186.
doi:10.1037/a0023664
- Baumeister, R.F. (1991). *Escaping the self: Alcoholism, spirituality, masochism, and other flights from the burden of selfhood*. New York: Basic Books.
- Bjorck, J. P., & Thurman, J. W. (2007). Negative life events, patterns of positive and negative religious coping, and psychological functioning. *Journal For The Scientific Study Of Religion*, 46(2), 159-167. doi:10.1111/j.1468-5906.2007.00348.x
- Berzin, S., & De Marco, A. C. (2010). Understanding the impact of poverty on critical events in emerging adulthood. *Youth & Society*, 42(2), 278-300. doi:10.1177/0044118X09351909
- Brennan, P.L., Schutte, K.K., Moos, B., & Moos, R.H. (2010). Twenty-year alcohol-consumption and drinking-problem trajectories of older men and women. *Journal of Studies on Alcohol and Drugs*, 72, 308-321.
- Boomsma, D.I., de Geus, E.J.C., van Baal, G.C.M., Koopmans, J.R. (1999). A religious upbringing reduces the influence of genetic factors on disinhibition: Evidence for interaction between genotype and environment on personality. *Twin Research*, 2, 115-125.
- Borders, T. F., Curran, G. M., Mattox, R., & Booth, B. M. (2010). Religiousness among at-risk drinkers: Is it prospectively associated with the development or maintenance of an

- alcohol-use disorder?. *Journal Of Studies On Alcohol And Drugs*, 71(1), 136-142.
- Brechting, E. H., Brown, T. L., Salsman, J. M., Sauer, S. E., Holeman, V. T., & Carlson, C. R. (2010). The role of religious beliefs and behaviors in predicting underage alcohol use. *Journal Of Child & Adolescent Substance Abuse*, 19(4), 324-334.
doi:10.1080/1067828X.2010.502494
- Brown, S. A., McGue, M., Maggs, J., Schulenberg, J., Hingson, R., Swartzwelder, S., & ... Murphy, S. (2008). A developmental perspective on alcohol and youths 16 to 20 years of age. *Pediatrics*, 121 (Suppl4), S290-S310. doi:10.1542/peds.2007-2243D
- Budescu, M. (2013). Systemic racism: Perceptions, stress, and coping among African American college students. *Dissertation Abstracts International*, 74.
- Buettner, C. K., & Debies-Carl, J. S. (2012). The ties that bind: Bonding versus bridging social capital and college student party attendance. *Journal Of Studies On Alcohol And Drugs*, 73(4), 604-612.
- Button, T. M., Stallings, M. C., Rhee, S., Corley, R. P., & Hewitt, J. K. (2011). The etiology of stability and change in religious values and religious attendance. *Behavior Genetics*, 41(2), 201-210. doi:10.1007/s10519-010-9388-3
- Carey, K. B. (1995). Effects of alcohol intoxication on self-focused attention. *Journal Of Studies On Alcohol*, 56(2), 248-252.
- Cavazos-Rehg, P. A., Spitznagel, E. L., Bucholz, K. K., Norberg, K., Reich, W., Nurnberger, J. r., & ... Bierut, L. (2007). The relationship between alcohol problems and dependence, conduct problems and diagnosis, and number of sex partners in a sample of young adults. *Alcoholism: Clinical And Experimental Research*, 31(12), 2046-2052.
doi:10.1111/j.1530-0277.2007.00537.x

- Chan, C. S., & Rhodes, J. E. (2013). Religious coping, posttraumatic stress, psychological distress, and posttraumatic growth among female survivors four years after Hurricane Katrina. *Journal Of Traumatic Stress, 26*(2), 257-265. doi:10.1002/jts.21801
- Chan, K.K., Neighbors, C., Gilson, M., Larimer, M.E., Marlatt, A.G. (2007). Epidemiological trends in drinking by age and gender: Providing normative feedback to adults. *Addictive Behaviors, 32*(5), 967-976.
- Chassin, L., Mann, L. M., & Sher, K. J. (1988). Self-awareness theory, family history of alcoholism, and adolescent alcohol involvement. *Journal Of Abnormal Psychology, 97*(2), 206-217. doi:10.1037/0021-843X.97.2.206
- Cloninger, C. R., Sigvardsson, S., & Bohman, M. (1988). Childhood personality predicts alcohol abuse in young adults. *Alcoholism: Clinical and Experimental Research, 12*(4), 494-505.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences*. 2nd edition. Mahwah, NJ: Lawrence Erlbaum Associates.
- Connors, G. J., Walitzer, K. S., & Tonigan, J. (2008). Spiritual change in recovery. In M. Galanter, L. Kaskutas (Eds.), *Research on Alcoholics Anonymous and spirituality in addiction recovery* (pp. 209-227). New York, NY US: Springer Science + Business Media.
- Converse, P. D., Wolfe, E. W., Huang, X., & Oswald, F. L. (2008). Response rates for mixed-mode surveys using mail and e-mail/Web. *American Journal Of Evaluation, 29*(1), 99-107. doi:10.1177/1098214007313228
- Cotton, S., Zebracki, K., Rosenthal, S. L., Tsevat, J., & Drotar, D. (2006). Religion/spirituality and adolescent health outcomes: A review. *Journal Of Adolescent Health, 38*(4), 472-480. doi:10.1016/j.jadohealth.2005.10.005

- Courtney, K. E., & Polich, J. (2009). Binge drinking in young adults: Data, definitions, and determinants. *Psychological Bulletin, 135*(1), 142-156. doi:10.1037/a0014414
- Cranford, J. A., McCabe, S., & Boyd, C. J. (2006). A new measure of binge drinking: Prevalence and correlates in a probability sample of undergraduates. *Alcoholism: Clinical And Experimental Research, 30*(11), 1896-1905. doi:10.1111/j.1530-0277.2006.00234.x
- Dawson, D.A., Grant, B.F., & Harford, T.C. (1995). Variation in the association of alcohol consumption with five DSM-IV alcohol problem domains. *Alcoholism: Clinical and Experimental Research, 19*(1), 66-74.
- DeHaan, L. G., Yonker, J. E., & Affholter, C. (2011). More than enjoying the sunset: Conceptualization and measurement of religiosity for adolescents and emerging adults and its implications for developmental inquiry. *Journal Of Psychology And Christianity, 30*(3), 184-195.
- Dew, R., Daniel, S. S., Armstrong, T. D., Goldston, D. B., Triplett, M., & Koenig, H. G. (2008). Religion/spirituality and adolescent psychiatric symptoms: A review. *Child Psychiatry And Human Development, 39*(4), 381-398. doi:10.1007/s10578-007-0093-2
- Donovan, J. E., & Jessor, R. (1985). Structure of problem behavior in adolescence and young adulthood. *Journal Of Consulting And Clinical Psychology, 53*(6), 890-904. doi:10.1037/0022-006X.53.6.890
- Ehlers, C. L., Montane-Jaime, K., Moore, S., Shafe, S., Joseph, R., & Carr, L. G. (2007). Association of the ADHIB3 allele with alcohol-related phenotypes in Trinidad. *Alcoholism: Clinical And Experimental Research, 31*(2), 216-220. doi:10.1111/j.1530-0277.2006.00298.x
- Emmons, R. A. (2005). Striving for the sacred: Personal goals, life meaning, and religion.

- Journal Of Social Issues*, 61(4), 731-745. doi:10.1111/j.1540-4560.2005.00429.x
- Emmons, R. A., & Paloutzian, R. F. (2003). The psychology of religion. *Annual Review Of Psychology*, 54, 377-402. doi:10.1146/annurev.psych.54.101601.145024
- Fetzer Institute/National Institute on Aging Working Group (1999). *Multidimensional Measurement of Religiousness/Spirituality for Use in Health Research*. Kalamazoo, MI: Fetzer Institute.
- Franklin, J., & Markarian, M. (2005). Substance abuse in minority populations. In R.J. Francis, S.I. Miller, & Mack, A.H. (Eds.), *Clinical Textbook of Addictive Disorders* (pp. 321-339). New York: Guilford.
- Grant, B. F., Dawson, D. A., Stinson, F. S., Chou, S., Dufour, M. C., & Pickering, R. P. (2004). The 12-month prevalence and trends in DSM-IV alcohol abuse and dependence: United States, 1991-1992 and 2001-2002. *Drug And Alcohol Dependence*, 74(3), 223-234. doi:10.1016/j.drugalcdep.2004.02.004
- Grekin, E. R., Sher, K. J., & Wood, P. K. (2006). Personality and substance dependence symptoms: Modeling substance-specific traits. *Psychology Of Addictive Behaviors*, 20(4), 415-424. doi:10.1037/0893-164X.20.4.415
- Goldbach, J. T., Tanner-Smith, E. E., Bagwell, M., & Dunlap, S. (2013). Minority stress and substance use in sexual minority adolescents: A meta-analysis. *Prevention Science*, doi:10.1007/s11121-013-0393-7
- Gorsuch, R. L. (1984). Measurement: The boon and bane of investigating religion. *American Psychologist*, 39(3), 228-236. doi:10.1037/0003-066X.39.3.228
- Gorsuch, R. L. (1995). Religious aspects of substance abuse and recovery. *Journal Of Social Issues*, 51(2), 65-83. doi:10.1111/j.1540-4560.1995.tb01324.x

- Harris, S., Sherritt, L. R., Holder, D. W., Kulig, J., Shrier, L. A., & Knight, J. R. (2008). Reliability and validity of the Brief Multidimensional Measure of Religiousness/Spirituality among adolescents. *Journal Of Religion And Health, 47(4)*, 438-457. doi:10.1007/s10943-007-9154-x
- Hendershot, C. S., Collins, S. E., George, W. H., Wall, T. L., McCarthy, D. M., Liang, T., & Larimer, M. E. (2009). Associations of ALDH2 and ADH1B genotypes with alcohol-related phenotypes in Asian young adults. *Alcoholism: Clinical And Experimental Research, 33(5)*, 839-847. doi:10.1111/j.1530-0277.2009.00903.x
- Hill, P.C. (2005). Measurement in the psychology of religion and spirituality: Current status and evaluation. In R.F. Paloutzian, & C.L. Park (Eds.), *Handbook of the Psychology of Religion and Spirituality* (pp. 43-61). New York: Guilford.
- Hill, P.C. & Hood, R.W. (1999). *Measures of Religiosity*. Birmingham, AL: Religious Education Press.
- Hill, P. C., & Pargament, K. I. (2003). Advances in the conceptualization and measurement of religion and spirituality: Implications for physical and mental health research. *American Psychologist, 58(1)*, 64-74. doi:10.1037/0003-066X.58.1.64
- Hittner, J. B., & Swickert, R. (2006). Sensation seeking and alcohol use: A meta-analytic review. *Addictive Behaviors, 31(8)*, 1383-1401. doi:10.1016/j.addbeh.2005.11.004
- Hopfer, C., Salomonsen-Sautel, S., Mikulich-Gilbertson, S., Min, S., McQueen, M., Crowley, T., & ... Hewitt, J. (2013). Conduct disorder and initiation of substance use: A prospective longitudinal study. *Journal Of The American Academy Of Child & Adolescent Psychiatry, 52(5)*, 511-518. doi:10.1016/j.jaac.2013.02.014
- Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis:

- Conventional criteria versus new alternatives. *Structural Equation Modeling*, 6(1), 1-55.
doi:10.1080/10705519909540118
- Humphreys, K. & Gifford, E. (2006). Religion, spirituality, and the troublesome use of substances. In W. Miller & K.M. Carroll (Eds.), *Rethinking Substance Abuse: What the Science Says and What We Should Do About It* (pp. 257 – 274). New York: Guilford.
- Hull, J. G., Young, R. D., & Jouriles, E. (1986). Applications of the self-awareness model of alcohol consumption: Predicting patterns of use and abuse. *Journal Of Personality And Social Psychology*, 51(4), 790-796. doi:10.1037/0022-3514.51.4.790
- Idler, E.L., Musick, M.A., Ellison, C.G., George, L.K., Krause, N, Ory, M.G., et al. (2003). Measuring multiple dimensions of religion and spirituality for health research: Conceptual background and findings from the 1998 General Social Survey. *Research on Aging*, 25, 327-365.
- Jackson, K.M., Sher, K.J., & Wood, P.K. (2000). Prospective analysis of comorbidity: Tobacco and alcohol use disorders. *Journal of Abnormal Psychology*, 109 (4), 679-694.
- Jackson, K.M. & Sher, K.J. (2003). Alcohol use disorders and psychological distress: A prospective state-trait analysis. *Journal of Abnormal Psychology*, 112 (4), 599-613.
- Jenkins, M. B., Agrawal, A., Lynskey, M. T., Nelson, E. C., Madden, P. F., Bucholz, K. K., & Heath, A. C. (2011). Correlates of alcohol abuse/dependence in early-onset alcohol-using women. *The American Journal On Addictions*, 20(5), 429-434. doi:10.1111/j.1521-0391.2011.00151.x
- Jessor, R. & Jessor, S. (1977). *Problem behavior and psychosocial development: A longitudinal study of youth*. New York: Academic Press.
- Johnson, T., & Robinson, E. R. (2008). Issues in measuring spirituality and religiousness in

- alcohol research. In M. Galanter, L. Kaskutas (Eds.), *Research on Alcoholics Anonymous and spirituality in addiction recovery* (pp. 167-186). New York, NY US: Springer Science + Business Media.
- Johnson, T. J., Sheets, V. L., & Kristeller, J. L. (2008). Empirical identification of dimensions of religiousness and spirituality. *Mental Health, Religion & Culture, 11*(8), 745-767.
doi:10.1080/13674670701561209
- Johnstone, B., Yoon, D., Franklin, K., Schopp, L., & Hinkebein, J. (2009). Re-conceptualizing the factor structure of the Brief Multidimensional Measure of Religiousness/Spirituality. *Journal Of Religion And Health, 48*(2), 146-163. doi:10.1007/s10943-008-9179-9
- Joshanloo, M. (2012). Investigation of the factor structure of spirituality and religiosity in Iranian Shiite university students. *International Journal Of Psychology, 47*(3), 211-221.
doi:10.1080/00207594.2011.617372
- Karlamangla, A., Zhou, K., Reuben, D., Greendale, G., & Moore, A. (2006). Longitudinal trajectories of heavy drinking in adults in the United States of America. *Addiction, 101*, 91-99.
- Kashdan, T.B., Vetter, C.J., & Collins, R.L. (2005). Substance use in young adults: Associations with personality and gender. *Addictive Behaviors, 30*, 259-269.
- Kass, J.D. & Lennox, S. (2005). Emerging models of spiritual development: A foundation for mature, moral, and health-promoting behavior. In W. Miller & H. Delaney (Eds.), *Judeo-Christian Perspectives on Psychology* (pp.187-204). Washington DC: American Psychological Association.
- Kendler, K.S., Gardner, C.O., & Prescott, C.A. (1997). Religion, psychopathology, and substance use and abuse: A multimeasure, genetic-epidemiologic study. *American*

Journal of Psychiatry, 154 (3), 322-329.

Kendler, K.S, Liu, X., Gardner, C.O., McCullough, M.E., Larson, D., & Prescott, C.A. (2003).

Dimensions of religiosity and their relationship to lifetime psychiatric and substance use disorders. *American Journal of Psychiatry, 160 (3), 496-503.*

Kendler, K. S., & Myers, J. (2009). A developmental twin study of church attendance and

alcohol and nicotine consumption: A model for analyzing the changing impact of genes and environment. *The American Journal Of Psychiatry, 166(10), 1150-1155.*

doi:10.1176/appi.ajp.2009.09020182

Klassen, B.J. & Grekin, E.R. (2012, March). Do religion and spirituality moderate the

relationship between trauma history and alcohol consequences: A test of the buffering hypothesis. Poster presented at the meeting of the Society for Psychology of Religion and Spirituality, Baltimore, Maryland.

Klassen, B.J., Hussain, M., & Grekin, E.R. (2011, July). Religiosity and alcohol consequences:

The moderating effects of race. Poster presented at the meeting of the Research Society on Alcoholism, Atlanta, Georgia.

Klassen, B. J., Smith, K. Z., & Grekin, E. R. (2013). Differential relationships between

religiosity, cigarette smoking, and waterpipe use: Implications for college student health.

Journal Of American College Health, 61(7), 381-385.

doi:10.1080/07448481.2013.819806

Knop, J., Penick, E. C., Nickel, E. J., Mortensen, E. L., Sullivan, M. A., Murtaza, S., & ...

Gabrielli, W. (2009). Childhood ADHD and conduct disorder as independent predictors of male alcohol dependence at age 40. *Journal Of Studies On Alcohol And Drugs, 70(2), 169-177.*

- Koenig, L. B., Haber, J., & Jacob, T. (2011). Childhood religious affiliation and alcohol use and abuse across the lifespan in alcohol-dependent men. *Psychology Of Addictive Behaviors*, 25(3), 381-389. doi:10.1037/a0024774
- Koenig, L. B., McGue, M., & Iacono, W. G. (2008). Stability and change in religiousness during emerging adulthood. *Developmental Psychology*, 44(2), 532-543. doi:10.1037/0012-1649.44.2.532
- Koenig, H.G., Parkerson, G.R., & Meador, K.G. (1997). Religion index for psychiatric research. *American Journal of Psychiatry*, 153, 885-886.
- Koenig, L. B., & Vaillant, G. E. (2009). A prospective study of church attendance and health over the lifespan. *Health Psychology*, 28(1), 117-124. doi:10.1037/a0012984
- Krentzman, A. R., Cranford, J. A., & Robinson, E. R. (2013). Multiple dimensions of spirituality in recovery: A lagged mediational analysis of Alcoholics Anonymous' principal theoretical mechanism of behavior change. *Substance Abuse*, 34(1), 20-32. doi:10.1080/08897077.2012.691449
- Krueger, R. F., Markon, K. E., Patrick, C. J., Benning, S. D., & Kramer, M. D. (2007). Linking antisocial behavior, substance use, and personality: An integrative quantitative model of the adult externalizing spectrum. *Journal Of Abnormal Psychology*, 116(4), 645-666. doi:10.1037/0021-843X.116.4.645
- Kuntsche, E., Knibbe, R., Gmel, G., & Engels, R. (2005). Why do young people drink? A review of drinking motives. *Clinical Psychology Review*, 25(7), 841-861. doi:10.1016/j.cpr.2005.06.002
- Lambert, N. M., Fincham, F. D., Marks, L. D., & Stillman, T. F. (2010). Invocations and intoxication: Does prayer decrease alcohol consumption?. *Psychology Of Addictive*

- Behaviors*, 24(2), 209-219. doi:10.1037/a0018746
- Lefkowitz, E. S. (2005). 'Things Have Gotten Better': Developmental Changes Among Emerging Adults After the Transition to University. *Journal Of Adolescent Research*, 20(1), 40-63. doi:10.1177/0743558404271236
- Mason, W., & Spoth, R. L. (2011). Thrill seeking and religiosity in relation to adolescent substance use: Tests of joint, interactive, and indirect influences. *Psychology Of Addictive Behaviors*, 25(4), 683-696. doi:10.1037/a0023793
- Mason, W., & Windle, M. (2002). A longitudinal study of the effects of religiosity on adolescent alcohol use and alcohol-related problems. *Journal Of Adolescent Research*, 17(4), 346-363. doi:10.1177/07458402017004002
- Masters, K. S., Carey, K. B., Maisto, S. A., Caldwell, P. E., Wolfe, T. V., Hackney, H. L., & ... Himawan, L. (2009). Psychometric examination of the Brief Multidimensional Measure of Religiousness/Spirituality among college students. *International Journal For The Psychology Of Religion*, 19(2), 106-120. doi:10.1080/10508610802711194
- Mays, V. M., Cochran, S. D., & Barnes, N. W. (2007). Race, Race-Based Discrimination, and Health Outcomes Among African Americans. *Annual Review Of Psychology*, 58, 201-225. doi:10.1146/annurev.psych.57.102904.190212
- McIntosh, E. (2013). Thriving in college: The role of spirituality and psychological sense of community in students of color. *Dissertation Abstracts International Section A*, 73.
- Meltzer, H., Dogra, N., Vostanis, P., & Ford, T. (2011). Religiosity and the mental health of adolescents in Great Britain. *Mental Health, Religion & Culture*, 14(7), 703-713. doi:10.1080/13674676.2010.515567
- Miller, L., Davies, M., & Greenwald, S. (2000). Religiosity and substance use and abuse among

- adolescents in the National Comorbidity Survey. *Journal of the American Academy of Adolescent Psychiatry*, 39(9), 1190-1197.
- Miller, W.R. (2002). Spirituality, treatment, and recovery. In M. Galanter (Ed.) *Recent Developments in Alcoholism* (pp. 391-404). New York: Springer.
- Miller, W.R., Forcehimes, A., O'Leary, M.J., & LaNoue, M.D. (2008). Spiritual direction in addiction treatment: Two clinical trials. *Journal of Substance Abuse Treatment*, 35, 434-442.
- Miller, W.R. & Rollnick, S. (2002). *Motivational Interviewing: Preparing people for change*. 2nd Ed. New York, NY: Guilford.
- Miller, W. R., & Thoresen, C. E. (2003). Spirituality, religion, and health: An emerging research field. *American Psychologist*, 58(1), 24-35. doi:10.1037/0003-066X.58.1.24
- Molina, B. G., Bukstein, O. G., & Lynch, K. G. (2002). Attention-deficit/hyperactivity disorder and conduct disorder symptomatology in adolescents with alcohol use disorder. *Psychology Of Addictive Behaviors*, 16(2), 161-164. doi:10.1037/0893-164X.16.2.161
- Molock, S., & Barksdale, C. L. (2013). Relationship between religiosity and conduct problems among African American and Caucasian adolescents. *Journal Of Child And Family Studies*, 22(1), 4-14. doi:10.1007/s10826-012-9584-2
- Meyer, I. H. (2003). Minority stress and mental health in gay men. In L. D. Garnets, D. C. Kimmel (Eds.) , *Psychological perspectives on lesbian, gay, and bisexual experiences* (2nd ed.) (pp. 699-731). New York, NY US: Columbia University Press.
- Naimi, T. S., Brewer, R. D., Mokdad, A., Denny, C., Serdula, M. K., & Marks, J. S. (2003). Binge drinking among US adults. *JAMA: Journal Of The American Medical Association*, 289(1), 70-75. doi:10.1001/jama.289.1.70

- National Institute on Alcohol Abuse and Alcoholism. (2003). National Council on Alcohol Abuse and Alcoholism Recommended Sets of Alcohol Consumption Questions. Retrieved March 12, 2008, from <http://www.niaaa.nih.gov/Resources/ResearchResources/TaskForce.htm>
- Nobles, R. (2011). An examination of the minority stress hypothesis in a sample of undergraduates from the United States. *Dissertation Abstracts International*, 71,
- Ohannessian, C., & Hesselbrock, V. M. (2008). A comparison of three vulnerability models for the onset of substance use in a high-risk sample. *Journal Of Studies On Alcohol And Drugs*, 69(1), 75-84.
- Pardini, D., White, H., & Stouthamer-Loeber, M. (2007). Early adolescent psychopathology as a predictor of alcohol use disorders by young adulthood. *Drug And Alcohol Dependence*, 88, S38-S49. doi:10.1016/j.drugalcdep.2006.12.014
- Pargament, K. I., Smith, B. W., Koenig, H. G., & Perez, L. (1998). Patterns of positive and negative religious coping with major life stressors. *Journal For The Scientific Study Of Religion*, 37(4), 710-724. doi:10.2307/1388152
- Park, C. L. (2013). Religion and meaning. In R. F. Paloutzian, C. L. Park (Eds.) , *Handbook of the psychology of religion and spirituality (2nd ed.)* (pp. 357-379). New York, NY US: Guilford Press.
- Piderman, K.M., Schneekloth, T.D., Pankrantz, V.S., Maloney, S.D., & Altchuler, S.I. (2007). Spirituality in alcoholics during treatment. *American Journal on Addictions*, 16, 232-237.
- Piderman, K.M., Schneekloth, T.D., Pankrantz, V.S., Stevens, S.R., & Altchuler, S.I. (2008). Spirituality during alcoholism treatment and continuous abstinence for one year. *International Journal of Psychiatry in Medicine*, 38, 391-406.

- Project MATCH Research Group. (1997). Matching alcoholism treatments to client heterogeneity: Project MATCH posttreatment drinking outcomes. *Journal of Studies on Alcohol, 58*, 7-29.
- Poage, E.D., Ketzenberger, K.E., & Olson, J. (2004). Spirituality, contentment, and stress in recovering alcoholics. *Addictive Behaviors, 29*, 1857-1862.
- Power, L., & McKinney, C. (2013). Emerging adult perceptions of parental religiosity and parenting practices: Relationships with emerging adult religiosity and psychological adjustment. *Psychology Of Religion And Spirituality, 5*(2), 99-109.
doi:10.1037/a0030046
- Rankin, L. A., & Kenyon, D. (2008). Demarcating role transitions as indicators of adulthood in the 21st century: Who are they?. *Journal Of Adult Development, 15*(2), 87-92.
doi:10.1007/s10804-007-9035-2
- Raykov, T. & Marcoulides, G.A. (2006). *A first course in structural equation modeling*. Mahwah, NJ: Lawrence Erlbaum Associates, Inc.
- Rew, L., & Wong, Y. (2006). A systematic review of associations among religiosity/spirituality and adolescent health attitudes and behaviors. *Journal Of Adolescent Health, 38*(4), 433-442. doi:10.1016/j.jadohealth.2005.02.004
- Richards, P., & Worthington, E.R. (2010). The need for evidence-based, spiritually oriented psychotherapies. *Professional Psychology: Research And Practice, 41*(5), 363-370.
doi:10.1037/a0019469
- Robinson, E.A.R., Cranford, J.A., Webb, J.R., & Brower, K.J. (2007). Six-month changes in spirituality, religiousness, and heavy drinking in a treatment-seeking sample. *Journal of Studies on Alcohol and Drugs, 68*, 282-290.

- Robinson, E.A.R., Krentzman, A.R., Webb, J.R., & Brower, K.J. (2011). Six-month changes in spirituality and religiousness in alcoholics predict drinking outcomes at nine months. *Journal of Studies on Alcohol and Drugs*, 72, 660-668.
- Sandoz, C.J. (1999). The spiritual experience in recovery: A closer look. *Journal of Ministry in Addiction and Recovery*, 6, 53-59.
- Schettino, J. (2013). The multi-dimensional nature of religiosity/spirituality and its association with psychological adjustment (unpublished doctoral dissertation). University of California, Los Angeles.
- Schulenberg, J. E., & Maggs, J. L. (2002). A developmental perspective on alcohol use and heavy drinking during adolescence and the transition to young adulthood. *Journal Of Studies On Alcohol*, SUPPL1454-70.
- Schulenberg, J., O'Malley, P. M., Bachman, J. G., Wadsworth, K. N., & Johnston, L. D. (1996). Getting drunk and growing up: Trajectories of frequent binge drinking during the transition to young adulthood. *Journal Of Studies On Alcohol*, 57(3), 289-304.
- Sheehan, K. (2001). E-mail survey response rates: A review. *Journal Of Computer-Mediated Communication*, 6(2), DOI: 10.1111/j.1083-6101.2001.tb00117.x
- Sher, K.J. (1991). *Children of alcoholics: A critical appraisal of theory and research*. Chicago, IL: University of Chicago Press.
- Sher, K. J., & Gotham, H. J. (1999). Pathological alcohol involvement: A developmental disorder of young adulthood. *Development And Psychopathology*, 11(4), 933-956.
doi:10.1017/S0954579499002394
- Sher, K. J., & Rutledge, P. C. (2007). Heavy drinking across the transition to college: Predicting first-semester heavy drinking from precollege variables. *Addictive Behaviors*, 32(4), 819-

835. doi:10.1016/j.addbeh.2006.06.024

Sher, K. J., & Slutske, W. S. (2003). Disorders of impulse control. In G. Stricker, T. A. Widiger, I. B. Weiner (Eds.), *Handbook of psychology: Clinical psychology, Vol. 8* (pp. 195-228). Hoboken, NJ US: John Wiley & Sons Inc.

Sher, K. J., & Trull, T. J. (1994). Personality and disinhibitory psychopathology: Alcoholism and antisocial personality disorder. *Journal Of Abnormal Psychology, 103*(1), 92-102.

doi:10.1037/0021-843X.103.1.92

Skarupski, K. A., Fitchett, G., Evans, D. A., & de Leon, C. (2010). Daily spiritual experiences in a biracial, community-based population of older adults. *Aging & Mental Health, 14*(7), 779-789. doi:10.1080/13607861003713265

Simons, L., Simons, R. L., & Conger, R. D. (2004). Identifying the Mechanisms whereby Family Religiosity Influences the Probability of Adolescent Antisocial Behavior. *Journal Of Comparative Family Studies, 35*(4), 547-563.

Spilka, B., Hood, R.W., Hunsberger, B., Gorsuch, R. (2003) *The Psychology of Religion*. New York: The Guilford Press.

Staton, M., Webster, J., Hiller, M. L., Rostosky, S., & Leukefeld, C. (2003). An exploratory examination of spiritual well-being, religiosity, and drug use among incarcerated men. *Journal Of Social Work Practice In The Addictions, 3*(3), 87-103.

doi:10.1300/J160v03n03_06

Sterling, R. C., Weinstein, S., Losardo, D., Raively, K., Hill, P., Petrone, A., & Gottheil, E. (2007). A Retrospective Case Control Study of Alcohol Relapse and Spiritual Growth. *The American Journal On Addictions, 16*(1), 56-61. doi:10.1080/10550490601080092

Stone, A. L., Becker, L. G., Huber, A. M., & Catalano, R. F. (2012). Review of risk and

- protective factors of substance use and problem use in emerging adulthood. *Addictive Behaviors*, 37(7), 747-775. doi:10.1016/j.addbeh.2012.02.014
- Storch, E.A., Roberti, J.W., Heidgerken, A.D., Storch, J.B., Lewin, A.B., Killiany, E.M., Baumeister, A.L., Bravata, E.A., & Geffken, G.R. (2004). The Duke Religion Index: An investigation. *Pastoral Psychology*, 53(2), 175-181.
- Storch, E.A., Strawser, M.S., & Storch, J.B. (2004). Two-week test-retest reliability of the duke religion index. *Psychological Reports*, 94, 993-994.
- Tabachnick, B.G., & Fidell, L.S. (2007). *Using Multivariate Statistics* (5th ed.). Boston: Allyn and Bacon.
- Taylor, R.J., Chatters, L.M., & Jackson, J.S. (2007). Religious and spiritual involvement among older African Americans, Caribbean Blacks, and Non-Hispanic Whites: Findings from the National Survey on American Life. *Journals of Gerontology, Series B*, 62, S238-S250.
- Todorova, I. G., Falcón, L. M., Lincoln, A. K., & Price, L. (2010). Perceived discrimination, psychological distress and health. *Sociology Of Health & Illness*, 32(6), 843-861. doi:10.1111/j.1467-9566.2010.01257.x
- Tsang, J., & McCullough, M. E. (2003). Measuring religious constructs: A hierarchical approach to construct organization and scale selection. In S. J. Lopez, C. R. Snyder (Eds.) , *Positive psychological assessment: A handbook of models and measures* (pp. 345-360). Washington, DC US: American Psychological Association. doi:10.1037/10612-022
- Tuvblad, C., Zheng, M., Raine, A., & Baker, L. A. (2009). A common genetic factor explains the covariation among ADHD ODD and CD symptoms in 9-10 year old boys and girls. *Journal Of Abnormal Child Psychology*, 37(2), 153-167. doi:10.1007/s10802-008-9278-9

- Uecker, J.E., Regnerus, M.D., & Vaaler, M.L. (2007). Losing my religion: The Social sources of religious decline in early adulthood. *Social Forces*, 85, 1667-1692.
- Underwood, L. G., & Teresi, J. A. (2002). The Daily Spiritual Experience Scale: Development, theoretical description, reliability, exploratory factor analysis, and preliminary construct validity using health-related data. *Annals Of Behavioral Medicine*, 24(1), 22-33.
doi:10.1207/S15324796ABM2401_04
- Vaughan, E. L., de Dios, M. A., Steinfeldt, J. A., & Kratz, L. M. (2011). Religiosity, alcohol use attitudes, and alcohol use in a national sample of adolescents. *Psychology Of Addictive Behaviors*, 25(3), 547-553. doi:10.1037/a0024660
- Wilsnack, R. W., Wilsnack, S. C., Kristjanson, A. F., Vogeltanz-Holm, N. D., & Gmel, G. (2009). Gender and alcohol consumption: Patterns from the multinational GENACIS project. *Addiction*, 104(9), 1487-1500. doi:10.1111/j.1360-0443.2009.02696.x
- Witkiewitz, K., King, K., McMahon, R. J., Wu, J., Luk, J., Bierman, K. L., & ... Pinderhughes, E. E. (2013). Evidence for a multi-dimensional latent structural model of externalizing disorders. *Journal Of Abnormal Child Psychology*, 41(2), 223-237. doi:10.1007/s10802-012-9674-z
- Worthington, E. L. (1989). Religious faith across the life span: Implications for counseling and research. *The Counseling Psychologist*, 17(4), 555-612. doi:10.1177/0011000089174001
- Worthington, E.L., Hook, J. N., Davis, D. E., & McDaniel, M. A. (2011). Religion and spirituality. *Journal Of Clinical Psychology*, 67(2), 204-214. doi:10.1002/jclp.20760
- Yonker, J. E., Schnabelrauch, C. A., & DeHaan, L. G. (2012). The relationship between spirituality and religiosity on psychological outcomes in adolescents and emerging adults: A meta-analytic review. *Journal Of Adolescence*, 35(2), 299-314.

doi:10.1016/j.adolescence.2011.08.010

Zinnbauer, B. J., Pargament, K. I., Cole, B., Rye, M. S., Butter, E. M., Belavich, T. G., & ...

Kadar, J. L. (1997). Religion and spirituality: Unfuzzifying the fuzzy. *Journal For The Scientific Study Of Religion*, 36(4), 549-564. doi:10.2307/1387689

ABSTRACT**RELIGIOSITY-SPIRITUALITY AND RISKY DRINKING OVER THE
TRANSITION TO COLLEGE: A MULTI-WAVE, LONGITUDINAL STUDY**

by

BRIAN JEFFERY KLASSEN**August 2014****Advisor:** Dr. Emily R. Grekin**Major:** Psychology (Clinical)**Degree:** Doctor of Philosophy

Although the relationship between religiosity-spirituality and risky alcohol use is one of the most frequently studied topics in mental health, relatively little is known about how these variables relate to each other over time, especially during specific developmental periods such as the transition from high school to college. This study analyzed three waves of self-report data collected from a sample (N=623) of college students over a two-year period. Analyses examined (1) the stability of religiosity-spirituality and risky drinking over the transition to college, (2) the magnitude and direction of relationships between religiosity-spirituality and risky drinking, (3) the degree to which third variables account for relationships between religiosity-spirituality and risky drinking, and (4) the degree to which observed relationships between religiosity-spirituality and risky drinking extend to multiple, alternative measures of these constructs. Religiosity-spirituality and risky drinking demonstrated a moderate degree of stability over the transition to college. Consistent with previous literature, religiosity-spirituality predicted risky drinking, but risky drinking did not predict religiosity-spirituality. Relationships between religiosity-spirituality and risky drinking were observed across multiple alternative measures of the constructs and remained significant even after controlling for race and conduct disorder

symptoms. In conclusion, religiosity-spirituality is a stable and important correlate and predictor of risky drinking, as well as a potential target for prevention and intervention during the transition to college.

AUTOBIOGRAPHICAL STATEMENT

I came to the doctoral program in clinical psychology at Wayne State University in 2007, after completing a bachelor's in psychology with honors at Calvin College (Grand Rapids, Michigan). While at Wayne State, my research interests were broadly within the area of correlates of alcohol use among college students. This has included personality variables (impulsivity, neuroticism), neuropsychological deficits, history of psychological trauma and, most recently, religion and spirituality. My research interests have also included Clinically, I maintained interests in personality assessment, posttraumatic stress disorder, and substance use disorders. Currently, I am completing my internship year at the Jesse Brown Veterans Affairs medical center in Chicago, Illinois. I will remain at Jesse Brown for a post-doctoral fellowship, with an emphasis on evidence-based approaches to treating PTSD, substance use disorders, and chronic pain.