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Positive and Negative Associations between Adolescents' Religiousness and Health Behaviors via Self-Regulation

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Abstract

It has been proposed that self-regulation may be the explanatory mechanism for the relation between religiousness and positive health behaviors. However, different religious motivations have differential effects on a variety of health related outcomes, which may explain the adverse effects of religiousness found in some studies. The current study hypothesized that higher identification as religious motivation would be linked to higher health-promoting behavior and lower health-risk behavior through higher self-regulation, whereas higher introjection would be linked to lower health-promoting behavior and higher health-risk behavior through lower self-regulation. The sample included 220 adolescents (mean age = 15 years, 55% male) and their primary caregivers. Structural equation modeling results supported the hypotheses and indicated that adolescent self-regulation mediated the relations between their religious motivation and health behavior. The findings suggest that different types of religious motivation may be promotive or hindering for adolescents' health.

Keywords

Religiousness; Motivation; Self-Regulation; Health-Risk Behavior; Health-Promoting Behavior; Adolescence

Religion is a multi-dimensional construct that exists across most cultures and exhibits a wide range of effects on thoughts, feelings, and behaviors. A large volume of previous literature has shown religiousness can provide a number of health benefits (for a review, see Regnerus, 2003). However, the link connecting religiousness to these health benefits is not well understood (George, Ellison, & Larson, 2002) and some literature has even demonstrated that religiousness can have adverse effects (e.g., Pargament, Koenig, Tarakeshwar, & Hahn, 2001; Peterman, LaBelle, & Steinberg, 2014). It is not clearly known whether differences in religious motivation may explain the direction of association between religiousness and health outcomes (i.e., beneficial vs. adverse). According to recent literature indicating health behavior is linked with religiousness via self-regulation (Kim-Spoon, Farley, Holmes, Longo, & McCullough, 2014; see McCullough & Willoughby, 2009 for a review), the current study examined whether the motivation for religiousness is a critical factor for

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determining whether one's religiousness promotes or demotes self-regulatory behavior and, in turn, health behavior among adolescents.

Adolescence has been identified as a developmental period where particularly high levels of unhealthy and risky behavior (such as substance use) are manifested (Casey, Jones, & Somerville, 2011; Steinberg, 2010); thus, it is critical to identify mechanisms that may make particular adolescents more susceptible to unhealthy and risky behavior. While religious motivation may be a determining factor that explains whether and how adolescents' religiousness may be related to their health behaviors, self-regulation has not been systematically examined as the linking mechanism that helps determine whether these associations are positive or negative. Moreover, no previous study, to the authors' knowledge, has simultaneously explored health-promoting behavior and health-risk behavior in relation to religious motivation.

Religiousness and Health Behavior

Following theoretical reviews suggested by McCullough and Willoughby (2009), we defined religion as "cognition, affect, and behavior that arise from awareness of, or perceived interaction with, supernatural entities that are presumed to play an important role in human affairs." Religiousness has frequently been associated with promotion of healthy outcomes and protection against risky and unhealthy outcomes. In particular, substance use is a health-risk behavior that has been widely studied in relation to religiousness (George et al., 2002; Kendler et al., 2003; Mason & Spoth, 2011; for a review, see Chitwood, Weiss, & Leukefeld, 2008). For example, using data from a nationally representative sample of 676 adolescents, Miller and colleagues (2000) reported that lower religiousness is associated with higher adolescent use and abuse of substances, including alcohol, marijuana, and cocaine.

Health-promoting behaviors, including wearing seatbelts, brushing teeth, and engaging in exercise seem to contribute to increased longevity, another association of religiousness (McCullough, Hoyt, Larson, Koenig, & Thoresen, 2000). In a meta-analysis, McCullough and colleagues (2000) found that religious involvement caused a higher likelihood that the individual would be alive at a follow-up assessment than those not religiously involved. Indeed, religiousness has been associated with better health practices like wearing seatbelts, brushing teeth, getting more exercise, and taking vitamins in a sample of 1,504 adults (Hill, Burdette, Ellison, & Musick, 2006). Similarly, another study demonstrated that a sample of 71,689 adult women were more likely to actively monitor their health (e.g. mammograms & PAP smears) and have a higher dietary fiber intake if they reported higher attendance at religious services (Salmoirago-Blotcher et al., 2011). In a review of the relationship between religiousness and health, Koenig (2012) found that 68% of 33 reviewed studies indicated a significant positive relation between religiousness and physical activity (16% the inverse). Moreover, 62% of 21 reviewed studies indicated a significant positive relation between religiousness and healthy dietary intake (one study the inverse). However, previous studies have focused on the relation between religiousness and physical health in adults creating a need to further explore this relation in adolescents. Furthermore, attempts must be made to investigate how those inverse associations between religiousness and physical health that are reported in some previous studies can be explained.

Taken together, extant literature suggests a robust relation between religiousness and health behavior while occasionally detrimental effects are found as well. However, only recently have researchers begun to explore self-regulation as a possible mediating mechanism between religiousness and health behaviors (McCullough & Willoughby, 2009). Nevertheless, very few empirical studies have explored self-regulation as a potential mechanism linking religiousness and health behavior among adolescents and none explored the potential effects that differences in religious motivation may have on these behaviors via self-regulation.

The Role of Self-Regulation in Linking Religiousness and Health Behavior

Following Baumeister, Vohs, and Tice (2007), we defined self-regulation as “the capacity for altering one's own responses, especially to bring them into line with standards such as ideals, values, morals, and social expectations, and to support the pursuit of long term goals,” and use the terms self-regulation and self-control interchangeably as has been done in previous studies (Kim-Spoon et al., 2014). Baumeister and colleagues (2007) demonstrated that self-regulation is limited in capacity and not domain specific. Furthermore, from this conceptual framework of the domain generality of self-control, self-control can be considered a unitary resource that can be exerted in one of the three response domains: cognitive, affective, and behavioral (Berkman, Graham, & Fisher, 2012). Berkman and colleagues illustrated through a review of functional neuroimaging studies that a number of brain regions were commonly implicated in a self-regulatory framework, no matter if the regulation was cognitive, affective, or behavioral in context. In particular, the right inferior frontal gyrus was implicated in all three domains, indicating it may be a region that provides a single pathway for them all. One of the implications of such findings is that it is important to measure self-regulation as an integration of all three domains as each pulls from a single, domain-general resource.

Subsequent literature to the theoretical proposal of McCullough and Willoughby (2009) on self-regulations role in linking religiousness and health behavior has focused on providing empirical evidence for this proposition. Watterson and Giesler (2012) demonstrated in a sample of 75 undergraduate students that religious people, when compared to nonreligious people, were better able to self-regulate (measured via persistence on an unsolvable anagram task) after initial depletion (via squeezing of a hand grip), suggesting that religion does influence self-regulation by building self-regulatory strength and may lead to better health outcomes. That is, an individual has a limited capacity of self-regulatory strength and, when that strength has been exhausted, self-regulation fails similarly to a muscle (Baumeister, Vohs, & Tice, 2007). Moreover, regulatory capacity, if frequently depleted and given enough time to recover, will subsequently increase for future use, or grow stronger after working-out, as a muscle will. Therefore, many religious individuals demonstrate higher self-regulatory capacity because most religious doctrines place participants in high constraint settings (Kenrick, McCreath, Govern, King, & Bordin, 1990) and require practices demanding of self-regulatory processes like praying, meditating, and tithing (e.g. Fazel 1998). Taken together, these findings indicate that religion may act as a domain which taxes self-regulatory abilities and, thus, strengthens it in the long run within the framework of the strength model of self-regulation.

These studies provide strong evidence that increased self-regulation creates the link between religiousness and health-promoting and health-risk behavior. While there are a variety of ways in which self-regulation can be increased by religiousness, there is reason to believe that religiousness is linked to better health through the enhanced self-regulation. However, most previous studies failed to explore the multi-dimensional aspect of the motivation to be religious. Distinguished types of religious motivations may contribute differentially to the health outcomes, but there has been no systematic investigation examining differing relations between religious motivations and health outcomes via self-regulation. As a result, researchers may have interpreted data that may be biased toward one aspect of religious motivation or another and, as previously noted, puzzled by adverse effects of religiousness (e.g., Pargament et al., 2001; Peterman et al., 2014) which might be explained by differences in religious motivations.

Religious Motivation

In their seminal study, Allport and Ross (1967) distinguished between extrinsic and intrinsic religious orientations. On one hand, they characterized extrinsic religiousness as a utility, or, a means to an end. The extrinsically oriented are focused on rewards like the sociability and status religion brings them and embrace or ignore particular religious teachings to fit their needs. On the other hand, intrinsic religiousness was characterized as a master motive, finding other needs as less significant, and embracing the creed of their religion to the fullest. In this regard, Allport and Ross claimed that extrinsically oriented religious people “use” their religion, whereas intrinsically motivated religious “live” their religion. Of particular significance, they found extrinsic religiousness and intrinsic religiousness to be differentially associated with the outcome of prejudice. Extrinsic religiousness was associated with more prejudice, whereas intrinsic religiousness was associated with less prejudice. This finding signifies the importance of considering types of religious motivation when examining effects of religiousness.

Deci and Ryan (1985) made a distinction in motivations with their expansion of Self-Determination Theory (SDT) which explores how behavioral developments are internalized. They defined internalization as, “the processes by which individuals acquire beliefs, attitudes, or behavioral regulations from external sources and progressively transform those external regulations into personal attributes, values, or regulatory styles.” Within the framework of SDT, attempts to foster certain behaviors can range from amotivation/unwillingness to passive compliance to active personal commitment, and these differences in motivation reflect the degree to which the value or behavior have been internalized (Ryan & Deci, 2000).

A continuum was identified describing how fully a value or behavior has been internalized ranging from completely extrinsic to completely intrinsic (Grolnick, Deci, & Ryan, 1997). Two areas on the continuum identified were introjection and identification. While both introjection and identification were categorized as subtypes of extrinsic motivation, critical distinctions were made between the two. Introjection landed closer to fully extrinsic motivation, as it was characterized by more external contingencies. That is, the value or behavior has been adopted only partially by the individual in order to gain self- or other-

approval. However, identification was not as closely related to fully extrinsic motivation, as it is characterized by more internal contingencies. Here, the value or behavior has been more fully adopted by the individual in order to make it entirely one's own, making the value or behavior more robust and closer to intrinsic motivation than introjection. In this sense, it may be discerned how a religious individual is motivated to be religious (from introjection to identification) through examination of the degree to which they have internalized their religious values and behaviors. Drawing the distinction between introjection versus identification is beneficial in discerning motivations as it is not as polarized as a purely extrinsic versus intrinsic categorization which has been met with criticism, including the inability to distinguish high scores on the intrinsic scale as a rigid dogmatic approach to religion or as a flexible authentic approach to religion (Mazidi & Ostovar, 2006; Strahan, 1996). Rather, we can elucidate more nuanced differences between religious motivation through examination of introjection and identification.

Religious Motivation, Self-Regulation, and Health Behavior

A small number of studies have called into question findings that associate general religiousness with health outcomes by demonstrating that it is identification that provides beneficial health outcomes, whereas introjection can either be unrelated or, actually, detrimental for one's health. Ryan and colleagues were among the first to demonstrate that the two are differentially related specifically to mental health outcomes among young adults (Ryan, Rigby, & King, 1993). That is, they found that higher levels of identification were significantly related to lower levels of anxiety, depression, somatization, and social dysfunction, and significantly related to higher levels of self-esteem, identity integration, and self-actualization. However, higher levels of introjection were only sometimes related to these health outcomes and, when they were, the relation indicated worse health outcomes. Similarly, another study found that identification was associated with greater general well-being, whereas introjection was not in a sample of Christians (Neyrinck et al., 2006).

These findings can be met with the criticism that the results are only generalizable to American Christians, as this demographic is the one for which the measure was developed. However, using a close adaption of the scale by Ryan and colleagues (1993) better fit for Islam, a study randomly selected students from four high schools in Shiraz, Iran to measure religious motivation and health outcomes (Mazidi & Ostovar, 2006). The participants consisted of mostly Muslims and some Christians. In confirmation of the earlier findings, identification was related to less somatic symptoms, anxiety, and depression than introjection religiousness. Thus, religious motivation appears to be a key consideration when determining if one's religiousness is beneficial, detrimental, or neither in both Christianity and Islam and, perhaps, other religions as well.

The Present Study

In the present study, we sought to integrate prior theories regarding religiousness and health related outcomes while focusing on differential effects of religious motivations in adolescents. We simultaneously attempted to demonstrate for the first time, to our knowledge, that religious motivation is associated differentially with health-risk and health-

promoting behavior in adolescents through self-regulation. We did so while also addressing an important methodological issue that existed in previous studies on similar topics. We statistically controlled for overall levels of general religiousness, so that we can evaluate the unique contributions of the respective types of religious motivation above and beyond the effects of general religiousness.

Figure 1 illustrates the hypothesized model of adolescent religious motivations linked to health-risk and health-promoting behaviors in which all possible paths are considered. Our first hypothesis was that higher introjection would be associated with lower self-regulation and that higher identification would be associated with higher self-regulation. Our second hypothesis was that higher self-regulation, in turn, would be associated with lower health-risk behavior and higher health-promoting behavior. Finally, we hypothesized that self-regulation would be a mediator between introjection and identification religious motivations and the health-risk and health-promoting outcomes.

Method

Participants

Participants included 220 adolescents (121 males, 99 females) that ranged in age from 11 to 18 years of age ($M = 15.10$, $SD = 1.57$). About 88.2% of the adolescents identified as Caucasian, 9.0% African-American, 1.4% Hispanic, and 1.4% other. However, due to the small amount of non-Caucasian participants, in statistical analyses this variable was divided into Caucasian (88%) and non-Caucasian (12%). Mean family income fell between \$35,000 and \$49,999 a year. The religious affiliations of the participants were 70% Protestant, 11% Roman Catholic, 1% Jewish, 5% “none”, and 13% “other.”

Measures

Religious Motivation—Adolescent's religious motivation was assessed using the adolescent's reports on the 12-item Religious Behavior scale which was an adaption of the Christian Religious Internalization Scale (Ryan et al., 1993) in order to be more inclusive of all God-based religions. Participants were instructed that God referred to Yahweh, Allah, Higher Being, or Supreme religious figure(s) in their religion. The scale reflected two types of religious internalizations: introjection and identification. Introjection was characterized by self- and other-approval based pressure to be religious, only partial internalization, and more extrinsic in nature. An example of an item related to higher introjection is “An important reason why I attend religious gatherings (a place of worship or worship service) is because others would disapprove of me if I didn't.” Identification was characterized as full adoption of religious values or behavior as one's own and is more intrinsic in nature. An example of an item related to higher identification is “When I turn to God, I most often do it because I enjoy spending time with Him.” These items were answered on a seven point scale ranging from “1 = not at all true” to “7 = very true.” Of the 12 total items, six were related to introjection and six were related to identification. In the present study Cronbach's alphas were .94 for identification and .81 for introjection.

Self-Regulation—Self-regulation was a latent variable comprised of behavioral, emotional, and cognitive regulation. Behavioral regulation was measured by an average of the adolescents' and parents' reports ($r = .36, p < .001$) on the same 13 items from the Brief Self-Control Scale (Tangney, Baumeister, & Boone, 2004). Measuring five domains of self-control (controlling thoughts, controlling emotions, controlling impulses, regulating behavior/performance, and habit breaking), this Likert scale was answered by how typical each of the items was of the participant. Answers could range from “1 = Not at all” to “5 = Very much,” with a typical question being “I am good at resisting temptation.” In the current sample, the alpha was .83.

Emotional regulation was measured via an average of the adolescents' and parents' reports ($r = .38, p < .001$) on the same eight items from the Emotion Regulation subscale of the Emotion Regulation Checklist (Shields & Cicchetti, 1997). The purpose of this measure is to identify processes that are important for adaptive regulation of the self, including socially appropriate emotional displays, empathy, and emotional self-awareness. A typical question is, “I often bother other people because I am too active or too excited about something” and potential answers ranged on a Likert scale from “1 = rarely/never” to “4 = always.” In the current sample, the alpha was .66 for the emotion regulation subscale.

The final dimension of self-regulation, cognitive regulation, was assessed by the adolescents' performance on the Stanford-Binet Digit Span test (Thorndike, Hagen, & Sattler, 1986). This test measures intelligence and cognitive abilities in individuals aged two to twenty-three. We used the reversed Memory for Digits subscale of the measure which focuses on short-term and verbal memory skills (Alloway, Gathercole, & Pickering, 2006). The participant must remember and repeat the digits back in reverse order of what was heard. From the neurobiological perspective, cognitive control is supported by working memory and inhibition (Luna, Padmanabhan, & O'Hearn, 2010). The following alphas have been reported for each age: 10 = .83, 11 = .81, 12 = .82, 13 = .84, 14 = .84, 15 = .81, 16 = .84, 17 = .94, 18-23 = .88 (Thorndike, Hagen, & Sattler, 1986). A confirmatory factor analysis (fully saturated model) demonstrated that behavioral ($b^* = .69$), emotional ($b^* = .74$), and cognitive regulation ($b^* = .26$) each significantly loaded on the latent factor ($p < .01$ for all).

Health-Risk Behavior—Substance use was highlighted as the health-risk behavior and the questionnaire allowed for private self-reporting of three domains of substance use by the adolescents: alcohol use (beer, wine, liquor, or mixed drinks), cigarette use, and marijuana use via an online questionnaire which has been demonstrated as proving a greater perception of privacy and confidentiality (Christian, Dillman, & Smyth, 2008). The participants reported typical frequency of use in each domain; for example, “Which is most true for you about smoking cigarettes?” was answered on a scale ranging from “1 = Never used” to “6 = Usually every day.” The alpha was .42 and may be explained by the very low amount of marijuana use. However, a confirmatory factor analysis (fully saturated model) demonstrated that cigarette ($b^* = .89$), alcohol ($b^* = .68$), and marijuana use ($b^* = .80$) each significantly loaded on the latent factor ($p < .001$ for all).

Health-Promoting Behavior—Health-promoting behavior was measured by an adaption of the Physical Activity Questionnaire (Andersen, World, & Torsheim, 2006; Boardman, 2006; Koivusilta et al., 1999). This scale measures frequency of behaviors that promote health and well-being. The latent construct consisted of amount of exercise (ranging from “1 = every day” to “7 = never”), teeth brushing frequency (ranging from “1 = several times a day” to “4 = at most once a week (or never)”), and general health maintenance (ranging from “1 = excellent” to “5 = poor”). The items were reverse scored so that higher scores indicated higher health-promoting behavior. A confirmatory factor analysis (fully saturated model) demonstrated that general health maintenance ($b^* = .50$), amount of exercise ($b^* = .63$), and teeth brushing frequency ($b^* = .35$) each significantly loaded on the latent factor ($p < .001$ for all).

General Religiousness—Adolescents’ general religiousness was assessed via a self-report of organizational religiousness, personal religiousness, and private practices (Fetzer, 1999; Jessor & Jessor, 1977). These three subscales comprise the composite of religiousness. Organizational religiousness focuses on formal religious participation. A typical item is “How often do you go to religious services?” Answers ranged from “1 = More than once a week” to “6 = Never.” Personal religiousness focuses on the importance of religiousness in one’s life. A typical item is “How important is religious faith in your life?” Answers ranged from “1 = Very important” to “5 = Not at all important.” Finally, private practices focuses on informal religious participation without others. A typical item is “How often do you pray privately in places other than at church or synagogue?” Answers ranged from “1 = More than once a day” to “8 = Never.” Answers were reverse scored so that higher composite scores indicated higher general religiousness. Reliability was calculated by Cronbach’s Alpha for the current sample. Organizational religiousness had an alpha of .78, personal religiousness had an alpha of .90, and private practices had an alpha of .85. All three subscales were weighted equally and then averaged to produce a composite variable to be used as a covariate.

Procedures

Using word-of-mouth, flyers, recruitment letters, e-mail distributions and other advertisements, the participants were recruited from Southwestern Virginia. If interested, participants contacted the research office via phone or e-mail. After describing the study to the interested party, research assistants extended invitations to participate in the study. If accepted, the participants (an adolescent and a primary caregiver) came to the research offices at the university where they were interviewed by trained research assistants in separate rooms and compensated for their time. The sample was representative of southwest Virginia (five counties, two cities; U.S. Census Bureau 2012) with regard to demographic characteristics such as ethnicity and family income. All procedures were approved by the institutional review board of the university.

Statistical Analyses

For all study variables, descriptive statistics were examined to determine normality of distributions and univariate and multivariate outliers. Moreover, general liner modeling (GLM) was used to discern significant multivariate predictors of the endogenous variables

among the demographic variables and any demographic variables with significant Wilk's Lambda coefficients were used as covariates. Skewness and kurtosis were examined for all variable distributions and acceptable levels were skewness less than 3 and kurtosis less than 10 (Kline, 2005). The hypothesized models were tested via Structural Equation Modeling (SEM) using MPlus statistical software version 7.0 (Muthén & Muthén, 2012). Overall model fit indices were determined by χ^2 value, degrees of freedom, corresponding p-value, Root Mean Square Error of Approximation (RMSEA), and Confirmatory Fit Index (CFI). RMSEA values of less than .05 were considered very good, whereas values less than .08 were considered acceptable, and CFI values of greater than .90 were considered a good fit (Hu & Bentler, 1999). Product-of-coefficients tests using standard errors estimated by the delta method were performed to test the significance levels of mediated effects (Taylor, MacKinnon, & Tein, 2008).

Results

Preliminary Analyses

Descriptive statistics and correlations can be found in Table 1. Furthermore, descriptive statistics revealed there were no univariate or multivariate outliers in the sample. However, the descriptive statistics did reveal the distribution of cigarette use was kurtotic (kurtosis > 10.0). As a result, cigarette use was log transformed and the resultant kurtosis level fell within the acceptable range. General linear modeling revealed that sex ($F = 7.11, p < .001$; male = 0 and female = 1), age ($F = 6.07, p < .001$), and family income ($F = 3.50, p < .001$) were significant multivariate predictors of endogenous variables and were thus included in the models as covariates. Race ($F = 1.33, p = .22$; White = 0 and non-White = 1) was not a significant predictor and was not included in the models.

Hypothesis Testing

Results of the SEM revealed the fit of the hypothesized model was acceptable ($\chi^2 = 113.24, df = 60, p < .001, RMSEA = .06, CFI = .90$) and can be seen in Figure 2 with standardized estimates. The model was also tested without general religiousness as a covariate ($\chi^2 = 110.39, df = 54, p < .001, RMSEA = .07, CFI = .90$) and the pattern of significant path estimates did not change. Therefore, general religiousness was kept in the final model in order to better evaluate unique contributions of religious motivation above and beyond the effect of general religiousness.

After controlling for sex, age, family income, and general religiousness, higher identification predicted higher self-regulation ($b = .09, SE = .03, p = .004$) and higher introjection predicted lower self-regulation ($b = -.11, SE = .03, p < .001$). In turn, higher self-regulation predicted lower health-risk behavior ($b = -.31, SE = .08, p < .001$) and higher health-promoting behavior ($b = .52, SE = .20, p = .01$). There were no remaining direct effects from identification to health-risk behavior ($b = .01, SE = .02, p = .81$) or health-promoting behavior ($b = -.03, SE = .05, p = .50$). Similarly, there were no remaining direct effects from introjection to health-risk behavior ($b = -.01, SE = .02, p = .80$) nor health-promoting behavior ($b = .03, SE = .05, p = .47$). Significant concurrent correlations were found between identification and introjection ($r = .43, p < .001$), and between health-promoting

behavior and health-risk behavior ($r = .32, p = .01$). As shown in Table 1, bivariate correlations indicated that correlations between health-risk and health-promoting variables are non-significant and almost zero except the correlation between teeth brushing and cigarette ($r = -.17, p < .01$). In our SEM, unlike the bivariate correlation, the correlation between the latent factors of health-risk and health-promoting variables reflected the association between residual variances of those latent factors after taking into account the effects of religious and self-regulation variables.

The delta method was then employed to test the significance of the mediated effect from identification and introjection to health-risk behavior and health-promoting behavior through self-regulation. Results indicated that self-regulation significantly mediated the effect of introjection on health-risk behavior ($Z = 2.73, p = .01, 95\% \text{ CI } [.03, .20]$) and the effect of identification on health-risk behavior ($Z = -2.37, p = .02, 95\% \text{ CI } [-.28, -.03]$). Furthermore, self-regulation significantly mediated the effect of introjection on health-promoting behavior ($Z = -2.38, p = .02, 95\% \text{ CI } [-.25, -.02]$) and the effect of identification on health-promoting behavior ($Z = 2.16, p = .03, 95\% \text{ CI } [.02, .34]$).

Finally, the model reported in Figure 2 included regression paths controlling for effects of demographic covariates (sex, age, and family income), and general religiousness. Sex significantly predicted self-regulation ($b = .19, SE = .06, p = .002$), health-promoting behavior ($b = -.46, SE = .12, p < .001$), but not health-risk behavior ($b = .08, SE = .05, p = .09$). The results indicated that girls showed higher self-regulation and lower health-promoting behaviors than boys. Age significantly predicted health-risk behavior ($b = .06, SE = .01, p < .001$), but not self-regulation ($b = .02, SE = .02, p < .41$) or health-promoting behavior ($b = -.04, SE = .03, p = .21$). The results indicated that older adolescents showed higher levels of health-risk behavior compared to younger adolescents. Family income significantly predicted self-regulation ($b = .03, SE = .01, p = .01$), health-promoting behavior ($b = .05, SE = .02, p = .01$), and health-risk behavior ($b = -.02, SE = .01, p = .03$), indicating that adolescents from families with higher income showed higher levels of self-regulation and health-promoting behavior and lower levels of health-risk behavior compared to adolescents from families with lower income. There was also a significant concurrent correlation between age and general religiousness ($r = -.14, p = .03$), but age was not correlated with introjection ($r = -.06, p = .39$), identification ($r = -.09, p = .16$), income ($r = .08, p = .24$), or sex ($r = -.01, p = .94$). Income was not significantly correlated with general religiousness ($r = -.03, p = .61$), introjection ($r = -.09, p = .18$), identification ($r = -.07, p = .34$), or sex ($r = -.01, p = .94$). Similarly, sex was not significantly correlated with general religiousness ($r = .03, p = .61$), introjection ($r = .05, p = .44$), or identification ($r = .12, p = .08$).

Discussion

In the extant literature, an array of studies has demonstrated that individuals with higher religiousness typically demonstrate better physical and mental health compared to their less religious counterparts (George et al., 2002). However, prior studies have been lacking in scope in a variety of ways. First, while it has been shown that religiousness is generally associated with beneficial health outcomes, though occasionally detrimental health

outcomes, religious motivation is rarely considered and may help to explain the discrepancies in findings. Secondly, it is not well known what explains the link between religiousness, of any motivation type, and health outcomes. It has been theorized that self-regulation is the mediating mechanism between religiousness and health outcomes (McCullough & Willoughby, 2009), but few empirical studies have corroborated this theory to date. Furthermore, prior studies that have examined differing associations of religious motivation have rarely addressed health-risk behavior and have never addressed health-promoting behavior simultaneously. These studies have also failed to control for general religiousness and, as a result, could not examine the unique contributions of religious motivation independent of the general religiousness levels.

The current study, therefore, sought to address these limitations in the literature. Identification and introjection were simultaneously examined as predictors to clarify the differences in their association with health outcomes and determine their relative contributions to adolescent health behavior. Self-regulation was considered as the mediating variable between religious motivation and health behavior to determine the explanatory mechanism of the link between religious motivation and health behavior. Furthermore, health-risk behavior and health-promoting behaviors were simultaneously considered as the outcome variables to determine if they are differentially predicted by the respective types of religious motivation. To determine the unique contributions of religious motivation, general religiousness was included as a covariate. The sample consisted of adolescence so that conclusions could be made about health behaviors during a period of development that is particularly susceptible to risk taking including health-risk behaviors.

Our first hypothesis was that higher introjection would be associated with lower self-regulation and that higher identification would be associated with higher self-regulation. Consistent with our hypothesis, we found that higher introjection predicted lower self-regulation, whereas higher identification predicted higher self-regulation. Our second hypothesis was that higher self-regulation, in turn, would be associated with lower health-risk behavior and higher health-promoting behavior. This hypothesis was also supported as self-regulation predicted higher health-promoting behavior and lower health-risk behavior and was a significant mediator between identification/introjection and health-promoting/health-risk behavior. That is, higher identification was related to higher self-regulation, which in turn was related to lower health-risk behavior; whereas higher introjection was related to lower self-regulation, which in turn was related to higher health-risk behavior. Similarly, higher identification was associated with higher self-regulation, which in turn was associated with higher health-promoting behavior; whereas higher introjection was associated with lower self-regulation, which in turn was associated with lower health-promoting behavior. These findings are consistent with prior studies that found higher identification is associated with better health and higher introjection is either unassociated with health or, if it is, associated with worse health (e.g., Mazidi & Ostovar, 2006; Neyrinck et al., 2006) and extended prior literature by elucidating how identification and introjection are differentially related to health-promoting behavior as well as health-risk behavior among adolescents.

These findings support McCullough and Willoughby's (2009) theory that religiousness promotes healthy behavior through self-regulation, showing that higher identification motivation was related to better health-related behaviors via higher self-regulation. However, their proposition was not comprehensive insofar as the relation of the varying religious motivations were opposite in direction. McCullough and Willoughby suggested that there should be a positive effect of religiousness on health behavior through self-regulation. The current findings confirmed their proposition for identification as it did indeed predict higher self-regulation and, thus, lower health-risk behavior and higher health-promoting behavior. For introjection, however, the opposite of their theoretical prediction was found as introjection predicted lower self-regulation and, thus, higher health-risk behavior and lower health-promoting behavior. As such, the present study emphasizes that religiousness is associated with self-regulation and, in turn, health behavior; but, also importantly, the type of motivation an individual has to be religious may determine whether that association will be positive or negative. This is particularly meaningful in light of the minority of studies that report negative effects of religiousness on health (e.g., Pargament et al.; Peterman et al., 2014) as our findings provide a framework in which these seemingly contradictory results can coexist as it incorporates the possibility for both positive and negative effects from being religious.

Furthermore, our findings seem to be in line with the strength model of self-regulation. As proposed by Baumeister and Vohs (2007), the strength model theorizes that depletion of self-regulatory resources provides, when given time to recover, more self-regulatory resources later. Since religiousness is frequently demanding of self-regulatory resources, it provides for the more self-regulatory strength for religious individuals. The current findings reveal that only religiousness that is motivated through identification is associated with higher self-regulation, whereas religiousness that is motivated through introjection is associated with lower self-regulation. Therefore, it may be concluded that religiousness motivated by identification is demanding of self-regulatory abilities; however, religiousness that is motivated by introjection is not.

Thus the findings demonstrate that those who have not fully internalized their beliefs and are not fully practicing their beliefs may not be building the capacity of their self-regulatory strength. As a result, these introjection driven believers may not be as well prepared to regulate themselves in the face of temptation to engage in health-risk behavior or opportunity for health-promoting behavior. It can be posited that this is a result of the more introjection driven believers' unlikelyhood to perform the behaviors that are demanding of self-regulatory strength, but rather are only seeking external benefits (such as approval from the community). Such individuals that perform only for more external rewards, then, can be seen as "freeloaders" (Norenzayan & Shariff, 2008). These individuals signal to the community that they are believers in order to gain approval and acceptance of its members without actually internalizing the beliefs and without fully engaging in the acceptable behaviors. For example, they may tell others they are members of the religious community without actually partaking in the prescribed behaviors such as tithing, meditating, praying, and fasting. Therefore, "freeloaders" do not gain the same benefits as the internalized believers. It is speculated that internalized believers are willing to perform the actions demanding of their religion that are more costly to their self-regulatory strength, whereas

freeloaders are lacking willingness to sacrifice to a greater extent than what is being gained by their group membership.

Furthermore, in the cases in which the introjection motivated believers do engage in the prescribed behavior, it may still be seen as circumventing practicing self-regulation because they show these behaviors to seek community approval by signaling religious beliefs. This may be regarded as external regulation rather than actually practicing self-regulation, which disallows for the individual to build self-regulatory strength and, further, repeatedly engaging in such externally contingent practices may lead to decreased self-regulatory strength over time. For example, an individual that prays in public only because he or she knows the community is watching and will approve is being regulated by externalities rather than the self. In contrast, the individual that prays in public as well as in private because they enjoy it and desire it for themselves is actually engaging in self-regulatory practices. As a result, measures of religious motivation provide more information than, for example, measures of organizational religiousness which only indicate whether an individual signals the prescribed behavior, but not why they are engaging in it.

This idea is consistent with recent research reporting that higher levels of perceived monitoring by others predicted lower self-control, whereas higher levels of perceived monitoring by the self predicted higher self-control among young adults (Carter, McCullough, & Carver, 2012). Thereby, the direct effect of higher monitoring by others on lower self-control may be seen as an avenue by which introjected driven believers are primarily concerned with external motivation sources (e.g., others' watching) and are thus being externally regulated. Similarly, those that are experiencing a higher sense of self-monitoring may be akin to identified driven believers who focus on internally motivated sources (e.g., self-standard) and are thus strengthening their self-regulatory abilities. Future studies would benefit from considering possibly differential effects of introjection and identification on self-monitoring and other-monitoring to better understand underlying processes that explain differential roles of the two religious motivations.

Additionally, the introjection driven believers may be experiencing cognitive dissonance as a result of the discrepancy between their beliefs and behaviors. This may be seen as akin to the transition communities described by McDade (2002) where adolescents in transition spheres experience greater levels of mental health problems including depression, stress, and anxiety compared to status congruent adolescents. Therefore introjection driven adolescents may experience higher levels of depression and anxiety as a result of their cognitive dissonance and their mental health problems make them vulnerable to experiencing decreased cognitive control (Hardin, Schroth, Pine, & Ernst, 2007), further weakening their self-regulatory ability (Berkman et al., 2012). Moreover, previous literature has indicated that religious participation serves as a form of reinforcement learning to which adolescents are particularly sensitive (Alcorta, 2009). That is, when the religious behavior is congruent with internal beliefs, as in identification driven believers (but not introjection driven believers), the adolescent is likely to find self-regulatory practices rewarding, and thus reinforcing their motivational force for self-regulation.

Furthermore, we can apply the explanation regarding the lack of benefit gained by introjection driven religious individuals to why religious settings and practices are more successful than the efforts of secular pro-health educational programs. Previous research has noted that there may be something unique about religion which allows it to outperform secular activities in decreasing problem health behaviors such as substance use (Good & Willoughby, 2011). This may be a result of religion's ability to sanctify certain goals and behaviors (Pargament & Mahoney, 2005) so that individuals are more likely to fully embrace and sacrifice for them, thus greater depleting self-regulatory strength. As a result, religion may facilitate more internally motivated levels (especially through identification) than secular programs.

Additionally, the current findings may be seen as consistent with research on the effects of religiousness on internal regulatory systems including the sympathetic nervous system (SNS), the hypothalamic-pituitary-adrenal axis (HPA), and the anterior cingulate cortex (ACC). Extant literature has indicated that meditation, forgiveness, and other common religious thoughts and practices reduce arousal in the SNS and HPA (Thoresen, 1999). As a result, the stress response in the body may be reduced such that less norepinephrine and cortisol are released. This in turn prevents the body from reaching unhealthy levels of functioning including inhibition of the immune system, increase infection risk, increased blood pressure, impaired healing response, increased risk of stroke, and increased risk of heart attack (Seybold & Hill, 2001; Tartaro, Luecken, & Gunn, 2005; Uchino, Uno, and Holt-Lunstad, 1999; Weisbuch-Remington, Mendes, Seery, & Blascovich, 2005). Similarly, Inzlicht, Tullet, and Good (2011) found a robust association between religiousness and the ACC, an area also associated with self-control (Shackman et al., 2011). Their findings indicated that religiousness buffered against error-related activity in the ACC, thus attenuating bodily states of distress. Furthermore, the attenuated, error-related ACC activity was not associated with decreases in motivation, attention or control.

These findings at the neurobiological level seem to fit within the current hypothetical framework as identification driven believers would be more likely to fully embrace and commit to the practices and beliefs that contribute to these buffering effects against SNS, HPA, and ACC arousal. In contrast, introjection driven believers may only signal that they embrace and are committed to the practices and beliefs for the sake of others' approval and the limited beliefs or behaviors they do signal are "empty" in the sense that they are not making them internally meaningful and thus preventing integration into their self-systems. As such, the current findings provide preliminary evidence for future researchers to explore the link between religion and health at the neurobiological level focusing on testing whether the religious practices that are associated with these buffering effects (e.g. meditation, forgiveness, and other common religious thoughts) may have differing effects depending on the motivations that drive the individual to engage in them.

Finally, the large magnitude of the zero-order bivariate correlation ($r = .84, p < .001$) between identification and general religiousness indicates a stronger relation between them compared to the relation between introjection and general religiousness ($r = .40, p < .001$). Therefore, it can be concluded that those that reported higher identification driven motivation were more likely to report higher general religiousness than individuals who

reported higher introjection driven motivation. This is consistent with the theoretical view proposed by Ryan et al. (1993) that identification driven individuals are described as those who “live” their religion and fully adopt its beliefs, whereas introjection driven individuals as those who “use” their religion and only adopt beliefs that are more beneficial to them. It would be expected, then, that general religiousness is more closely associated with identification than introjection.

Limitations and Future Directions

Some limitations of the present study must be noted. First, the cross-sectional nature of the analyses precludes the ability to make inferences regarding the causality of religious motivation and self-regulation on health-risk behavior and health-promoting behavior. Prior longitudinal studies regarding the reverse effect of health behaviors, including substance use, on religiousness have named this effect the “selection hypothesis.” This hypothesis posits that individuals who do things like use substances select out of religion because they are uncomfortable around peers who disapprove of these actions. However, these studies have either found no such effect of substance use on future religiousness (e.g. Good & Willoughby, 2011) or have been inconclusive. Nevertheless, future studies would benefit from a longitudinal analysis to rigorously test directions or temporal sequence of effects. Second, the low amount of substance use in the sample is a concern regarding the generalizability of the findings outside of a low-risk community sample. Although the distribution of substance use was consistent with expectations of a low-risk community of younger adolescents and the effect sizes were also consistent with expectations, future testing of these models with samples with differing levels of risk is warranted. Third, the data of the present study only included working memory as an indicator of cognitive self-regulation, but not for other aspects of executive functioning that contribute to cognitive control, especially response inhibition. However, updating (as measured by working memory) has been shown to be substantially correlated to the two other dimensions of executive function including response inhibition and set shifting (Miyake & Friedman, 2012), and working memory and response inhibition are considered to be two fundamental aspects of cognitive control (Luna et al., 2010).

Conclusions

In conclusion, the type of motivation a person has to be religious is vital to consider when determining the effects of religiousness. Specifically, the current findings demonstrated that differing religious motivations have varying relations with health behaviors through self-regulation. Identified religiousness contributes to beneficial health behaviors including higher health-promoting behavior and lower health-risk behavior through self-regulation. However, introjected religiousness contributes to detrimental health behaviors including lower health-promoting behavior and higher health-risk behavior through self-regulation.

The conclusions drawn from this study are particularly informing regarding health behavior during adolescence. Considering the increased amount of risk taking behavior during this developmental period, identifying factors that may contribute to the development of health-risk behavior is beneficial in informing preventative and intervening measures. Moreover, identifying factors that may contribute to the development of health-promoting behavior

may help redirect adolescents from unhealthy behavior. Our findings provide preliminary evidence suggesting that prevention efforts that involve religious motivation driven by identification and self-regulation ability may be particularly beneficial. Furthermore, the present findings call into question broad conclusions previous studies have made in the field of religiousness research. That is, it is not sufficient to conclude that religiousness is associated with a health behavior without considering the motivation of the religiousness as the effects may vary if the motivation to be religious is of one type or another.

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Figure 1.
Hypothesized model of religious motivations, general religiousness, self-regulation, health risk and health promotion.

Figure 2.

SEM results of the hypothesized model of religious motivations, general religiousness, self-regulation, health risk and health promotion.

Notes: For clarity of presentation, the following non-significant paths are not shown: identification → health risk ($b^* = .03$, $p = .81$); identification → health promotion ($b^* = -.12$, $p = .49$); introjection → health risk ($b^* = -.02$, $p = .80$); introjection → health promotion ($b^* = .08$, $p = .46$); general religiousness → self-regulation ($b^* = -.04$, $p = .79$); general religiousness → health promotion ($b^* = .09$, $p = .59$). Furthermore, paths related to covariates (age, sex, income) are not shown but are reported in text with unstandardized estimates. B = behavioral, E = emotional, Co = cognitive, Ci = cigarette use (log transformed), A = alcohol use, M = marijuana use, G = general health, X = exercise, T = teeth brushing; * $p < .05$, ** $p < .01$

Descriptive Statistics and Bivariate Correlations of Religious Motivation, General Religiousness, Self-Regulation, Health-risk Behavior, and Health-promoting Behavior

Table 1

Variables	1	2	3	4	5	6	7	8	9	10	11	12	M (SD)
1. Identification	-												4.29 (1.91)
2. Introjection	.44***	-											2.58 (1.20)
3. General religiousness	.84***	.40***	-										4.88 (1.76)
4. Behavioral regulation	.20**	-.09*	.15*	-									3.61 (.55)
5. Emotional regulation	.18**	-.14*	.13	.51***	-								3.30 (.32)
6. Cognitive regulation	-.08	-.18**	.01	.18**	.19**	-							49.93 (7.38)
7. Alcohol use	-.26***	-.05	-.34***	-.26***	-.06	.04	-						1.81 (1.05)
8. Cigarette use [^]	-.23**	-.04	-.29***	-.32***	-.21**	.00	.61***	-					.19 (.41)
9. Marijuana use	-.23**	-.02	-.29***	-.29***	-.13	-.01	.55***	.70***	-				1.35 (1.02)
10. General health	-.04	-.05	.00	.16*	.19**	.18**	.00	-.05	.00	-			3.91 (.83)
11. Exercise	.06	.02	.10	.06	-.08	.08	.05	.05	.01	.32***	-		5.27 (1.48)
12. Teeth brushing	.11	-.02	.09	.23**	.22***	.06	.01	-.17**	-.07	.18**	.22**	-	3.52 (.66)

Note: n = 212-220

[^] log transformed

* p .05

** p .01

*** p .001