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Compounding risk: An examination of associations between spirituality/religiosity, drinking motives, and alcohol-related ambivalence among heavy drinking young adults

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Abstract

Objectives—The present study assessed combinations of spirituality/religiosity (S/R), a known protective factor against heavy drinking, with drinking motives, and alcohol-related ambivalence to better understand how these factors interrelate and are associated with drinking and alcohol-related problems.

Methods—Participants were 241 heavy drinking undergraduate students (81.74% female; $M_{age} = 23.48$ years; $SD = 5.50$) who completed study questionnaires online.

Results—Coping, enhancement, and conformity drinking motives were associated with greater alcohol use and problems, however there were no main effects of either ambivalence or S/R on alcohol outcomes. S/R interacted with ambivalence with respect to drinking and problems. S/R also interacted with conformity drinking motives with respect to drinking and problems. Further, ambivalence interacted with conformity drinking motives regarding problems. Three-way interactions emerged between ambivalence, S/R, and drinking motives (social, coping, and enhancement motives) regarding drinking and problems. Results show that individuals at highest risk for problematic drinking are those who more strongly endorse drinking motives, are low in S/R, and high in ambivalence.

Conclusions—Findings supported hypotheses and provide support for clusters of individual difference factors that put heavy drinking college students at higher risk for problematic drinking. These examinations have practical utility and may inform development and implementation of

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Human Subjects

This study was approved by the institutional review board at the data collection site, the University of Houston.

Contributors

Dawn Foster conceptualized the study and conducted statistical analysis. Chelsie Young wrote the discussion and supported manuscript draft development. Michelle Quist and Jennifer Bryan wrote the introduction and supported manuscript draft development. All authors contributed to and have approved the final manuscript.

Conflict of Interest

All authors declare that they have no conflicts of interest.

interventions and programs targeting alcohol misuse among heavy drinking undergraduate students.

Keywords

spiritual; religious; motivation; ambivalent

Excessive drinking among undergraduate students remains a public health concern in the United States due to varying negative consequences (Ham & Hope, 2003; Hingston, Zha, & Weitzman, 2009). The US Surgeon General and the Department of Health and Human Services recognize that one of the major social and public health concerns experienced by undergraduate students is heavy drinking (U.S. Department of Health and Human Services, 2010). Almost 13% of college students drink heavily, a rate that is higher than non-college student same age peers (Substance Abuse and Mental Health Services Administration, 2014). Drinking to excess in college can lead to a multitude of adverse outcomes (Dunn, Larimer, & Neighbors, 2002; Perkins, 2002a, 2002b) including diminished academic performance (Johnston, O'Malley, Meich, Bachman, & Schulenberg, 2014; Kuntsche, Knibbe, Gmel, & Engels, 2005), involvement in risky sexual behaviors, and missed opportunities for personal success (Dunn et al., 2002; Geisner, Larimer, & Neighbors, 2004; Hingson, 2010). Research also indicates that heavy drinking undergraduates report mental and physical health issues such as alcohol dependence, depression, anxiety, eating disorders, and weight gain (Abbey, Buck, Zawacki, & Saenz, 2003; Dunn et al., 2002; Gerend & Cullen, 2008). Therefore, it is necessary to understand combinations of factors that influence heavy drinking behavior in order to appropriately design and implement prevention and intervention strategies for this vulnerable population. Specifically, we examine associations between S/R, a protective factor against problematic drinking, and factors that are associated with greater drinking (i.e., drinking motives and alcohol-related ambivalence) to better understand how clusters of such factors impact drinking behavior.

Spirituality/religiosity

Spirituality is generally conceptualized as a personal relationship with a higher power with a focus on transcendence (Barry, Nelson, Davarya, & Urry, 2010; Sauer-Zavala, Burris, & Carlson, 2014), whereas religiosity tends to be conceptualized as an organized belief system with proscriptions for behavior that is upheld by other group members (Good & Willoughby, 2006). Previous research has repeatedly demonstrated that aspects of both spirituality and religiosity buffer against heavy and problematic drinking (e.g., Leigh, Bowen, & Marlatt, 2005; Neighbors et al., 2013; Nonnemaker, McNeely, & Blum, 2003; Stewart, 2001). A recent review of the literature found evidence for a negative association between S/R and alcohol consumption in over 80% of studies (Koenig, King, & Carson, 2012). However, less is understood about how S/R exerts this protective influence on drinking or what combinations of factors are associated with lower risk of heavy drinking. Researchers have posited that religiosity is negatively associated with unhealthy behaviors such as heavy drinking in part because several religions have proscribed notions of what is acceptable behavior and drinking in moderation or abstention from drinking are generally encouraged (Kathol & Sgoutas-Emch, 2016; Northcutt & Jarvis, 1987). Another potential reason why

religiosity is negatively associated with heavy drinking is that personal attitudes towards alcohol tend to be more negative (Chawla, Neighbors, Lewis, Lee, & Larimer, 2007) and norms for drinking among religious populations tend to be lower (Patock-Peckham, Hutchinson, Cheong, & Nagoshi, 1998). Thus, individuals may personally view alcohol more negatively, have lower perceptions of others' drinking (perceived descriptive norms), and more readily conform to these lower drinking norms in spiritual/religious populations compared to non-spiritual/religious groups, so as to not deviate from those with whom they identify, all of which may result in lower rates of drinking and alcohol-related problems. Finally, religiosity is thought to result in healthier behaviors because it can offer more positive resources for coping such as social support by fellow members of the congregation (Menagi, Harrell, & June, 2008), while spirituality can provide positive coping in the form of reliance on God for help (Giordano et al., 2015), both of which may prevent individuals from drinking alcohol for coping purposes (Ciarrocchi, & Brelsford, 2009). While there are several proposed reasons for why this negative link between S/R and alcohol use exists, less is understood about how S/R and other individual difference factors interrelate, and how these combined associations relate to heavy drinking. Next, we will discuss how S/R relates to motivations for drinking.

Drinking motives

The reasons why individuals choose to consume alcohol often vary. Motivational drinking models have attempted to explain why people drink, and suggest that alcohol consumption is often associated with desired outcomes (Cooper, 1994). Cooper (1994) classified motivations for drinking into four domains: conformity (e.g., "So that others won't kid you about not drinking"), coping (e.g., "To cheer you up when you are in a bad mood"), social (e.g., "To be sociable"), and enhancement (e.g., "Because you like the feeling"). Research shows drinking motives are associated with fewer protective behavioral strategies (i.e., putting extra ice in a drink; Linden, Kite, Braitman, & Henson, 2014), pregameing more frequently (Bachrach, Merrill, Bytschkow, & Read, 2012) and higher rates of alcohol use and problems (Cooper, 1994; Fossos, Kaysen, Neighbors, Lindgren, & Hove, 2011; Foster & Neighbors, 2013; Foster, Neighbors, & Prokhorov, 2014; Kuntsche, et al., 2005). Thus, motives were expected to be risk factors for greater drinking and related problems in the present sample. Additionally, we expected S/R to interact with drinking motives. Prior research has found that those with higher religious coping reported lower endorsement of social and enhancement drinking motives, especially among women (Daugherty & McLarty, 2003). Thus, S/R was expected to moderate the effect of motives on drinking and problems such that more strongly endorsing any of the drinking motives would be associated with increased risk drinking and problems, particularly among those lower in S/R who do not reap the protective benefits associated with S/R.

Ambivalence

Despite having motives for drinking, many individuals may not have straightforward positive evaluations of alcohol consumption. In other words, individuals tend to be ambivalent about alcohol consumption (Cameron, Stritzke, & Durkin, 2003; Conner et al., 2002; Graham, 2003; Leigh, 1989). Drinking ambivalence is the internal conflict that arises

when an individual identifies both the advantages/pros (i.e., escaping problems or for enjoyment) and disadvantages/cons (i.e., behaving badly or hangovers) of drinking (Miller & Rollnick, 2002). This inconsistency with respect to alcohol expectations can create a “drinker’s dilemma” due to the awareness of the potential negative as well as positive consequences of alcohol consumption (Edwards et al., 1994). Research shows that ambivalence is linked with increases in drinking and the experience of alcohol-related problems (Oser, McKellar, Moos, & Moos, 2010) including not being able to do homework or study for a test, passing out, and getting into fights (White & Labouvie, 1989). Furthermore, those seeking therapy for drinking reported consuming more alcohol if the therapist focused on the ambivalence when ambivalence was high and motivation to change was low (Magill, Stout, & Apodaca, 2013).

Moreover, previous studies have indicated that S/R interacts with ambivalence. A recent study on political behavior found that S/R was linked to value-driven religious ambivalence, such that those with higher S/R experienced more ambivalence toward constructs that contradicted values of their religion (Ben-Nun, Bloom & Arikan, 2012). However, S/R predicted an in-group effect, which is protective against contrary behaviors (Ben-Nun et al., 2012). Many religions have negative attitudes toward drinking (Johnson et al., 2008), thus, we expected that S/R would moderate the effect of ambivalence on drinking and problems such that ambivalence would be associated with greater drinking/problems among those lower in S/R compared to those higher in S/R.

Research also shows that ambivalence interacts with drinking motives such that those who are higher in motives and ambivalence tended to consume more alcohol and report experiencing more alcohol problems (Foster et al., 2014). Moreover, a qualitative study revealed that most motives for drinking were also identified as reasons for not drinking as consumption increased, with the exception of violence, alcoholism, and cost (de Visser & Smith, 2007). Based on previous work, ambivalence was expected to be linked with greater drinking and alcohol-related problems for the present sample. Further, ambivalence was expected to moderate the relationship between motives and drinking and problems such that motives would be linked with higher alcohol use and problems among those high in ambivalence, but would be linked with lower drinking and alcohol-related problems among those low in ambivalence.

Taken together, extant literature indicates that S/R may influence relationships among motives and ambivalence, and may play an important role in influencing drinking outcomes. In other words, S/R was expected to interact with motives and ambivalence with respect to alcohol consumption and harmful problems such that motives would be associated with higher levels of drinking outcomes among those experiencing more ambivalence and lower S/R. However, among those with higher S/R, drinking motives were expected to be linked with lower drinking rates, particularly among those experiencing more ambivalence.

Current study

The present study examined relationships among S/R, motives, and ambivalence in a sample of heavy drinking college students. The study was designed to examine the incremental

validity of motives, ambivalence, and S/R with regards to alcohol consumption and related problems, and to evaluate the unique effects above and beyond theoretically relevant covariates including gender (Neighbors, Lee, Lewis, & Fossos, 2007), race/ethnicity (LaBrie, Lac, Kenney, & Mirza, 2011), age (Staff, Greene, Maggs, & Schoon, 2014), year in school (Vaughan, Corbin, & Fromme, 2009), Greek membership (Neighbors et al., 2007), and work status (Staff et al., 2014). We had three main hypotheses. Our first hypothesis was related to main effects; specifically, we expected to replicate previous findings and predicted that S/R (H1a) would be linked with lower drinking and problems, whereas drinking motives (H1b) and ambivalence (H1c) would each be associated with more drinking and problems. Our second hypothesis was related to moderating relationships (two-way interactions). We expected ambivalence to moderate the relationship between motives and drinking and problems (H2a). We further expected S/R to moderate the influence of motives on drinking and problems (H2b), and to also moderate the association between ambivalence and alcohol outcomes (H2c). Our third hypothesis (H3) predicted that S/R would interact with motives and ambivalence (a three-way interaction) such that the relationship between motives and ambivalence would be influenced differentially by low versus high S/R. We predicted that those at highest risk for heavy alcohol consumption and problems would be high in drinking motives, high in ambivalence, and low in S/R.

Method

Participants

The present sample consisted of 241 heavy drinking undergraduate students (81.74% female; $M_{\text{age}} = 23.48$ years; $SD = 5.50$) enrolled in at least one psychology, health, or education course at the time of the data collection. The racial and ethnic distribution of this sample was as follows: 51.04% identified as White/Caucasian; 0.83% identified as Native American/American Indian; 13.28% identified as Black/African American; 10.79% identified as Asian; 0.83% identified as Native Hawaiian/Pacific Islander; 7.47% identified as multi-ethnic; and 15.77% identified as 'Other.' Inclusion criteria were that participants had to be: (1) 18 years or older; (2) currently enrolled as a student; (3) provide informed consent; and (4) meet heavy drinking criteria (report 4/5+ drinks on one occasion in the past month for females/males respectively).

Measures

Demographics—Participants provided demographic information including gender, year in school, work status, age, racial background, and ethnicity.

Alcohol consumption—The Daily Drinking Questionnaire (DDQ; Collins, Parks, & Marlatt, 1985; Kivlahan et al., 1990) was used to indicate participants' average alcohol consumption per week. The DDQ asks participants to estimate the standard number of alcoholic drinks they consumed on every day of a typical week (Monday-Sunday) in the previous 30 days. Drinks on each day of the week were summed in order to derive the average number of drinks consumed each week. Relative to other drinking indices, weekly drinking has been shown to be a reliable index of problems related to alcohol among college students (Borsari, Neal, Collins, & Carey, 2001; $\alpha = .71$). The Quantity/Frequency Scale

(QF; Marlatt et al., 1995) was also used as a measure of alcohol consumption. The QF is a five-item measure that asks participants to report the number of drinks and the number of hours spent drinking on a peak drinking event within the past 30 days.

Alcohol problems—The Rutgers Alcohol Problem Index (RAPI; White & Labouvie, 1989) was used to assess the number of undesired consequences related to alcohol that were experienced by respondents. The RAPI is a 23-item scale that measures negative consequences related to alcohol use in the last 30 days. Responses range from never (0) to 10 times or more (4). Items were rated based on how many times each problem occurred while drinking (e.g., “went to work or school high or drunk”; White & Labouvie, 1989; $\alpha = .92$).

Spirituality/religiosity—Respondents indicated their spiritual and religious behaviors and attitudes using six items. Items were on 7-point Likert scales and assessed the extent to which respondents viewed themselves as religious and spiritual as well as their attitudes (i.e., approval) of spirituality, religion, attending services, and prayer. Anchors ranged from (*Not at all*) to (*Very much*) and from (*Strong disapproval*) to (*Strong approval*; $\alpha = .86$).

Drinking motives—The Drinking Motives Questionnaire-Revised (DMQ-R; Cooper, 1994) was utilized to assess motives related to consuming alcohol. Participants provided ratings on a 5-point scale ranging from 1 (*Never/Almost Never*) to 5 (*Almost Always/Always*) regarding 20 reasons why people may be motivated to drink. The DMQ-R yields four sub-scales that reflect motives for drinking including social (e.g., “Because it helps you enjoy a party”; $\alpha = .89$), coping (e.g., “To forget your worries”; $\alpha = .85$), enhancement (e.g., “Because you like the feeling”; $\alpha = .86$), and conformity (e.g., “Because your friends pressure you to drink”; $\alpha = .85$) motives.

Ambivalence—The Drinking Ambivalence Scale (DAS) was modified from the General Ambivalence Scale (Thompson, Zanna, & Griffin, 1995) and was used to assess alcohol-related ambivalence. The DAS asks about feelings, attitudes, and thoughts toward drinking. Items evaluating alcohol’s positive or negative qualities ask respondents to evaluate these qualities according to a scale ranging from 1 (*Not at all*) to 4 (*Extremely*). Participants rated the positivity and negativity of their feelings, attitudes, and thoughts. Items include “Considering only the favorable qualities of drinking, how favorable is your evaluation of drinking?” for the positive aspect of alcohol-related attitudes and “Considering only the unfavorable qualities of drinking and ignoring the unfavorable characteristics, how favorable is your evaluation of drinking?” for the negative aspect of alcohol-related attitudes (overall $\alpha = .51$). Higher scores indicate greater ambivalence.

Procedure

Participants were informed that the purpose of this research was to study health behaviors. Participants were recruited via email, classroom visits, and flyers placed in campus buildings. Interested students signed up for participation and received a unique personalized identification number with which they accessed the web-based survey. Participants completed a battery of questionnaires online and received course extra credit as

compensation for their involvement. A total of 709 participants completed study materials. Six hundred forty-nine of these had no missing data and were retained. Of these, 241 met heavy drinking criteria and comprised the final sample for the present study. All study procedures and treatment of human subjects were conducted in compliance with ethical standards of the American Psychological Association. The study protocol was approved by the Institutional Review Board at the study site.

Statistical analyses

Zero-order correlations were obtained to examine the relationships between the independent and dependent variables. Covariates included in the models were age, gender, race, ethnicity, year in school, Greek membership, and work status based on their known associations with alcohol use, so as to ensure that any observed effects were not due to these factors (Del Boca, Darkes, Greenbaum, & Goldman, 2004; Larimer, Turner, Mallett, & Geisner, 2004; Wechsler, Dowdall, Davenport, & Castillo, 1995). Predictor variables were centered prior to inclusion in the regression models to reduce multicollinearity. Incremental validity of covariates and independent variables (IV) were examined in relation to dependent variables (DV). Separate models were constructed for each alcohol outcome variable. For models wherein DVs were alcohol variables (drinks per week, peak drinks, and alcohol-related problems), covariates and IVs (S/R, alcohol-related ambivalence, and drinking motives) were entered at Step 1. At Step 2, two-way interactions (product terms) between IVs were added. Three-way interactions between IVs were added at Step 3. Significant interactions were graphed using parameter estimates from the regression equation where low and high values were specified as one standard deviation below and above their respective means (Cohen, Cohen, West, & Aiken, 2003). All statistical analyses were conducted using SAS 9.3.

Results

Preliminary analyses included examinations of skewness and kurtosis, and study variables were found to be within acceptable normal distribution range. Means, standard deviations, bivariate correlations, and ranges for study variables are presented in Table 1. Multiple linear regression analyses are presented in Tables 2–4. DVs were drinks per week, peak drinks, and alcohol problems. IVs were S/R, ambivalence, and drinking motives. Separate models were constructed for each of the four drinking motives. In each model, all drinking motives were statistically controlled. For the models where drinks per week was the outcome (Table 2), enhancement drinking motives ($\beta = 0.39, p < .001$) emerged with significant main effects. A significant two-way interaction emerged between ambivalence and conformity motives when taking into account social, coping, and enhancement motives ($\beta = .54, p < .05$). Three three-way interactions emerged. The first was between S/R, ambivalence, and social motives ($\beta = -2.79, p < .05$), the second was between S/R, ambivalence, and coping motives ($\beta = -3.34, p < .05$), and the third was between S/R, ambivalence, and enhancement motives ($\beta = -3.82, p < .01$).

For the peak drinks model (Table 3), enhancement drinking motives ($\beta = 0.21, p < .05$) emerged with significant main effects. A two-way interaction emerged between S/R and

ambivalence when taking into account each of the four drinking motives ($\beta = -1.10, p < .01$). Further, a significant three-way interaction emerged between S/R, alcohol-related ambivalence, and enhancement drinking motives ($\beta = -2.82, p < .05$).

For the alcohol problems model (Table 4), coping ($\beta = -0.19, p < .05$), enhancement ($\beta = 0.30, p < .01$), and conformity ($\beta = 0.29, p < .001$) motives emerged with significant main effects. A two-way interaction emerged between S/R and conformity drinking motives ($\beta = 0.60, p < .01$), and between ambivalence and conformity motives ($\beta = 0.79, p < .001$). Further, two three-way interactions emerged. The first was between S/R, alcohol-related ambivalence, and coping drinking motives ($\beta = -2.70, p < .05$), and the second was between S/R, alcohol-related ambivalence, and enhancement drinking motives ($\beta = -3.93, p < .01$).

Although two-way interactions emerged, the presence of three-way interactions superceded the two-way effects. As such, the analytic focus was on the three-way interactions. However, it may be worth noting that for two-way interactions involving S/R and ambivalence, S/R was linked with more drinking and problems among those low in ambivalence, but was associated with less drinking and problems among those high in ambivalence. Further, for two-way interactions involving motives and ambivalence, motives were positively linked with outcomes among those high in ambivalence, but were negatively associated with outcomes among those low in ambivalence. Additionally, for two-way interactions involving motives and S/R, motives were positively linked with outcomes, particularly among those high relative to those low in S/R. To save space, three two-way interactions were graphed (Figure 1).

For all three-way interactions, drinking motives were positively associated with outcomes among those high in ambivalence when S/R was low. When S/R was high, drinking motives were negatively associated with outcomes among those high in ambivalence, but positively associated with outcomes among those low in ambivalence. To save space, three-way interactions related to enhancement motives were graphed (Figures 2–4).

Discussion

The present study assessed relationships among S/R, a known buffer against heavy drinking, and risk factors for heavy drinking including drinking motives, and alcohol-related ambivalence, in the context of alcohol consumption and related problems in a sample of heavy drinking college students. Regarding our hypotheses of main effects, we found support for one of the three hypotheses and did not find support for the remaining two. Specifically, we found that enhancement drinking motives were positively associated with drinks per week, peak drinks, and problems, and that coping drinking motives were positively associated with problems. This is consistent with our hypothesis (H1b) and with previous research showing associations between drinking motives and drinking behavior over time (Crutzen, Kuntsche, & Schelleman-Offermans, 2013). Social motives were negatively associated with problems, suggesting that individuals drinking for social reasons were less likely to report experiencing alcohol-related problems.

Contrary to expectations, we found no main effect for S/R on drinking and problems (H1a). S/R is generally found to be protective against heavy alcohol use (e.g., Koenig et al., 2012), but the present data failed to find this effect. This could be due to differences in the way that S/R was measured, the heavy drinking nature of the sample, or regional differences. It could be that drinking behaviors among college students who drink heavily are less likely to be linked with their religious or spiritual views and more strongly linked with peer norms (Lau-Barraco & Linden, 2014) or social network influences (Astudillo, Connor, Roiblat, Ibanga, & Gmel, 2013).

Surprisingly, the present findings also revealed there was no main effect of alcohol-related ambivalence on drinking and problems (H1c). This could be due to a moderating influence, such as motivation to change, that was not accounted for in the current study. Furthermore, the sample was composed of college drinkers who reported at least one heavy drinking occasion in the past month (4/5 drinks on one occasion for females/males), and thus these individuals may not have felt much ambivalence regarding their drinking unless they were also motivated to change their behavior. Past work linking alcohol ambivalence to drinking and related problems has focused on treatment-seeking individuals (Oser et al., 2010).

Next, we tested two-way interactions between S/R and ambivalence, S/R and motives, and ambivalence and motives with respect to alcohol use and related problems, controlling for other motives. In doing so, we found support for several of our hypotheses. Results were in line with our expectations such that alcohol-related ambivalence was found to moderate relationships between S/R and drinking motives with respect to alcohol outcomes (H2a). Drinking motives were positively associated with alcohol outcomes among those high in ambivalence, but were associated with lower alcohol use and related problems among those low in ambivalence. These findings are consistent with the literature in that the combination of being high in ambivalence and more strongly endorsing drinking motives was associated with greater alcohol use and problems. Thus, drinking motives appear to be a risk factor for heavier drinking, especially among individuals high in ambivalence.

Further, as expected, S/R was found to moderate the association between drinking motives and drinking behavior and problems (H2b). Drinking motives were positively linked to drinking behavior and associated problems, particularly among those high in S/R relative to those low in S/R. This finding was contrary to our expectations in that we had expected the positive relationship between motives and alcohol use and problems to be stronger among those *low* in S/R, but findings emerged such that the relationship was stronger among those *high* in S/R (right graph in Figure 1). Perhaps, because the sample is composed of heavier drinking students, those more strongly endorsing drinking motives might be engaging in heavier alcohol use and experiencing more negative consequences overall. Thus, S/R may not be as protective for these individuals. Another potential explanation is that individuals high in S/R who drink heavily may then be higher in alcohol-related ambivalence because heavy drinking goes against their religious beliefs, yet they drink at high levels. Thus, they feel ambivalent towards alcohol because their personal attitudes differ from those prescribed by their religion.

Additionally, findings supported our predictions in that S/R moderated the effect of alcohol-related ambivalence on drinking (H2c). Specifically, ambivalence was associated with fewer peak drinks among those higher in S/R; however, among individuals lower in S/R, ambivalence was associated with greater reported peak drinks. S/R was also found to moderate the association between drinking motives and alcohol-related problems such that motives were positively associated with problems, and this was particularly evident among those high in S/R relative to those low in S/R. In other words, S/R was associated with more drinking and related negative consequences among those low in ambivalence, but was associated with lower alcohol use and related problems among those high in ambivalence. This finding did not come out as predicted; we expected S/R to be associated with more drinking and problems among those high in ambivalence. Perhaps this may be grounds for additional examination of religious orientation and motivation to reduce drinking, which may be important factors in better understanding this association.

We then tested three-way interactions between drinking motives, S/R, and drinking-related ambivalence with respect to drinking behavior. Results supported our third hypothesis (H3) in that several three-way interactions emerged between S/R, drinking motives, and ambivalence. The relationship between motives and ambivalence was differentially influenced by low versus high S/R. We predicted that those at highest risk for increased alcohol outcomes would be high in drinking motives, high in ambivalence, and low in S/R. We found that drinking motives were positively associated with alcohol outcomes among those high in ambivalence when S/R was low. However, when S/R was high, drinking motives were negatively associated with alcohol outcomes among those high in ambivalence, but positively associated with alcohol outcomes among those low in ambivalence.

These findings lend additional support to the perspective that S/R is an important factor to consider in alcohol behavior, and suggest that its influence on drinking and undesired consequences may not be completely straightforward. It appears that S/R may not always exert a protective influence against drinking behavior or buffer against undesired consequences, and specific mechanisms at play warrant additional examination. Future research may examine the discrepancy between personal attitudes towards drinking, religious norms, and drinking behavior as a potential mechanism underlying these findings. Individuals with larger discrepancies between their own attitudes, what is considered acceptable levels of drinking for their religion, and their behavior may more strongly endorse all four drinking motives and experience more alcohol-related ambivalence. Additionally, their awareness of this discrepancy may impact their drinking and experience of alcohol-related problems, especially if they are high in drinking to cope, as this awareness would likely result in discomfort via cognitive dissonance theory (Aronson, 1969; Festinger, 1957), which some individuals may attempt to alleviate by drinking. Future research is needed to better understand potential mechanisms that would explain these relationships.

Implications of these findings are that drinking motives are associated with higher alcohol use and related consequences, particularly among those low in S/R and high in ambivalence. These examinations have practical utility and may inform development and implementation of interventions and programs targeting alcohol misuse among heavy drinking

undergraduate students. Future intervention efforts might target heavy drinkers and aim to resolve their ambivalence related to alcohol, perhaps by using Motivational Interviewing techniques (Miller & Rollnick, 2002) that incorporate religious-based aspects, and thus potentially reduce future alcohol use and negative consequences.

Limitations and future directions

The findings of the present study should be considered in light of its limitations. First, the sample was relatively homogenous as it was comprised of college students who volunteered to participate. It will be important for investigators to draw from other populations to address potential self-selection bias among individuals with these characteristics and to increase generalizability. The present analyses included only heavy drinking students, and as such, findings can be generalized to heavy drinking peers. Further work will be needed to understand whether these complex relationships exist in lighter/moderate alcohol users. Additionally, the present data was cross-sectional, and therefore, findings cannot isolate causal relations or shed light on processes over time. Future investigations might examine how S/R, ambivalence, drinking motives, and drinking behavior may reciprocally influence one another over time.

Another limitation is the use of a non-validated measure of SR. Further, the current study did not find a main effect of S/R on drinking and related problems, possibly because the operationalization of S/R did not differentiate between intrinsic religiosity (participating in religious activities because doing so is in line with one's values and personal identity) versus extrinsic religiosity (taking part in religious activities because one is motivated by external approval or support; Allport & Ross, 1967). Furthermore, religious affiliation was not assessed and therefore differences between religions could not be discerned. Additionally, the Cronbach's alpha for the ambivalence scale was relatively low (.51), and thus, findings with regard to ambivalence should be interpreted tentatively. The concept of alcohol-related ambivalence encompasses mixed or contradicting feelings or attitudes with respect to drinking, which may lead to relatively weak intercorrelations between items within the scale. However, the ambivalence scale has been useful in assessing attitudinal dynamics related to alcohol use (e.g., Foster et al., 2014) as well as adolescents' responses to anti-drug messages (Zhao & Cappella, 2008) and attitudes regarding sexual behaviors among men who have sex with men (Picciano, Roffman, Kalichman, Rutledge, & Perghuis, 2001). Future investigations related to ambivalence, motives, and spirituality/religiosity might evaluate intrinsic versus extrinsic religiosity and religious affiliation as moderating influences of relationships between ambivalence and drinking motives.

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Highlights

- Spirituality/religiosity (S/R), drinking motives (DM), and ambivalence were examined
- Two and three-way interactions emerged regarding heavy drinking and problems
- High DM, low S/R, and high ambivalence were associated with drinking outcomes

Figure 1.

Multiple two-way interactions emerged. *Left:* Ambivalence interacted with S/R with respect to peak drinks. *Middle:* Drinking motives and ambivalence interacted with respect to drinks per week. *Right:* Drinking motives interacted with S/R with respect to alcohol problems.

Figure 2.
Three-way interaction between S/R, enhancement motives, and alcohol-related ambivalence with respect to peak drinks.

Figure 3.
Three-way interaction between S/R, enhancement drinking motives, and ambivalence with respect to drinks per week.

Figure 4.
Three-way interaction between S/R, enhancement drinking motives, and ambivalence with respect to alcohol problems.

Table 1

Means, Standard Deviations, and Correlations among Variables

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
1. Peak drinks	–															
2. Drinks per week	0.58 ^{***}	–														
3. Alcohol problems	0.31 ^{***}	0.39 ^{***}	–													
4. Spirituality/religiosity	–0.03	–0.07	–0.06	–												
5. Ambivalence	–0.0005	0.01	0.05	–0.02	–											
6. Social drink motives	0.11 [†]	0.12 [†]	0.10	–0.05	0.08	–										
7. Cope drink motives	0.10	0.12 [†]	0.34 ^{***}	–0.13 [†]	0.13 [†]	0.54 ^{***}	–									
8. Enhance drink motives	0.20 ^{**}	0.26 ^{***}	0.16 [*]	–0.15 [*]	0.08	0.71 ^{***}	0.53 ^{***}	–								
9. Conform drink motives	0.06	0.10	0.37 ^{***}	–0.19 ^{**}	0.05	0.35 ^{***}	0.45 ^{***}	0.34 ^{***}	–							
10. Ethnicity	–0.07	0.01	–0.02	0.08	–0.05	–0.02	0.05	–0.01	0.06	–						
11. Race	0.14 [*]	–0.01	0.03	–0.12 [†]	0.10	0.09	0.07	0.15 [*]	0.01	–0.38 ^{***}	–					
12. Age	–0.03	0.10	–0.01	0.13	–0.16 [*]	–0.06	–0.15 [*]	–0.13 [*]	–0.12 [†]	–0.04	0.001	–				
13. Year in school	–0.10	–0.15 [*]	–0.06	0.13 [*]	–0.03	–0.02	–0.07	–0.06	–0.11 [†]	–0.05	0.03	0.39 ^{***}	–			
14. Greek membership	0.01	–0.03	0.01	–0.04	–0.09	–0.05	0.03	–0.07	–0.06	0.04	0.09	0.13 [*]	0.08	–		
15. Work status	–0.04	0.01	0.02	0.10	–0.06	–0.06	–0.10	–0.20 ^{**}	–0.05	0.03	–0.09	0.17 ^{**}	0.18 ^{**}	0.06	–	
16. Gender	0.29 ^{***}	0.26 ^{***}	–0.01	–0.12 [†]	–0.05	0.05	–0.09	0.07	0.004	0.08	0.11	0.14 [*]	–0.08	–0.004	–0.04	–
Mean	6.89	8.29	33.13	5.36	5.40	14.73	10.06	12.42	7.54	2.95	1.67	23.48	3.49	1.87	1.93	0.18
Standard Deviation	3.36	7.71	9.23	1.35	1.77	4.96	4.37	4.90	3.60	2.33	0.47	5.50	1.39	0.34	0.70	0.39
Minimum	4.00	0.00	25.00	1.00	–1.00	5.00	5.00	5.00	5.00	1.00	1.00	18.00	1.00	1.00	1.00	0.00
Maximum	21.00	58.00	89.00	7.00	9.50	25.00	25.00	25.00	23.00	7.00	2.00	46.00	8.00	2.00	3.00	1.00
Alpha	NA	0.71	0.92	0.86	0.51	0.89	0.85	0.86	0.85	NA	NA	NA	NA	NA	NA	NA

Note. N=241

 $p < .001$.

**

 $p < .01$.

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$\hat{\beta}$ $p < .10$ Gender dummy coded (male = 1, female = 0). Significant effects are bold.
 $\hat{\beta}$ $p < .05$.
*

Table 2

Hierarchical regression analysis with drinks per week as outcome.

	Predictor	B	SE	t	p	β	Adj R ²
Step 1	Gender	4.00	1.25	3.19	0.002	0.20^{**}	0.1358
	Ethnicity	-1.11	1.09	-1.02	0.31	-0.07	
	Race	-0.10	0.22	-0.47	0.64	-0.03	
	Age	0.25	0.10	2.58	0.01	0.18[*]	
	Year in School	-1.04	0.37	-2.82	0.01	-0.19[*]	
	Greek Membership	-0.27	1.40	-0.19	0.85	-0.01	
	Work Status	0.90	0.69	1.30	0.20	0.08	
	Social Drink Motives (S)	-0.28	0.14	-1.96	0.05	-0.18 [†]	
	Cope Drink Motives	0.07	0.14	0.50	0.62	0.04	
	Enhance Drink Motives	0.61	0.14	4.19	<.0001	0.39^{***}	
Step 2	Conform Drink Motives	0.02	0.15	0.15	0.88	0.01	0.1276
	Spirituality/Religiosity (A)	-0.02	0.36	-0.04	0.97	-0.003	
	Ambivalence (B)	0.10	0.27	0.36	0.72	0.02	
	A * B	-0.19	0.24	-0.81	0.42	-0.30	
Step 3	A * S	-0.04	0.07	-0.50	0.61	-0.16	0.1411
	B * S	0.002	0.05	0.04	0.97	0.01	
	A * B * S	-0.09	0.04	-2.13	0.03	-2.79[*]	
Step 1	Gender	4.00	1.25	3.19	0.002	0.20^{**}	0.1358
	Ethnicity	-1.11	1.09	-1.02	0.31	-0.07	
	Race	-0.10	0.22	-0.47	0.64	-0.03	
	Age	0.25	0.10	2.58	0.01	0.18[*]	
	Year in School	-1.04	0.37	-2.82	0.01	-0.19[*]	
	Greek Membership	-0.27	1.40	-0.19	0.85	-0.01	
	Work Status	0.90	0.69	1.30	0.20	0.08	
	Social Drink Motives	-0.28	0.14	-1.96	0.05	-0.18 [†]	

Predictor	B	SE	t	p	β	Adj R ²
Cope Drink Motives (C)	0.07	0.14	0.50	0.62	0.04	
Enhance Drink Motives	0.61	0.14	4.19	<.0001	0.39***	
Conform Drink Motives	0.02	0.15	0.15	0.88	0.01	
A	-0.02	0.36	-0.04	0.97	-0.003	
B	0.10	0.27	0.36	0.72	0.02	
Step 2 A * B	-0.13	0.22	-0.58	0.56	-0.21	0.1306
A * C	-0.04	0.08	-0.51	0.61	-0.15	
B * C	0.05	0.06	0.85	0.40	0.21	
Step 3 A * B * C	-0.14	0.05	-2.56	0.01	-3.34*	0.1516
Step 1 Gender	4.00	1.25	3.19	0.002	0.20**	0.1358
Ethnicity	-1.11	1.09	-1.02	0.31	-0.07	
Race	-0.10	0.22	-0.47	0.64	-0.03	
Age	0.25	0.10	2.58	0.01	0.18*	
Year in School	-1.04	0.37	-2.82	0.01	-0.19*	
Greek Membership	-0.27	1.40	-0.19	0.85	-0.01	
Work Status	0.90	0.69	1.30	0.20	0.08	
Social Drink Motives	-0.28	0.14	-1.96	0.05	-0.18†	
Cope Drink Motives	0.07	0.14	0.50	0.62	0.04	
Enhance Drink Motives (E)	0.61	0.14	4.19	<.0001	0.39***	
Conform Drink Motives	0.02	0.15	0.15	0.88	0.01	
A	-0.02	0.36	-0.04	0.97	-0.003	
B	0.10	0.27	0.36	0.72	0.02	
Step 2 A * B	-0.19	0.23	-0.80	0.42	-0.30	0.1272
A * E	-0.03	0.08	-0.38	0.70	-0.12	
B * E	-0.01	0.06	-0.13	0.90	-0.03	
Step 3 A * B * E	-0.14	0.05	-3.00	0.003	-3.82**	0.1571
Step 1 Gender	4.00	1.25	3.19	0.002	0.20**	0.1021

Predictor	B	SE	t	p	β	Adj R ²
Ethnicity	-1.11	1.09	-1.02	0.31	-0.07	
Race	-0.10	0.22	-0.47	0.64	-0.03	
Age	0.25	0.10	2.58	0.01	0.18*	
Year in School	-1.04	0.37	-2.82	0.01	-0.19*	
Greek Membership	-0.27	1.40	-0.19	0.85	-0.01	
Work Status	0.90	0.69	1.30	0.20	0.08	
Social Drink Motives	-0.28	0.14	-1.96	0.05	-0.18 [†]	
Cope Drink Motives	0.07	0.14	0.50	0.62	0.04	
Enhance Drink Motives	0.61	0.14	4.19	<.0001	0.39***	
Conform Drink Motives (N)	0.02	0.15	0.15	0.88	0.01	
A	-0.02	0.36	-0.04	0.97	-0.003	
B	0.10	0.27	0.36	0.72	0.02	
<hr/>						
Step 2 A * B	-0.05	0.23	-0.20	0.84	-0.07	0.1448
A * N	0.03	0.09	0.31	0.75	0.07	
B * N	0.16	0.07	2.18	0.03	0.54*	
<hr/>						
Step 3 A * B * N	-0.05	0.06	-0.75	0.45	-0.84	0.1431

Note. N = 241

$p < .001$

**

$p < .01$

*

$p < .05$. Significant effects are bold.

Table 3

Hierarchical regression analysis with peak drinks as outcome.

	Predictor	B	SE	t	p	β	Adj R ²
Step 1	Gender	2.62	0.56	4.70	<.0001	0.30***	0.1021
	Ethnicity	0.41	0.49	0.84	0.40	0.06	
	Race	-0.13	0.10	-1.31	0.19	-0.09	
	Age	-0.02	0.04	-0.45	0.66	-0.03	
	Year in School	-0.19	0.16	-1.14	0.25	-0.08	
	Greek Membership	0.33	0.62	0.53	0.59	0.03	
	Work Status	0.18	0.31	0.58	0.56	0.04	
	Social Drink Motives (S)	-0.06	0.06	-0.98	0.33	-0.09	
	Cope Drink Motives	0.05	0.06	0.84	0.40	0.07	
	Enhance Drink Motives	0.14	0.06	2.22	0.03	0.21*	
Step 2	Conform Drink Motives	0.004	0.07	0.06	0.95	0.004	
	Spirituality/Religiosity (A)	0.17	0.16	1.04	0.30	0.07	
	Ambivalence (B)	-0.03	0.12	-0.21	0.83	-0.01	
	A * B	-0.30	0.10	-2.95	0.004	-1.10**	0.1256
	A * S	-0.03	0.03	-0.97	0.33	-0.30	
Step 3	B * S	-0.03	0.02	-1.32	0.19	-0.35	
	A * B * S	-0.01	0.02	-0.56	0.58	-0.74	0.1229
Step 1	Gender	2.62	0.56	4.70	<.0001	0.30***	0.1021
	Ethnicity	0.41	0.49	0.84	0.40	0.06	
	Race	-0.13	0.10	-1.31	0.19	-0.09	
	Age	-0.02	0.04	-0.45	0.66	-0.03	
	Year in School	-0.19	0.16	-1.14	0.25	-0.08	
	Greek Membership	0.33	0.62	0.53	0.59	0.03	
	Work Status	0.18	0.31	0.58	0.56	0.04	
	Social Drink Motives	-0.06	0.06	-0.98	0.33	-0.09	
	Cope Drink Motives (C)	0.05	0.06	0.84	0.40	0.07	
	Enhance Drink Motives	0.14	0.06	2.22	0.03	0.21*	

Predictor	B	SE	t	p	β	Adj R ²
Enhance Drink Motives	0.14	0.06	2.22	0.03	0.21*	
Conform Drink Motives	0.004	0.07	0.06	0.95	0.004	
A	0.17	0.16	1.04	0.30	0.07	
B	-0.03	0.12	-0.21	0.83	-0.01	
Step 2 A * B	-0.25	0.10	-2.57	0.01	-0.92*	0.1166
A * C	-0.01	0.04	-0.16	0.87	-0.05	
B * C	-0.01	0.03	-0.52	0.60	-0.13	
Step 3 A * B * C	-0.05	0.02	-1.96	0.05	-2.59[†]	0.1277
Step 1 Gender	2.62	0.56	4.70	<.0001	0.30***	0.1021
Ethnicity	0.41	0.49	0.84	0.40	0.06	
Race	-0.13	0.10	-1.31	0.19	-0.09	
Age	-0.02	0.04	-0.45	0.66	-0.03	
Year in School	-0.19	0.16	-1.14	0.25	-0.08	
Greek Membership	0.33	0.62	0.53	0.59	0.03	
Work Status	0.18	0.31	0.58	0.56	0.04	
Social Drink Motives	-0.06	0.06	-0.98	0.33	-0.09	
Cope Drink Motives	0.05	0.06	0.84	0.40	0.07	
Enhance Drink Motives (E)	0.14	0.06	2.22	0.03	0.21*	
Conform Drink Motives	0.004	0.07	0.06	0.95	0.004	
A	0.17	0.16	1.04	0.30	0.07	
B	-0.03	0.12	-0.21	0.83	-0.01	
Step 2 A * B	-0.28	0.10	-2.70	0.01	-1.00*	0.1215
A * E	-0.04	0.03	-1.15	0.25	-0.35	
B * E	-0.01	0.02	-0.57	0.57	-0.15	
Step 3 A * B * E	-0.04	0.02	-2.18	0.03	-2.82*	0.359
Step 1 Gender	2.62	0.56	4.70	<.0001	0.30***	0.1021
Ethnicity	0.41	0.49	0.84	0.40	0.06	

Predictor	B	SE	t	p	β	Adj R ²
Race	−0.13	0.10	−1.31	0.19	−0.09	
Age	−0.02	0.04	−0.45	0.66	−0.03	
Year in School	−0.19	0.16	−1.14	0.25	−0.08	
Greek Membership	0.33	0.62	0.53	0.59	0.03	
Work Status	0.18	0.31	0.58	0.56	0.04	
Social Drink Motives	−0.06	0.06	−0.98	0.33	−0.09	
Cope Drink Motives	0.05	0.06	0.84	0.40	0.07	
Enhance Drink Motives	0.14	0.06	2.22	0.03	0.21*	
Conform Drink Motives (N)	0.004	0.07	0.06	0.95	0.004	
A	0.17	0.16	1.04	0.30	0.07	
B	−0.03	0.12	−0.21	0.83	−0.01	
Step 2 A * B	−0.20	0.10	−2.02	0.04	−0.74*	0.1270
A * N	0.01	0.04	0.16	0.87	0.04	
B * N	0.06	0.03	1.72	0.09	0.43†	
Step 3 A * B * N	−0.004	0.03	−0.14	0.89	−0.16	0.1231

Note. N = 241

p < .001

**
p < .01

*
p < .05. Significant effects are bold.

Table 4

Hierarchical regression analysis with alcohol-related problems as outcome.

	Predictor	B	SE	t	p	β	Adj R ²
Step 1	Gender	0.27	1.48	0.18	0.86	0.01	0.1538
	Ethnicity	0.13	1.29	0.10	0.92	0.01	
	Race	-0.20	0.26	-0.77	0.44	-0.05	
	Age	0.10	0.11	0.88	0.38	0.06	
	Year in School	-0.24	0.44	-0.55	0.58	-0.04	
	Greek Membership	0.37	1.66	0.22	0.82	0.01	
	Work Status	0.57	0.82	0.70	0.49	0.04	
	Social Drink Motives (S)	-0.36	0.17	-2.15	0.03	-0.19 *	
	Cope Drink Motives	0.64	0.16	3.85	0.0002	0.30 ***	
	Enhance Drink Motives	0.10	0.17	0.56	0.58	0.05	
Step 2	Conform Drink Motives	0.75	0.17	4.29	<.0001	0.29 ***	0.1501
	Spirituality/Religiosity (A)	0.22	0.43	0.51	0.61	0.03	
	Ambivalence (B)	0.06	0.32	0.20	0.85	0.01	
	A * B	-0.34	0.28	-1.24	0.22	-0.46	
	A * S	0.03	0.09	0.33	0.74	0.10	
Step 3	B * S	-0.004	0.06	-0.07	0.94	-0.02	0.1560
	A * B * S	-0.08	0.05	-1.60	0.11	-2.08	
	Gender	0.27	1.48	0.18	0.86	0.01	
	Ethnicity	0.13	1.29	0.10	0.92	0.01	
	Race	-0.20	0.26	-0.77	0.44	-0.05	
Step 1	Age	0.10	0.11	0.88	0.38	0.06	0.1538
	Year in School	-0.24	0.44	-0.55	0.58	-0.04	
	Greek Membership	0.37	1.66	0.22	0.82	0.01	
	Work Status	0.57	0.82	0.70	0.49	0.04	
	Social Drink Motives	-0.36	0.17	-2.15	0.03	-0.19 *	
	Cope Drink Motives (C)	0.64	0.16	3.85	0.0002	0.30 ***	
	Enhance Drink Motives	0.10	0.17	0.56	0.58	0.05	
	Conform Drink Motives	0.75	0.17	4.29	<.0001	0.29 ***	
	Spirituality/Religiosity (A)	0.22	0.43	0.51	0.61	0.03	
	Ambivalence (B)	0.06	0.32	0.20	0.85	0.01	

Predictor	B	SE	t	p	β	Adj R ²
Enhance Drink Motives	0.10	0.17	0.56	0.58	0.05	
Conform Drink Motives	0.75	0.17	4.29	<.0001	0.29***	
A	0.22	0.43	0.51	0.61	0.03	
B	0.06	0.32	0.20	0.85	0.01	
Step 2						0.1510
A * B	-0.37	0.26	-1.38	0.17	-0.49	
A * C	0.06	0.10	0.59	0.56	0.17	
B * C	0.01	0.07	0.11	0.91	0.03	
Step 3						0.1635
A * B * C	-0.13	0.06	-2.09	0.04	-2.70*	
Step 1						0.1538
Gender	0.27	1.48	0.18	0.86	0.01	
Ethnicity	0.13	1.29	0.10	0.92	0.01	
Race	-0.20	0.26	-0.77	0.44	-0.05	
Age	0.10	0.11	0.88	0.38	0.06	
Year in School	-0.24	0.44	-0.55	0.58	-0.04	
Greek Membership	0.37	1.66	0.22	0.82	0.01	
Work Status	0.57	0.82	0.70	0.49	0.04	
Social Drink Motives	-0.36	0.17	-2.15	0.03	-0.19*	
Cope Drink Motives	0.64	0.16	3.85	0.0002	0.30***	
Enhance Drink Motives (E)	0.10	0.17	0.56	0.58	0.05	
Conform Drink Motives	0.75	0.17	4.29	<.0001	0.29***	
A	0.22	0.43	0.51	0.61	0.03	
B	0.06	0.32	0.20	0.85	0.01	
Step 2						0.1525
A * B	-0.28	0.27	-1.03	0.31	-0.38	
A * E	0.02	0.09	0.21	0.83	0.06	
B * E	0.06	0.07	0.85	0.40	0.22	
Step 3						0.1844
A * B * E	-0.17	0.05	-3.13	0.002	-3.93**	
Step 1						0.1538
Gender	0.27	1.48	0.18	0.86	0.01	
Ethnicity	0.13	1.29	0.10	0.92	0.01	

Predictor	B	SE	t	p	β	Adj R ²
Race	-0.20	0.26	-0.77	0.44	-0.05	
Age	0.10	0.11	0.88	0.38	0.06	
Year in School	-0.24	0.44	-0.55	0.58	-0.04	
Greek Membership	0.37	1.66	0.22	0.82	0.01	
Work Status	0.57	0.82	0.70	0.49	0.04	
Social Drink Motives	-0.36	0.17	-2.15	0.03	-0.19 *	
Cope Drink Motives	0.64	0.16	3.85	0.0002	0.30 ***	
Enhance Drink Motives	0.10	0.17	0.56	0.58	0.05	
Conform Drink Motives (N)	0.75	0.17	4.29	<.0001	0.29 ***	
A	0.22	0.43	0.51	0.61	0.03	
B	0.06	0.32	0.20	0.85	0.01	
Step 2 A * B	-0.20	0.26	-0.77	0.44	-0.27	0.2142
A * N	0.30	0.10	2.89	0.004	0.60 **	
B * N	0.28	0.08	3.32	0.001	0.79 **	
Step 3 A * B * N	-0.11	0.07	-1.45	0.15	-1.55	0.2180

Note. N = 241

p < .001

**
p < .01

*
p < .05. Significant effects are bold.