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Depressive Symptoms, Religious Coping, and Cigarette Smoking Among Post-secondary Vocational Students

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Abstract

Depressive symptoms are associated with increased levels of cigarette smoking, yet not every individual experiencing depressive symptoms smokes. This study examined whether religious coping moderated the impact of depressive symptoms on past 30-day cigarette use among a racially/ethnically diverse sample of 963 post-secondary vocational students (46.8% women; mean age = 25 years). Results from negative binomial regression analyses indicated that depressive symptoms increased the likelihood of cigarette smoking (quantity-frequency measure of cigarette use) for female students, whereas positive religious coping decreased the likelihood of smoking for female students. Consistent with religious coping theory and as expected, negative religious coping moderated the depressive symptoms-smoking relationship such that negative religious coping exacerbated the impact of depressive symptoms on cigarette smoking among females. Positive religious coping also moderated the depressive symptoms-cigarette smoking relationship for females. However, contrary to expectations, high levels of positive religious coping exacerbated the likelihood of cigarette smoking among females with high levels of depressive symptoms. Surprisingly, neither depressive symptoms nor positive or negative religious coping contributed to the likelihood of males' smoking. Study limitations and suggestions for directions in future research are discussed.

Keywords

depressive symptoms; religious coping; cigarette smoking; vocational student; stress

Although the rate of cigarette smoking by adults in the United States (U.S.) is now half of what it was in 1964 (U.S. Department of Health, 1964), 19.3% of U.S. adults 18 years and older report that they smoke cigarettes (Schiller, Lucas, Ward, & Peregoy, 2012). Tobacco use remains the leading cause of preventable death in the U.S. (Mokdad, Marks, Stroup, & Gerberding, 2004) and individuals dealing with depressive symptoms tend to smoke more than their non-depressed peers (Anda et al., 1990; Kenney & Holahan, 2008). A study of the historical trends of the relationship between depression and cigarette smoking suggests that

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the depression-cigarette use relationship has only become apparent in recent years as the prevalence rate of cigarette smoking declined and those who continue to smoke are more likely to be depressed (Murphy et al., 2003).

Depressive symptoms are a significant cause of stress with the potential to spin out of control if an individual does not engage in the necessary efforts to cope with their situation (Smith, McCullough, & Poll, 2003). Tomkins' (1966) negative affect model for smoking suggests that some may smoke to reduce their negative affect enough to deal with and get to the root of their stress, whereas others may use cigarettes to completely sedate themselves without facing their stressors. Perhaps as Murphy and colleagues (2003) noted, the relief associated with the reduction of depressive symptoms is so beneficial that depressed individuals continue to smoke cigarettes despite the well-known harmful health effects. Yet, not every individual who experiences depressive symptoms smokes, suggesting that other variables may moderate the relationship between depressive symptoms and cigarette use. Therefore, this study examined the unique role of religious coping, over and above nonreligious coping, as a potential moderator of the relationship between depressive symptoms and cigarette use among a racially/ethnically diverse sample of students enrolled in two-year post-secondary vocational schools.

The more religiously involved an individual is, the less likely she or he is to smoke cigarettes (see Koenig, McCullough, & Larson, 2001). This association has been reported in samples of college students (Oleckno & Blaconiere, 1991), young adults (Whooley, Boyd, Gardin, & Williams, 2002), and older adults (Koenig et al., 1998). While these studies indicate an inverse relationship between the institutional aspects of religious involvement (e.g., religious service attendance) and cigarette use (see Koenig et al., 2001), relatively less research has examined the unique role of more personal measures of religiousness, such as religious coping, on cigarette use. Nonetheless, drawing on religious coping theory and existing research (Koenig et al., 2001), it is likely that individuals who use positive religious coping may turn to a "divine other" (e.g., God of monotheistic faiths) for support in times of stress and in this way reduce reliance on smoking, whereas those who engage in negative religious coping may not only lack that sense of support but feel a sense of abandonment that increases the possibility of smoking. From this perspective positive religious coping should be directly inversely associated with smoking, whereas negative religious coping should be positively associated with smoking.

Religious Coping

Religious coping can be defined as specific means through which some individuals incorporate "a full range of behaviors, emotions, cognitions, and relationships" to deal with a variety of stressful situations (Pargament, Tarakeshwar, Ellison, & Wulff, 2001, p. 498). Positive religious coping includes a search for a spiritual connection, a collaborative relationship with a divine other, and seeking support from a divine other (Pargament, 1999). Conversely, negative religious coping includes a sense that a divine other is punishing oneself for sins as well as a sense of abandonment by a divine other (Pargament, 1999). A variety of health-related outcomes associated with positive and negative religious coping vary in expected ways. For example, positive religious coping is associated with better

stress-related adjustment compared to negative religious coping, which is associated with more adjustment problems (Pargament et al., 1998). Personal measures of religiousness may play a particularly salient role for individuals who experience decreased levels of control in their life. Prayer, for example, is a common coping strategy that individuals draw upon when dealing with stress (see Pargament, 1997).

Religious Coping as a Moderator of Depressive Symptoms and Cigarette Use

In addition to the direct effects of positive and negative religious coping on cigarette use, we anticipate that both types of religious coping will moderate the association between depressive symptoms and current cigarette use. Feeling a sense of support from a divine other (positive religious coping) may buffer, or lessen the deleterious impact of depressive symptoms on cigarette use. Depressed individuals are more likely than non-depressed individuals to become socially withdrawn (see review by Tse & Bond, 2004), exhibit excessive reassurance seeking (Joiner & Metalsky, 1995) and express neediness for emotional support. Coyne's (1976) interactional theory of depression suggests that the increased demand on these relationships often leads to diminished levels of support for, and even rejection of, the depressed individual (see Joiner & Metalsky, 1995). Thus, individuals lacking in social support from their "real" relationships may particularly gain from the support, and the sense of control over stressful situations, provided by a collaborative relationship with a perceived divine other. This relationship with a divine other may rival the intensity of relationships with family and friends (Pollner, 1989). As noted by Pollner (1989, p. 93), the divine is often personified as one who will convey a sense of support as well as guidance for individuals, particularly during stressful circumstances. A supportive relationship with a divine other may diminish a depressed individual's need to smoke cigarettes by filling the void of social support that those with depressive symptoms often experience. In this way, a relationship with a divine other may make up for a lack of relationship or support from family and friends.

Unlike the buffering role of positive religious coping, negative religious coping may exacerbate the influence of depressive symptoms on cigarette smoking. Unsupportive social relationships coupled with feelings of abandonment and/or punishment by a divine other may decrease one's sense of purpose and meaning in life and worsen existing feelings of negative affect, all of which may increase cigarette smoking among those with depressive symptoms. For example, compared to their peers who reported lower levels of negative religious coping, individuals living with HIV/AIDS who reported higher utilization of negative religious coping strategies subsequently reported significantly higher levels of depressive symptoms and more symptoms associated with HIV/AIDS (Trevino et al., 2010).

Occupational Status and Sense of Control Through a Divine Other

Individuals in blue-collar occupations, which rank low on occupational prestige, tend to lack autonomy in their daily work and a sense of control at their job, which increase their risk for experiencing depressive symptoms (Link, Lennon, & Dohrenwend, 1993). These individuals are also more likely than white-collar workers to have higher rates of current smoking

(Barbeau, Krieger, & Soobader, 2004). Blue-collar workers may lack the coping resources typically afforded only to those with higher levels of socioeconomic status and thus may possibly gain a sense of control through a relationship with a divine other (Pollner, 1989). In this way, religious coping could be a coping resource that fills a specific need for blue-collar workers who perceive a lack of control in their life. Vocational students enrolled in post-secondary two-year vocational/technical school programs, which prepare students for blue-collar occupations (e.g., welding, air-conditioning), also report higher smoking rates than the general adult population (Loukas, Murphy, & Gottlieb, 2007), making vocational students an excellent population for the current study.

Gender Differences Across Study Variables

A discussion of depressive symptoms, cigarette smoking, and religious coping would not be complete without examination of gender differences. Women are twice as likely as men to suffer from depressive symptoms (Nolen-Hoeksema, 2001) and women report more cigarette smoking in response to negative affect (Brandon & Baker, 1991). It follows, then, that depressive symptoms may predict women's smoking outcomes to a greater degree than men's. Women report more religious involvement than men across a variety of indicators (see Beit-Hallahmi & Argyle, 1997). Likewise, women's stronger propensity to rely upon and cultivate relationships with others, including a divine other (Pollner, 1989), increases the likelihood that the direct and moderating influence of religious coping will be greater for them compared to men. Moreover, societal norms tend to suggest that women are more reliant upon others to deal with the stressors they face, whereas men are expected to be more self-reliant when working through their problems. So, in this sense, women may be more likely than men to seek out, engage in, and benefit from a collaborative relationship with a divine other, whereas men may be more likely to deal with their problems without such a reliance on a divine other (Maynard, Gorsuch, & Bjorck, 2001).

Study Hypotheses

Findings in the literature indicate that religious and nonreligious coping are correlated and that even among those who draw on religious coping to deal with stress, nonreligious coping is also a fundamental part of their coping repertoire (Pargament, 1997). To provide a conservative test of the impact of religious coping on smoking, the overlapping variance associated with non-religious problem-focused (active coping, use of instrumental social support) and emotion-focused coping (denial, self-blame) was removed. Thus, we tested whether or not religious coping makes a unique contribution to cigarette smoking over and above the contribution of nonreligious coping. Moreover, because age and financial stress are positively correlated with cigarette smoking (Siahpush, Borland, & Scollo, 2003) and because cigarette smoking outcomes vary by race (Kiviniemi, Oromo, & Giovino, 2011), this study also controlled for these variables. In summary, the current study examined whether positive and negative religious coping moderated the relationship between depressive symptoms and the likelihood of current cigarette use, over and above the contributions of age, race, financial stress, and nonreligious problem- and emotion-focused coping. We hypothesized that:

1. depressive symptoms, negative religious coping, and emotion-focused nonreligious coping would be directly associated with higher levels of past 30-day cigarette use, and positive religious coping and problem-focused nonreligious coping would be directly associated with lower levels of current cigarette use; and
2. positive religious coping would buffer or lessen the impact of depressive symptoms on past 30-day cigarette use, whereas negative religious coping would exacerbate or worsen the negative impact of depressive symptoms on past 30-day cigarette use.

Method

Participants

Study participants were drawn from a larger study comprised of a convenience sample of 1,120 students recruited from 81 required introductory- and advanced-level classes at two two-year public colleges in Texas. Student enrollment at the participating schools was 2,590 and 9,582, respectively. The schools offer programs in areas including automotive technology, air-conditioning repair, allied health, business management, computer-aided drafting, medical technology, repair and manufacturing technology, and vocational nursing. Of the 1,434 students enrolled in the 81 classes, 1,131 were in class during the survey administration and 1,120 (78% of enrolled students) volunteered to complete the 117-item anonymous self-report Vocational Student Tobacco Use Survey. Students with any missing data were excluded from the analyses ($n = 157$); thus, the final sample size was 963.

Of the 963 students who had complete data, 46.8% were women, 53.2% were men; 38.5% were White, 23.9% were African American, 32.8% were Hispanic, 4.7% reported another race/ethnicity and 10 participants did not provide their race/ethnicity. With regard to age ($M=25.30$, $SD=8.59$) 60.6% of the participants were aged 18 to 24, 25.6% were 25 to 34, 13.8% were older than 35, and 11 participants did not complete this item. Although respondents did not provide their religious affiliation, county-level data assessed in 2000 indicated that in the first county where data were collected religious affiliation was: Evangelical Protestant, 29.9%; Catholic, 25%; Mainline Protestant, 8.4%; Other, 1.1%; Orthodox, 0.2%; and Unclaimed, 35%. In the second county, religious affiliation was: Catholic, 41.2%, Evangelical Protestant, 16%; Mainline Protestant, 6.1%; Other, 1.8%; Orthodox, .09%, Unclaimed, 34.9% (Association of Statisticians of American Religious Bodies, 2000).

Procedure

Upon approval from the Institutional Review Boards (IRBs) at the University conducting the study and the participating college with an IRB, the researchers scheduled administration of the voluntary and anonymous survey during 25 minutes of class time. A total of 40 classes participated in data collection at the first school (30 classes fall 2007, 10 classes spring 2008). At the second school, a total of 41 classes (20 classes fall 2007, 9 classes spring 2008, 12 classes summer 2008) participated in data collection. Across both schools, the survey was administered in 81 classes, from fall 2007 to summer 2008.

Measures

Demographic covariates—Students reported basic demographic information including gender, age, and race/ethnicity. One item from Pearlin, Menaghan, Lieberman, and Mullan's (1981) measure of economic strain was used to assess students' perceived financial stress. This item measured students' financial situation "at the end of the month" (1= 'some money left over'; 2= 'just enough to make ends meet'; 3= 'not enough money to make ends meet'). A high score indicates higher levels of perceived financial stress.

Nonreligious coping covariates—Eight items (four subscales) from the 28-item Brief COPE (Carver, 1997) were used to assess how often students engaged in four different types of nonreligious coping strategies. Students were asked to 'think about how you try to understand and deal with major problems in your life. To what extent is each involved in the way you cope?' The four types of nonreligious coping were measured with two items each. Two items measured active coping (e.g., 'I've been concentrating my efforts on doing something about the situation I'm in'); two items measured instrumental support (e.g., 'I've been trying to get advice or help from other people about what to do'); two items measured denial (e.g., 'I've been refusing to believe that it has happened'); and two items measured self-blame (e.g., 'I've been blaming myself for things that happened'). Each item was scored on a scale from 0 to 3 and a high score indicated greater use of a coping strategy. Based on an exploratory factor analysis and previous research (Carver, Scheier, & Weintraub, 1989), two common types of nonreligious coping – problem-focused (active coping, using instrumental support) and emotion-focused (denial, self-blame) coping – served as control variables in this study. In this sample, Cronbach's alpha for problem-focused coping was 0.87 and 0.84, for women and men, respectively. Cronbach's alpha for emotion-focused coping was 0.85 and 0.87, for women and men, respectively.

Religious coping—Five items were selected from the 6-item Brief RCOPE (Pargament, 1999) to assess how often (0= 'a great deal' to 3= 'not at all') students engage in both positive and negative forms of religious coping when dealing with a major life problem. Prior to answering the religious coping items, students were asked to 'think about how you try to understand and deal with major problems in your life. To what extent is each of these involved in the way you cope?' Three items measured positive religious coping (e.g., 'I work together with God as partners to get through the hard times') and two items measured negative religious coping (e.g., 'I feel that stressful situations are God's way of punishing me for my sins or lack of spirituality'). The self-directing negative religious coping item ('I try to make sense of the situation and decide what to do without relying on God') is considered to be conceptually distinct from the other negative religious coping items and thus was removed. That is, whereas the two remaining negative religious coping items consider the individual's relationship with God, the self-directing negative religious coping item taps into the individual's actions apart from a relationship with God and in this way may be more similar to other nonreligious coping strategies. Each item was reverse coded so that higher scores indicate greater use of positive and negative religious coping strategies.

Although past research studies generally report good reliability for positive religious coping (e.g., $\alpha = 0.81$), Cronbach's alpha tends to be lower for negative religious coping (e.g., $\alpha =$

0.58) (see Pargament et al., 2001). Consistent with Pargament's study, the Cronbach's alpha for the three-item positive religious coping subscale was 0.86 and 0.90, for women and men, respectively, whereas Cronbach's alpha for the two-item negative religious coping subscale was 0.59 and 0.65, for women and men, respectively.

Depressive symptoms—The Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977) is a 20-item measure of the frequency and severity of depressive symptoms occurring in the past week. Students indicated how often in the past week they experienced symptoms of the following four subscales: somatic complaints, depressive affect, positive affect, and interpersonal problems. Each item (e.g., 'I felt that I could not shake off the blues even with help from my family or friends') is scored on a scale ranging from 0 ('rarely or none of the time; less than 1 day') to 3 ('most or all of the time; 5 to 7 days'); therefore, a high score indicates elevated levels of depressive symptomatology. Previous studies have validated the four-factor structure of the CES-D in adult samples (Golding & Aneshensel, 1989) and provide evidence of reliability for this well-established measure of depressive symptoms. Cronbach's alpha for the CES-D measure was 0.85 and 0.83 for women and men, respectively, indicating that the measure has good internal consistency reliability in the current sample.

Quantity-frequency of current cigarette use—Current cigarette use was measured using two items from the National College Health Risk Behavior Survey (Centers for Disease Control and Prevention, 1997). One item measured frequency of current cigarette use (e.g., 'During the past 30 days, on how many days did you smoke cigarettes?'). Students identified how often they smoke cigarettes on a scale ranging from 0 ('0 days') to 6 ('all 30 days'). One item measured quantity of current cigarette use (e.g., 'During the past 30 days, on the days you smoked, how many cigarettes did you smoke per day?'). Students identified the quantity of current cigarette use on a scale ranging from 0 ('I did not smoke cigarettes during the past 30 days') to 6 ('more than 20 cigarettes per day'). Similar to Schleicher, Harris and Catley (2009), the two current cigarette use items were multiplied together to create a quantity-frequency variable for cigarette use, which provided a count of the quantity-frequency of cigarettes smoked during the 30 days prior to the survey and ranged from 0 to 36.

Missing Data Analysis

Data from 157 students were removed from the current sample because they were missing substantial amounts of data. A series of analyses were conducted to examine if the data from these 157 students differed from the 963 that were retained for study analyses, potentially resulting in an exclusion bias. The non-parametric Mann Whitney U-test indicated that the distribution of scores on the quantity-frequency of cigarette smoking variable did not differ between the two groups ($p = .87$). Similarly, independent samples t-tests indicated that there were no differences between the two groups on positive religious coping [$t(1040) = 1.79, p = .08$], negative religious coping [$t(1038) = 1.17, p = .24$], or depressive symptoms [$t(1083) = 1.42, p = .16$]. Thus, removal of 157 students' data from the current sample did not result in exclusion bias.

Data Analysis

Negative binomial regression was used to examine the unique contributions of positive and negative religious coping to the quantity-frequency of past 30-day cigarette use after accounting for the contributions of the covariates (age, race, perceived financial stress, problem- and emotion-focused coping). Negative binomial regression is the preferred statistical method when the dependent variable represents a count of events that are non-normally distributed (Hox, 2010). In the present study, 70.2% of participants received a 0 (indicating they were non-smokers) on the quantity-frequency variable; thus, this count variable was non-normally distributed.

To determine if the association between depressive symptoms and current cigarette use varied (was moderated) by use of positive and negative religious coping, two separate two-way interactions between depressive symptoms and religious coping were tested. In order to determine the nature of a significant interaction, the methods outlined by Aiken and West (1991) were used. Specifically, the relationship between depressive symptoms and quantity-frequency of past 30-day cigarette use was examined at high (1 SD above the mean value) and low (1 SD below the mean value) levels of the positive or negative religious coping variable. In order to prevent problems with multicollinearity, the nonreligious coping (problem- and emotion-focused) covariates and the depressive symptoms and religious coping (positive and negative) predictor variables were each mean-centered (Aiken & West, 1991).

Each of the covariates (age, race, financial stress, problem- and emotion-focused coping) and all three predictor variables (depressive symptoms, positive and negative religious coping) were entered simultaneously in model one. Both of the two-way interaction terms (depressive symptoms $\times$ positive religious coping; depressive symptoms $\times$ negative religious coping) were tested independently in model two, with all covariates and main effects included.

Results

Preliminary Analyses

Given that the comorbidity of cigarette smoking and depression vary across males and females (Husky, Mazure, Paliwal, & McKee, 2008), Box's M test was used to determine the homogeneity of variance-covariance matrices of the study variables across gender in this study. Because Box's M test was significant (Box's $M = 58.67$, $df = 36$, $p = .01$) indicating that the variance-covariance matrices varied across gender, all subsequent models were run separately for male and female students.

Mean Differences Across Gender

Mean differences across gender in the study variables were examined for descriptive purposes and are presented in Table 1. With the exception of age, race, and emotion-focused nonreligious coping, results indicated a statistically significant difference at the $p < .05$ level in scores for each study variable across gender. Female students reported significantly more perceived financial stress, depressive symptoms, positive religious coping, and problem-

focused coping than did male students. However, male students reported significantly more negative religious coping and quantity-frequency of past 30-day cigarette use than did female students.

Zero-order Correlations

Prior to testing the study hypotheses, zero-order correlations between the independent and dependent variables for males and females were examined. As shown in Table 1, compared to their nonwhite peers, both white male and white female students were more likely to smoke cigarettes in the past month. Perceived financial stress, depressive symptoms, and problem-focused nonreligious coping were each associated with increased smoking among female students. Lastly, positive religious coping was associated with decreased cigarette smoking in the past month among female students.

Main Effects

The negative binomial regression, for model one, predicting quantity-frequency of past 30-day cigarette use from the covariates, depressive symptoms and positive and negative religious coping was statistically significant for male ($\chi^2(8) = 49.08, p < .001$) and female ($\chi^2(8) = 159.27, p < .001$) students (see Table 2, model one). Among the covariates, age and race were both uniquely associated with past 30-day cigarette use for male and female students, whereas financial stress and emotion-focused coping were uniquely associated with past 30-day cigarette use, but only for female students. Among the predictor variables, depressive symptoms and positive religious coping were significantly associated with quantity-frequency of past 30-day cigarette use, but for females only.

Given that the negative binomial regression model is log linear, it is possible to convert the regression coefficients into the predicted multiplicative effect of a 1-unit change in the variable of interest (i.e., depressive symptoms) on the count of cigarette use, holding all other variables constant (Coxe, West, & Aiken, 2009). For example, the exponentiation of the regression coefficient for financial stress ($e^{0.37} = 1.45$) indicates the multiplicative difference in quantity-frequency of cigarettes smoked based on a female student's financial stress. Thus, a female student with a perceived financial stress score of 3 is expected to have a quantity-frequency score for cigarettes smoked that is, on average, 1.45 times greater than a student with a perceived financial stress score of 2. Examination of the exponentiation of the regression coefficients for the other covariates indicate that for both males and females, a student who is 25 years old is expected to have a quantity-frequency score that is, on average, 1.02 times greater than a 24 year-old student of the same gender and that White male and female students are expected to have quantity-frequency scores that are, on average, 1.92 and 2.61 times greater than their non-White counterparts, respectively. In addition, a female with an emotion-focused coping score of 9 is expected to have a quantity-frequency score for cigarettes smoked that is, on average, 1.05 times greater than a female with an emotion-focused coping score of 8.

Regarding the exponentiation of the regression coefficients for the female depressive symptoms and positive religious coping predictor variables (see Table 2), results indicate that a student with a depressive symptoms score of 20 is expected to have a quantity-

frequency score for cigarettes smoked that is, on average, 1.03 times greater than a student with a depressive symptoms score of 19. Furthermore, a 1-unit increase in positive religious coping causes the expected quantity-frequency score for cigarettes smoked by female students to decrease by a factor of 0.93.

Interaction Effects

As shown in Table 2, model two, four two-way interactions were significant: two between depressive symptoms and positive religious coping, one for males ($\chi^2(9) = 57.08, p < .001$) and one for females ($\chi^2(9) = 167.80, p < .001$) and two between depressive symptoms and negative religious coping, one for males ($\chi^2(9) = 55.01, p < .001$) and one for females ($\chi^2(9) = 171.87, p < .001$). Probing the significant 2-way interaction between depressive symptoms and negative religious coping for female students revealed that depressive symptoms were significantly associated with cigarette smoking during the past month at high level of religious coping ($\beta = .05, p < .001$), but not low levels of religious coping ($\beta = .01, p > .05$) (see Figure 1). As expected, findings indicated that negative religious coping exacerbated the influence of depressive symptoms on the likelihood of female students' past 30-day cigarette use. On the other hand, probing male students' depressive symptoms $\times$ negative religious coping interaction revealed that depressive symptoms were not associated with quantity-frequency of past 30-day cigarette smoking at high levels of negative religious coping ($\beta = .003, p > .10$), but were marginally associated with past month smoking at low levels of negative religious coping ($\beta = -.02, p = .086$). Given the non-significant and marginal associations, this finding is not discussed further.

Probing the significant depressive symptoms $\times$ positive religious coping interaction for female students indicated that depressive symptoms were significantly associated with quantity-frequency of past 30-day cigarette use at high levels of positive religious coping ($\beta = .05, p < .001$), but not low levels of positive religious coping ($\beta = .003, p > .05$). Although unexpected, these results indicate that high levels of positive religious coping exacerbated the influence of depressive symptoms on the likelihood of females' current cigarette use. However, examination of the point estimates in Figure 2, indicate that high levels of positive religious coping may be protective for female students reporting low levels of depressive symptoms, but the protective effect is no longer present for those females with high levels of depressive symptoms. For males, probing the depressive symptoms $\times$ positive religious coping interaction revealed that depressive symptoms were marginally associated with quantity-frequency of past month cigarette use at high ($\beta = .02, p = .08$) and low ($\beta = -.02, p = .07$) levels of positive religious coping. Given these findings, this interaction is not further discussed.

Discussion

Despite the growing amount of research examining the influence of religious involvement on various health behaviors, our knowledge of the influence of religious coping on the association between depressive symptoms and cigarette use is lacking. This study extends existing research by examining religious coping as a moderator of the relationship between depressive symptoms and the likelihood of past 30-day cigarette use, while controlling for

the influence of nonreligious coping and other covariates in a racially/ethnically diverse sample of vocational/technical school students. In partial support of hypothesis 1, findings indicated that depressive symptoms were associated with an increased likelihood of cigarette use among female students, whereas positive religious coping decreased the likelihood of female students' cigarette use, even after controlling for demographic variables and nonreligious coping. Corroborating theory on the role of religious coping, results also showed that negative religious coping exacerbated the influence of depressive symptoms on the likelihood of cigarette use for females. Unexpectedly, however, positive religious coping also exacerbated the influence of depressive symptoms on the likelihood of female cigarette use.

Consistent with Tomkins' (1966) negative affect model for smoking and prior research (Kenney & Holahan, 2008), depressive symptoms were associated with an increased likelihood of current cigarette use, but only among female students. Past studies report that women have higher rates of depression/depressive symptoms than men (see Nolen-Hoeksema, 2001) and are more likely to use tobacco when dealing with feelings of negative affect (Brandon & Baker, 1991). Moreover, this finding supports those of others showing that depression (Husky et al., 2008) is more strongly associated with cigarette smoking in women than men. The positive association between depressive symptoms and smoking lends itself to the paradox of coping and substance (cigarette) use noted by Brandon and colleagues (Brandon, Herzog, Irvin, & Gwaltney, 2004): cigarette smoking functions both as a way to deal with one's stress and a deleterious health outcome associated with other unproductive efforts to deal with stress.

Additional findings indicated that in comparison with their counterparts, female vocational students who used positive religious coping were less likely to report current cigarette use. Just as Tomkins' (1966) negative affect model for smoking suggests that some smoke to relieve their stress, findings from this study suggest that female vocational students may use positive religious coping to deal with their stress, but without the health risks of smoking. It is likely that individuals who see themselves as working together with a divine other to deal with their problems may be able to better adapt to their stressful situations (see review by Koenig et al., 2001). These findings add to the growing literature showing the beneficial influence of various aspects of religion on females' health behaviors (Koenig et al., 2001).

Contrary to the findings for positive religious coping, negative religious coping was not directly associated with past 30-day smoking. However, results confirmed our expectations that negative religious coping would interact with depressive symptoms and exacerbate its impact on the likelihood of current cigarette use. Specifically, female students who reported high levels of depressive symptoms and also engaged in high levels of negative religious coping had an increased likelihood of current cigarette use. Individuals who experience depressive symptoms often exhibit negative emotions and behaviors that turn others away from them, eroding their network of support (Coyne, 1976). Therefore, female students who have strained social relationships associated with depressive symptoms may also feel that God has abandoned them and that their stress is a result of God punishing them. For this reason, female students may be at increased risk for smoking cigarettes.

Unexpectedly, high levels of positive religious coping exacerbated the detrimental impact of depressive symptoms on the likelihood of female students' current cigarette smoking. In particular, although women with low levels of depressive symptoms may have benefited from the use of positive religious coping, women with high levels of depressive symptoms did not. These findings are partially inconsistent with the direct salutary contribution of positive religious coping to female students' cigarette use and with our expectation that positive religious coping would buffer the impact of depressive symptoms on current smoking. However, results are consistent with previous findings that positive religious coping exacerbated the influence of perceived racial/ethnic discrimination on the likelihood of African American students' current cigarette use (Horton & Loukas, in press). According to Pargament (1997), overreliance on a divine other to assist with or take control of a situation, particularly when an individual needs to take action to deal with their stress, can have harmful consequences. It is possible then that female students with high levels of depressive symptoms may cede personal control over their situation and rely too much on a divine other to get them through difficult situations (Pargament, 1999). Overreliance on positive religious coping to deal with the stress of depressive symptoms may also indicate female students' inability to assess the best way to deal with their situation. This explanation supports Pargament's warning of the potential breakdown in the coping process that can occur when the use of religious and nonreligious coping resources are not coordinated appropriately to address a stressful situation (Pargament, 1997). Another explanation for this unexpected finding may be that individuals tend to use all available coping resources, whether positive or negative, to deal with elevated levels of distress associated with depressive symptoms (Coyne, Aldwin, & Lazarus, 1981).

Surprisingly, neither depressive symptoms nor religious coping contributed to the likelihood of males' smoking. The lack of findings for male students may be due in part to males' lower mean scores for depressive symptoms and for positive religious coping. The lack of findings for males may also be attributed to the fact that the strength of association between affective disorders and cigarette smoking is weaker for males than females (Brandon & Baker, 1991). Regarding religious involvement, other variables may be better predictors of cigarette smoking for males and should be pursued in future studies. Given that men tend to be less collaborative and less religiously involved than women (Pew Research Center, 2008), subsequent studies should consider the roles of self-directing religious coping (dealing with one's stress independent of a divine other) and spiritual discontent (feelings of anger and distancing oneself from a divine other) in male vocational school students' smoking.

The limitations of the current study must be taken into account when interpreting the findings. The cross-sectional study design limits our ability to examine the temporal relationships between the study variables. Future studies should assess both the short- and long-term influences of religious coping on the relationship between depressive symptoms and cigarette smoking using full measures of religious and nonreligious coping. Due to space limitations, a brief form of the religious coping measure and selected subscales of the nonreligious coping measure were used in the present study. Another limitation is the low internal consistency reliability of the two-item negative religious coping subscale, which may have influenced the study findings. The low internal consistency reliability of negative

religious coping may be due to the use of two diverse items measuring struggle with a divine other. Subsequent studies using measures that tap into other more specific aspects of negative religious coping should be conducted to determine if the pattern of findings reported in the present study is replicated. Additionally, the absence of data on the religious affiliation and level of organizational religious involvement of the study participants limits the ability to assess the influence of institutional aspects of religiousness on the study findings. Finally, findings are limited to the examination of religious coping by those affiliated with a monotheistic faith and our measures of religious coping do not include assessment of spiritual coping outside of the influence of organized religion. Future studies should therefore examine religious coping for individuals of other faiths and incorporate examination of the role of spirituality in the association between depressive symptoms and smoking.

Notwithstanding these limitations, this study contributes to the literature in several areas, including religious coping, cigarette smoking, and vocational students training to work in blue-collar occupations. This research demonstrated that the direct and moderating influences of religious coping on the likelihood of cigarette smoking occurred in ways that were expected and unexpected. As expected, findings indicated that positive religious coping was associated with a decreased likelihood of female students' cigarette use and negative religious coping exacerbated the influence of high levels of depressive symptoms on the likelihood of females' smoking. Although unexpected, this research also suggests that overreliance on positive religious coping increased the likelihood of cigarette smoking for females who reported high levels of depressive symptoms. Simultaneous examination of both the personal (i.e. religious coping, attachment to God) and organizational (i.e., religious affiliation and religious service attendance) measures of religious involvement, depressive symptoms, and cigarette use is needed for a finer-grained analysis of these associations.

There are practical implications to the finding that religious coping is relevant to the female vocational students participating in this study. For females to whom religion is important, religious coping serves as an addition to their repertoire of existing coping resources from which they can draw upon. In particular, such women may also benefit from the social support of those within their religious community and the proscriptive norms of their faith that discourage harmful health behaviors such as smoking (Koenig et al., 2001). The implication of these findings for women who are currently trying to quit smoking, is that in addition to other resources, religious coping may contribute to decreases in smoking.

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Figure 1.
Examining the depressive symptoms X Negative Religious Coping interaction for female students.

Figure 2. Examining the depressive symptoms X Positive Religious Coping interaction for female students.

Table 1

Means, Standard Deviations and Zero-Order Correlations (r) for Male (n = 512) and Female (n = 451) Students' Study Variables

	1	2	3	4	5	6	7	8	9	Female M(SD)
1. Age	-----	-.02	.18***	.001	-.11*	-.001	.08	-.17***	.06	25.09(7.93)
2. Race	-.16***	-----	-.07	.02	-.04	.03	-.20***	-.08	.21***	0.37(0.48)
3. Financial Stress	.11*	-.09*	-----	.15***	.14**	.20***	.03	.02	.13**	1.75(0.78)
4. PFC	.04	-.03	.11*	-----	.36***	.07	.11*	-.02	.04	7.56(3.38)
5. EFC	-.11**	-.03	.14**	.40***	-----	.41***	.04	.32***	.09*	3.84(3.51)
6. Depress Symptoms	-.06	-.08	.17***	.08	.46***	-----	-.06	.17***	.15**	0.68(0.45)
7. PRC	.06	-.09*	.04	.16***	.08	-.08	-----	.11*	-.11	1.96(0.92)
8. NRC	-.21***	-.12**	.09	.05	.22***	.22***	.26***	-----	.01	1.08(1.48)
9. ^a Cigarette Use	.06	.14***	.05	.04	.04	.04	-.03	-.02	-----	3.38(7.82)
Male M (SD)	25.49 (9.15)	0.40 (0.49)	1.60 (0.71)	6.70 (3.39)	3.61 (3.51)	0.62 (0.43)	1.74 (1.00)	1.37 (1.67)	4.86 (8.96)	
t	-.71	-1.14	3.07	3.92***	1.01	2.05*	3.45***	-2.82**	-2.72**	

Note. Female students' zero-order correlations are above the diagonal and male students' are below. PFC = problem-focused coping; EFC = emotion-focused coping; PRC = positive religious coping; NRC = negative religious coping.

^a Quantity-frequency of cigarette smoking in the past 30 days.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 2

Negative Binomial Regression Analysis for Variables Predicting Quantity-Frequency of Past 30-day Cigarette Use for Male (n = 512) and Female (n = 451) Students

Variable	Male Betas		Female Betas	
	Model 1	Model 2	Model 1	Model 2
Sociodemographics				
Age	.02***		.02*	
Race (White=1)	.65***		.96***	
Financial Stress	.08		.37***	
Main Effects				
Nonreligious Coping				
Problem-focused	.01		.01	
Emotion-focused	.02		.05**	
Depressive Symptoms	.001		.03***	
Religious Coping				
Positive	-.02		-.07**	
Negative	.01		-.04	
Interaction Terms				
Dep. Sympt. X PRC		.01**		.01**
Dep. Sympt. X NRC		.01*		.02***

Note. PRC = positive religious coping; NRC = negative religious coping. Two-way interactions were analyzed in separate models. Main effects from the interaction models are not shown because they cannot be interpreted in the presence of the interactions.

*
p < .05.

**
p < .01.

p < .001.