

Differing Religious Motivations are associated with Adolescent  
Health Behavior through Self-Regulation

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ABSTRACT

Previous literature has widely demonstrated the physical and mental benefits of religiousness. However, how religiousness benefits health is not as well known. It has been proposed that self-regulation is the linking mechanism and the current study sought to confirm this theory. Furthermore, religious motivation has been found to have differential effects on a variety of outcomes. The current study hypothesized that higher identification as religious motivation is linked to higher health-promoting behavior and lower health-risk behavior through higher self-regulation, which was composed of behavioral, emotional, and cognitive regulation. It was also hypothesized that higher introjection as religious motivation is linked to lower health-promoting behavior and higher health-risk behavior through lower self-regulation. The current sample included 220 adolescents (mean age = 15 years, 55% male) and their primary caregivers. This study's findings clarified that the motivation to be religious is critical when considering health benefits as it predicts health outcomes distinctly from only religiousness in general and self-regulation mediates this relation. Specifically, higher identification was related to higher self-regulation and subsequently lower health-risk behavior, whereas introjection was linked to lower self-regulation and subsequently higher health-risk behavior. However, when health-promoting behaviors, such as exercise or brushing teeth, were considered, the relation did not exist. In addition, non-significant interaction effects between identification and introjection indicated that these effects are only additive in nature. The current findings are particularly important by providing information about protective factors for risk taking behavior during adolescence, a developmental period associated with greater risk taking behavior.

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## **1.0 - Introduction**

Religion is a multi-dimensional construct that exists across most cultures and exhibits a wide range of effects on thoughts, feelings, and behaviors. 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). The present study sought to examine whether religiousness is linked to adolescent health behavior via self-regulation (McCullough & Willoughby, 2009) while extending prior research by indicating that the motivations for religiousness are critical factors for determining whether one's religiousness promotes or demotes self-regulatory behavior and, in turn, adolescent health behavior. Specifically, we examined introjection and identification (Deci & Ryan, 1985) as two aspects of religious motivation that are differentially related to health-promoting or health-risk behavior.

We further investigated whether differing relations between religious motivation and health behavior can be explained through self-regulation as a mediating mechanism. We also examined the nature of the differential effects of identification and introjection by examining their interactive effects on self-regulation, health-promoting, or health-demoting behavior. Moreover, we sought to clarify if the effects of religious motivation on health outcomes through self-regulation was specific to God based religious individuals or if it was also present in non-God based religious individuals. The current study focused on adolescence to see how religiousness and self-regulation jointly explain individual differences in health related behavior during a critical developmental period associated with increased risky behavior (Casey, Jones, & Somerville, 2011; Steinberg, 2010).

## **1.1 - Religiousness**

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. For example, religiousness has been associated with better health practices like wearing seatbelts, brushing teeth, getting more exercise, and taking vitamins (Hill, Burdette, Ellison, & Musick, 2006). In particular, Hill and colleagues examined 1,504 adults in Texas and found that regular religious attendance, particularly weekly attendance, is associated with these healthy behaviors. Similarly, Shmueli and Tamir (2007) found lower smoking rates, less stress, and healthier diets among religious individuals in a sample of 3,056 adults in Israel. Another study extended the findings to a sample of 5,000 adolescents nationally representative of the United States (Wallace & Forman, 1998). This study also concluded that higher levels of religiousness are associated with health-promoting behavior like proper nutrition, more exercise, and more rest in adolescents and lower levels of risky behavior like carrying weapons, getting into fights, and drinking and driving. In particular, substance use is a health-risk behavior that has been widely studied in relation to religiousness (for a review, see Chitwood, Weiss, & Leukefeld, 2008). 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.

These healthy behaviors, including wearing seatbelts, brushing teeth, getting more exercise, taking vitamins, and less substance use, seem to contribute to increased longevity, another association of religiousness (McCullough, Hoyt, Larson, Koenig, & Thoresen, 2000). In

a meta-analysis, McCullough and colleagues examined 42 independent samples with measures associating religiousness and mortality rates. They found that religious involvement caused a higher likelihood that the individual would be alive at a follow-up assessment than those not religiously involved. However, religious people are not just living a longer and physically healthier life, but seem to be living better mentally as well. That is, religiousness is associated with less psychiatric disorders such as depression and anxiety (George et al., 2002; Kendler, et al., 2003; Smith, McCullough & Poll, 2003), less delinquency, antisocial behavior, and crime (Laird, Marks, & Marrero, 2011; Regnerus, 2003), and decreased substance use and abuse (George et al., 2002; Kendler et al., 2003; Mason & Spoth, 2011; Miller, Davies, Greenwald, 2000). These studies, then, indicate that religious individuals have a better quality of life as a result of the decreased amount of these negative outcomes.

Taken together, we concluded from previous studies that there is a robust relation between religiousness and health behavior, both physical and mental. However, most previous studies failed to identify the mechanisms linking religiousness and health behavior and to point out this gap in the literature. Only recently, researchers have begun to explore possible mediating mechanisms. For example, one study examining the relationship between religiousness and adolescent substance use found a similar relationship (religiousness negatively related to substance use) in the National Survey on Drug Use and Health and explained the relationship through respondent and peer attitudes towards drug use and psychological well-being (Ford & Hill, 2012). However, these seem to be minor mediating mechanisms and have not been as widely replicated or as large in magnitude as an alternative explanation with growing support. Namely, self-regulation as the mediating mechanism has started to be widely accepted and replicated as central to the relation between religiousness and health behavior.

## **1.2 - 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, Farley, Holmes, Longo, & McCullough, 2013). 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. A recent study found similarly that commonly activated brain regions for self-control in all three domains can be identified for treatment-seeking cigarette smokers (Tabibnia, et al., 2014). 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.

McCullough and Willoughby (2009) proposed that religiousness is associated with health and well-being through the linking mechanism of self-regulation. Six avenues were identified linking religiousness and self-control/self-regulation: 1) religiousness can promote self-control, 2) religion influences self-regulation by influencing people’s goals, 3) religion influences self-regulation by promoting self-monitoring, 4) religion influences self-regulation by building self-

regulatory strength, 5) religions influence self-regulation by prescribing and promoting mastery with specifically religious outputs for self-change, and 6) religion affects health, well-being, and social behavior through self-regulation and self-control. However, these avenues were proposed only theoretically.

Subsequent literature has focused on providing empirical evidence for these propositions. Watterson and Giesler (2012) demonstrated that religious people when compared to nonreligious people were better able to self-regulate after initial depletion, suggesting that religion does influence self-regulation by building self-regulatory strength (propositions 1 and 4) and 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 require practices demanding of self-regulatory processes (e.g. praying, meditating, and tithing).

Another study demonstrated that religious adolescents were less likely to engage in substance use through an increase in self-regulation brought on by increased religious and self-monitoring (propositions 1, 3, and 5; Kim-Spoon et al., 2013). That is, those adolescents who are more religious experience more religious monitoring, or belief that a supernatural entity is aware of and concerned with their actions, and subsequently engaged in more self-monitoring, perhaps to stay in line with beliefs deemed acceptable by that entity or by beliefs deemed acceptable by the religion which that entity is associated with. Further, the higher self-monitoring in the

adolescents created higher self-control, which resulted in decreased substance use in the religious adolescents.

A particular study observed that, paradoxically, religious individuals enjoy a higher sense of well-being compared to nonreligious individuals even though the religious individuals must endure more stringent goals and standards as a result of religions fostering of self-regulatory efficiency and flexibility (propositions 1 and 2; Koole, McCullough, Kuhl, & Roelofsma, 2009). This was explained by a self-regulatory module that is more flexible, efficient, and largely unconscious in religious individuals. As a result, the religious possess a higher level of emotional well-being while still attempting to meet standards of living that are more demanding of physical and mental resources.

When taken together, the prior 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, it remains that religiousness leads to better health through the increased self-regulation. However, these 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 the majority of studies examining the relations between religiousness and health outcomes only examined religiousness in general. As a result, researchers may have interpreted data that may be biased toward one aspect of religious motivation or another and, thus, made unwarranted or incomplete conclusions.

### **1.3 - 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 motivated are focused on rewards like the sociability and status religion brings them and will 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 motivated 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 creates interesting questions regarding other effects of religiousness that may be dependent on the type of religious motivation.

Deci and Ryan (1985) made a distinction in motivations with their expansion of Self-Determination Theory which explores how motivations of 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.” A continuum was identified that describes 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. Introjection landed closer to 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. Identification landed closer to intrinsic motivation, as it is characterized by more internal

contingencies. Here, the value or behavior has been fully adopted by the individual in order to make it entirely one's own, making the value or behavior more robust.

These distinctions in degrees of internalization can be applied to one's religious motivation in a similar manner as Allport and Ross's (1967) Religious Orientation Scale. The Christian Religious Internalization Scale was developed in order to measure the degree to which one's religiousness had been internalized, meaning, whether one's religiousness was introjection or identification based (Ryan, Rigby, & King, 1993). These scores of introjection and identification were correlated with, among others, Allport and Ross's intrinsic and extrinsic orientations in three separate samples: a secular college (SC;  $n = 80$ ) with an average age of 20.5, a religious college (RC;  $n = 151$ ) with an average age of 22.5, and a church community (CC;  $n = 42$ ) with an average age of 35. The three samples provided correlations between introjection/identification and extrinsic/intrinsic. Extrinsic was positively correlated with introjection (SC  $r = .31, p < .01$ ; RC  $r = .29, p < .01$ ; CC  $r = .10, p = ns$ ) and negatively correlated with identification (SC  $r = -.31, p < .01$ ; RC  $r = -.35, p < .01$ ; CC  $r = -.54, p < .01$ ). Meanwhile, intrinsic was positively correlated with identification (SC  $r = .77, p < .01$ ; RC  $r = .65, p < .01$ ; CC  $r = .33, p < .05$ ) and unrelated to introjection. These empirical findings strongly support the theoretical conjecture that the internalizations of introjection and identification can be likened to extrinsic and intrinsic motivation, respectively. That is, an individual scoring high on identification internalization of religiousness will likely be high in intrinsic motivation of religiousness and low in extrinsic motivation of religiousness, whereas an individual scoring high on introjection internalization of religiousness will likely be high in extrinsic motivation of religiousness with no relation to intrinsic motivation of religiousness.

#### **1.4 - Religious Motivations, Self-Regulation, and Health Behavior in Adolescence**

A small number of studies have called into question studies that associate religiousness in general with health outcomes by demonstrating that it is more intrinsically motivated religiousness that provides beneficial health outcomes and more extrinsically motivated religiousness can either be unrelated or, actually, detrimental for one's health. Allport and Ross (1967) were among the first to demonstrate that the two are differentially related to prejudice. Ryan and his colleagues (1993) were among the first to demonstrate that the two are differentially related specifically to health outcomes. 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.

More recent studies have concluded similarly that more intrinsically motivated or identified religiousness is related to lower health-risk behavior, while more extrinsically motivated or introjected religiousness is either unrelated or related to higher health-risk behavior. For example, Klanjšek, Vazsonyi, and Trejos-Castillo (2012) found that intrinsic religiousness was associated with a buffering effect against deviance (theft, substance use, interpersonal violence, property damage, truancy, and cheating on school tests), whereas extrinsic religiousness had a weak or nonexistent association with these risky behaviors in college students.

Another study focusing on levels of religious internalization found higher general well-being among adults with more intrinsically motivated beliefs and behavior (Neyrinck, Vansteenkiste, Lens, Duriez & Hutsebaut, 2006). That is, those who are religious because of its personal significance and have reached more intrinsic levels of internalization including

identification instead of more extrinsic levels of internalization including introjection adhere more strictly to their faith's belief contents and report higher well-being. Similarly, levels of religious internalization were found to be a protective factor against pornography use in a sample of 419 adolescents from across the United States with greater internalization linked to less pornography use (Hardy, Steelman, Coyne, & Ridge, 2013).

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 ( $n = 82$ ) and some Christians ( $n = 37$ ). In confirmation of the earlier findings, greater intrinsic religiousness was related to less somatic symptoms, anxiety, and depression than greater extrinsic religiousness ( $p < .001$ ). 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.

Adolescence has been identified as a developmental period where particularly high levels of risky behavior like substance use are manifested (Casey et al., 2011; Steinberg, 2010); thus, it is critical to identify mechanisms that may make particular adolescents more susceptible to risky behavior and, thus, further provide valuable information for intervention and prevention of potential problems. However, the majority of the limited number of studies examining religious motivation and healthy and risky behavior has focused on adulthood. Moreover, no previous study, to the authors' knowledge, has simultaneously explored health-promoting behavior and health-risk behavior in relation to religious motivation at any age. As a result, more studies

focusing on these relations between religiousness and healthy and non-risky behavior, particularly during this critical developmental period, would be very beneficial additions to the literature.

### **1.5 Regulatory Focus and Health Behavior**

An additional benefit of exploring health-promoting behavior and health-risk behavior simultaneously is the ability to shed light on the regulatory focus of the varying religious motivations in terms of Self-discrepancy Theory (Crowe & Higgins, 1997; Higgins, 1998). Individuals, depending on the situation, can employ their self-regulatory abilities in either a health-promotion framework or a risk-prevention framework. Those who are either situationally or chronically health-promotion focused would have different goals than those who are either situationally or chronically risk-prevention focused. According to Crowe and Higgins (1997), a health-promotion focus is concerned with advancement, growth, and accomplishment. They demonstrated that those with this type of regulatory focus are more inclined to insure hits and insure against errors of commission. Furthermore, they are characterized as having strong ideals, have nurturance needs, think in terms of gain and non-gain situations, are sensitive to presence or absence of positive outcomes, employ approach as a strategic means, and have emotions of cheerfulness or dejection (Higgins, 1998). Meanwhile, a risk-prevention focus is concerned with security, safety, and responsibility (Crowe & Higgins, 1997). They are characterized as having strong oughts, have security needs, think in terms of non-loss, loss situations, are sensitive to absence or presence of negative outcomes, employ avoidance as a strategic means, and have emotions of quiescence or agitation (Higgins, 1998).

Considering these descriptions of health-promotion focus and risk-prevention focus, strong parallels can be traced between these focuses in Self-discrepancy Theory and

identification and introjection in Self-determination Theory. As described by Sideridis (2006), both Self-determination Theory and Self-discrepancy Theory place individuals with feelings of obligation as a motive that affects goal pursuits for those that are more introjection based and risk-prevention focused. Meanwhile, individuals with feelings of the pursuit of an ideal self as a motive that affects goal orientation are more identification based and health-promotion focused. As such, the present study used a combination of Self-determination theory and Self-discrepancy Theory to predict and interpret behavior in a way that has not been done to date. That is, instead of pitting identification and introjection against each other when predicting a health outcome, we can evaluate their unique and relative contributions in specific terms of both a health-promotion outcome and a risk-prevention outcome. According to self-discrepancy theory and self-determination theory, we would expect to see identification more related to health-promotion outcomes and introjection more related to risk-prevention outcomes.

### **1.6 - The Additive Effects of Religious Motivation**

Another issue that has not been explored in the religious motivation literature is whether the effects of religious motivation are additive or interactive. All prior studies employing religious identification and religious introjection have presumed additive effects, but have not appropriately tested whether an interaction effect can be rejected. However, other domains have explored this issue, particularly in exercise and sport motivation. Vallerand and Fortier (1998) proposed an Additive Relationship hypothesis regarding intrinsic and extrinsic in motivation to exercise in which it was proposed that more intrinsic motivation, such as identification, has only additive effects with more extrinsic motivation, such as introjection. Subsequent studies confirmed this hypothesis by empirically testing the interaction of these constructs and found that no such interaction effect existed (Vlachopoulos & Karageorghis, 2005). Therefore, additive

effects have been presumed in the religious motivation literature and empirically demonstrated in other domains; however, no previous study has empirically confirmed there is no interaction between identification and introjection in religious motivation. As a result, the present study sought to address this absence in the previous literature.

### **1.7 - 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 using cross-sectional analyses. 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. Namely, without statistically controlling for overall levels of general religiousness, it cannot be determined what the unique contributions of the different religious motivations are and, resultantly, the contributions of the respective types of religious motivation cannot be interpreted. Therefore, we used general religiousness as a covariate.

Figure 1 illustrates the hypothesized model of health-risk and health-promoting behaviors for our first hypothesis. Our first hypothesis was that self-regulation, as a latent construct of behavioral, emotional, and cognitive regulation, mediates the relationship between religious motivation (introjection or identification) and health-risk behavior and health-promoting behavior after controlling for demographic covariates (e.g., gender, age, and income). We expected that higher introjection would be associated with lower self-regulation and that higher identification would be associated with higher self-regulation and, in turn, higher self-regulation will be associated with lower health-risk and higher health-promotion. Moreover, we

expected that introjection would be more strongly related to risk-prevention behavior, whereas identification would be more strongly related to health-promotion behavior. Health-risk behavior is a latent construct consisting of cigarette, alcohol, and marijuana use. Health-promoting behavior is a latent construct consisting of general health maintenance, exercise frequency, and teeth brushing frequency.

Our second hypothesis was that our first hypothesis would hold true even after controlling for general religiousness. That is, we expected to see that self-regulation mediates the relationship between religious motivation (introjection or identification) and health-risk and health-promotion even after general religiousness is statistically controlled for. Our third hypothesis was that the effects of identification and introjection are only additive in nature. Here, an interaction term between identification and introjection was added to the hypothesized model in order to test this. We hypothesized that the interaction term would not be significant in predicting any of the endogenous variables and, as a result, demonstrate that the relation between identification and introjection is only additive. Furthermore, we tested the generalizability of the hypothesized model that was tested with all participants regardless of religious denomination by examining parameter invariance of only participants with God based religions versus only participants with non-God based religions.

## **2.0 - Method**

### **2.1 - 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, statistical analyses including this variable will be 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.” Of the 220 participants, 154 (70.0%) identified with a religion that is God based (e.g., Christianity, Judaism, Islam) while 66 (30.0%) identified with no religion or a non-God based religion (e.g. “None” or “Other”).

### **2.2 - Procedures**

Using word-of-mouth, flyers, recruitment letters, e-mail distributions and other advertisements, the participants were recruited from southwest 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.

### **2.3 – Measures**

**Religious Motivation.** Adolescent's religious motivation was assessed using the adolescent's reports on the 12-item Religious Behavior scale (Ryan, Rigby, & King, 1993). 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 is a latent variable comprised of behavioral, emotional, and cognitive regulation. Behavioral regulation was measured by an average of the adolescents' and parents' reports on 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 13 item 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 on 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 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 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 a series of increasingly numerous digits to the researcher. In the first task, the digits are repeated back as heard; however, in the second task, the participant must repeat the digits back in reverse order of what was heard. 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).

Figure 2 reports the result of confirmatory factor analysis (CFA) for the measurement structure of the latent construct of self-regulation. The CFA revealed strong and significant factor loadings of the indicator variables. Self-regulation was comprised of behavioral self-regulation (Set to 1.0 for scaling,  $b^* = .78, p < .001$ ), emotional self-regulation ( $b^* = .76, p < .001$ ), and cognitive self-regulation ( $b^* = .40, p < .001$ ). The model was a fully saturated model ( $\chi^2 = 0, df = 0$ ).

**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.

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 absence of marijuana use. That is, all participants at this age reported “1 = Never used.”

Figure 3 is the measurement outcome of the structure of health-risk behavior which was determined by a CFA. The CFA revealed strong and significant factor loadings of the indicator variables. Health-risk behavior was comprised of alcohol use (Set to 1.0 for scaling,  $b^* = .68, p < .001$ ), log transformation of cigarette use ( $b^* = .89, p < .001$ ), and marijuana use ( $b^* = .80, p < .001$ ). The model was a fully saturated model ( $\chi^2 = 0, df = 0$ ).

**Health-Promoting Behavior.** Health-promoting behavior was measured by an adaption of the Physical Activity Questionnaire (Andersen, et al., 2006; Boardman, 2006; Koivusilta et al., 1999). 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.

Figure 4 illustrates the results of the measurement structure of health-promoting behavior that was explored in a CFA. The CFA revealed strong and significant factor loadings of the indicator variables. Health-promoting behavior was comprised of general health (Set to 1.0 for scaling,  $b^* = .52, p < .001$ ), amount of exercise ( $b^* = .63, p < .001$ ), and teeth brushing frequency ( $b^* = .37, p < .001$ ). The model was a fully saturated model ( $\chi^2 = 0, df = 0$ ).

**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.

#### **2.4 - Statistical Analyses**

For all study variables, descriptive statistics were examined to determine normality of distributions and univariate and multivariate outliers. Moreover, general liner modeling 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 three and kurtosis less than ten (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  $\chi^2$  value, degrees of freedom, corresponding p-value, Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR). RMSEA values of less than .05 were considered very good while values less than .08 were

considered acceptable and SRMR values of less than .08 were considered a good fit (Hu & Bentler, 1999). The mediation model included cross-sectional design regarding the association of religious motivation, self-regulation, and in turn, health-risk behavior and health-promotion behavior. 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). The Wald Test was used to determine significant differences in model fit indices for the tested parameter invariances. Power was calculated using the G\*Power 3 program (Faul, Erdfelder, Buchner, & Lang, 2007, 2009) for the analysis ( $n = 220$ ) with alpha equal to .05. In the analysis the power for a small effect size ( $f^2 = .02$ ) was .312, for a medium effect size ( $f^2 = .15$ ) the power was .997, and for a large effect size ( $f^2 = .35$ ) the power was .100.

### **3.0 - Results**

#### **3.1 - Preliminary Analyses**

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 gender ( $F = 7.11, p < .001$ ), age ( $F = 6.07, p < .001$ ), and income ( $F = 3.50, p < .001$ ) were significant multivariate predictors of endogenous variables and are thus included in the models as covariates. Race ( $F = 1.33, p = .22$ ) was found not to be a significant multivariate predictor and was thus not included in the models as a covariate.

#### **3.2 - Hypothesis Testing**

Results of the SEM revealed the fit of the hypothesized model was acceptable ( $\chi^2 = 115.07, df = 60, p < .001, RMSEA = .06, SRMR = .06$ ) and can be seen in Figure 5. After controlling for gender, age, and income, the predictor variables identification ( $b^* = .35, p < .001$ ) and introjection ( $b^* = -.23, p < .01$ ) both significantly predicted self-regulation. In turn, self-regulation significantly predicted health-risk behavior ( $b^* = -.38, p < .001$ ) but not health-promoting behavior ( $b^* = .18, p = .23$ ). There were direct effects from identification to health-risk behavior ( $b^* = -.20, p = .02$ ) but not health-promoting behavior ( $b^* = .01, p = .96$ ). There were no direct effects from introjection to health-risk behavior ( $b^* = .00, p = .99$ ) nor health-promoting behavior ( $b^* = -.01, p = .91$ ). A significant concurrent correlation was found for identification and introjection ( $r = .45, p < .001$ ), but not for health-promoting behavior and health-risk behavior ( $r = .18, p = .13$ ).

The covariates (gender, age, and income) had significant relations with a variety of endogenous variables; however, they were not significantly correlated with any exogenous variables or each other. As a result, the model was trimmed to remove concurrent correlations of the covariates with the exogenous variables and with each other. Gender significantly predicted self-regulation ( $b^* = .25, p < .001$ ), health-promoting behavior ( $b^* = -.39, p < .001$ ), and health-risk behavior ( $b^* = .15, p = .03$ ). The results indicated that girls showed higher self-regulation, less health-promoting behaviors, and more health-risk behaviors than boys. Age significantly predicted self-regulation ( $b^* = .35, p < .001$ ), health-promoting behavior ( $b^* = -.27, p = .01$ ), and health-risk behavior ( $b^* = .48, p < .001$ ). The results indicated that older adolescents had more self-regulation, less health-promoting behavior, and more health-risk behavior. Income significantly predicted self-regulation ( $b^* = .33, p < .001$ ) and health-promoting behavior ( $b^* = .22, p = .02$ ), but not health-risk behavior ( $b^* = -.10, p = .17$ ). The results indicated that adolescents from families with higher income showed greater self-regulation and higher health-promoting behavior.

The delta method was then employed to test the significance of the mediated effects from identification to health-risk behavior through self-regulation and introjection to health-risk behavior through self-regulation. Results indicated that self-regulation significantly mediated the effects of introjection on health-risk behavior ( $Z = 2.38, p = .02, 95\% \text{ CI } [.02, .16]$ ). Furthermore, self-regulation also had significance in the mediated effects of identification on health-risk behavior ( $Z = -2.89, p < .01, 95\% \text{ CI } [-.22, -.04]$ ).

In Figure 6, the hypothesized model was expanded to include general religiousness as a covariate in order to identify the unique contributions of religious motivation on health outcomes. The results indicated that the model fit was acceptable ( $\chi^2 = 128.64, df = 69, p < .001$ ,

RMSEA = .06, SRMR = .06). After controlling for gender, age, income, and general religiousness, the predictor variables identification ( $b^* = .27, p = .03$ ) and introjection ( $b^* = -.22, p < .01$ ) both significantly predicted self-regulation. In turn, self-regulation significantly predicted health-risk behavior ( $b^* = -.36, p < .001$ ) but not health-promoting behavior ( $b^* = .19, p = .22$ ). There were no direct effects from identification to health-risk behavior ( $b^* = -.04, p = .78$ ) nor health-promoting behavior ( $b^* = .04, p = .83$ ). Similarly, there were no direct effects from introjection to health-risk behavior ( $b^* = .03, p = .72$ ) nor health-promoting behavior ( $b^* = -.01, p = .89$ ). A significant concurrent correlation was found for identification and introjection ( $r = .45, p < .001$ ), general religiousness and identification ( $r = .85, p < .001$ ), and general religiousness and introjection ( $r = .43, p < .001$ ), but not for health-promoting behavior and health-risk behavior ( $r = .17, p = .14$ ).

The covariates (gender, age, income, and general religiousness) had significant relationships with endogenous variables. Gender significantly predicted self-regulation ( $b^* = .26, p < .001$ ), health-promoting behavior ( $b^* = -.39, p < .001$ ), and approached significance for health-risk behavior ( $b^* = .13, p = .06$ ). Age significantly predicted self-regulation ( $b^* = .35, p < .001$ ), health-promoting behavior ( $b^* = -.27, p = .01$ ), and health-risk behavior ( $b^* = .47, p < .001$ ). Income significantly predicted self-regulation ( $b^* = .32, p < .001$ ) and health-promoting behavior ( $b^* = .23, p = .02$ ), but not health-risk behavior ( $b^* = -.09, p = .23$ ). Finally, general religiousness significantly predicted health-risk behavior ( $b^* = -.24, p = .05$ ) but did not significantly predict self-regulation ( $b^* = .08, p = .50$ ) or health-promoting behavior ( $b^* = -.03, p = .87$ ). The finding indicates that adolescents with higher general religiousness reported lower health-risk behavior.

The delta method was then used to test the significance of the mediated effects from identification to health-risk behavior through self-regulation and introjection to health-risk behavior through self-regulation. Results indicated that self-regulation significantly mediated the effects of introjection on health-risk behavior ( $Z = 2.32, p = .01, 95\% \text{ CI } [.01, .15]$ ). Furthermore, self-regulation approached significance in the mediated effects of identification on health-risk behavior ( $Z = -1.80, p = .07, 95\% \text{ CI } [-.20, .01]$ ).

Figure 7 presents the results of testing the interaction effects of introjection and identification. The results showed that the model had acceptable fit ( $\chi^2 = 147.31, df = 78, p < .001, \text{RMSEA} = .06, \text{SRMR} = .06$ ). As was done in Figure 2, gender, age, income, and general religiousness were controlled for in the analysis. Introjection and identification were centered to create a multiplicative term of the interaction. Introjection significantly predicted self-regulation ( $b^* = -.29, p < .001$ ), whereas identification ( $b^* = .16, p = .20$ ) did not. The interaction term of identification and introjection did not significantly predict self-regulation ( $b^* = .09, p = .26$ ). In turn, self-regulation significantly predicted health-risk behavior ( $b^* = -.35, p < .01$ ) but not health-promoting behavior ( $b^* = .22, p = .14$ ). There were no direct effects from identification to health-risk behavior ( $b^* = -.12, p = .32$ ) nor health-promoting behavior ( $b^* = .13, p = .45$ ). Similarly, there were no direct effects from introjection to health-risk behavior ( $b^* = .04, p = .63$ ) nor health-promoting behavior ( $b^* = .07, p = .53$ ). Moreover, there were no direct effects from the interaction term of identification and introjection to health-risk behavior ( $b^* = -.10, p = .19$ ) nor health-promoting behavior ( $b^* = -.14, p = .18$ ). A significant concurrent correlation was found for identification and introjection ( $r = .44, p < .001$ ) and identification and the interaction term ( $r = -.45, p < .001$ ), but not introjection and the interaction term ( $r = -.02, p = .81$ ). There was no significant concurrent correlation for health-promoting behavior and health-risk behavior

( $r = .17, p = .14$ ).

The covariates (gender, age, income, and general religiousness) were also significantly associated with endogenous variables. Gender significantly predicted self-regulation ( $b^* = .27, p < .001$ ), health-promoting behavior ( $b^* = -.40, p < .001$ ), and health-risk behavior ( $b^* = .14, p = .05$ ). Age significantly predicted self-regulation ( $b^* = .35, p < .001$ ), health-promoting behavior ( $b^* = -.26, p = .01$ ), and health-risk behavior ( $b^* = .47, p < .001$ ). Income significantly predicted self-regulation ( $b^* = .30, p < .001$ ) and health-promoting behavior ( $b^* = .23, p = .02$ ), but not health-risk behavior ( $b^* = -.10, p = .19$ ). Moreover, general religiousness significantly predicted self-regulation ( $b^* = .24, p = .04$ ), but did not significantly predict health-promoting behavior ( $b^* = -.22, p = .19$ ) and approached significance predicting health-risk behavior ( $b^* = -.22, p = .07$ ).

The delta method was then used to test the significance of the mediated effects from identification to health-risk behavior through self-regulation and introjection to health-risk behavior through self-regulation. Results indicated that self-regulation significantly mediated the effects of introjection on health-risk behavior ( $Z = 2.52, p = .01, 95\% \text{ CI } [.02, .18]$ ). However, self-regulation was not significant in the mediated effects of identification on health-risk behavior ( $Z = -1.19, p = .23, 95\% \text{ CI } [-.15, .04]$ ).

Next, a series of nested model tests were run in order to determine if the model was generalizable to both God based and non-God based religious beliefs. In order to run these tests, the configural invariant model was first run in which all parameters were freely estimated for both the God based and non-God based groups in a two-group model. Results of the model indicated that the fit was mediocre ( $\chi^2 = 311.13, df = 144, p < .001, \text{RMSEA} = .10, \text{SRMR} = .11$ ). Moreover, the next model was run with the effects of identification and introjection on self-

regulation constrained to be equal. The fit of this model remained marginal ( $\chi^2 = 312.31$ ,  $df = 146$ ,  $p < .001$ , RMSEA = .10, SRMR = .11), but the model fit proved to not be significantly worse by the Wald Test ( $\Delta\chi^2 = 1.21$ ,  $\Delta df = 2$ ,  $p = .55$ ). As a result, it was concluded that the effects of identification and introjection on self-regulation are invariant, or not significantly different for the God-based group and the non-God based group.

The next model was run with the effects of identification and introjection on self-regulation constrained to be equal and, additionally, the effects of self-regulation on health-promoting behavior and health-risk behavior were constrained to be equal in order to determine if these added paths are invariant across the two groups. The fit of the model remained marginal ( $\chi^2 = 318.15$ ,  $df = 148$ ,  $p < .001$ , RMSEA = .10, SRMR = .12). However, the additionally constrained paths proved to not significantly degrade model fit by the Wald Test ( $\Delta\chi^2 = 5.22$ ,  $\Delta df = 2$ ,  $p = .07$ ), albeit significance was approached. As a result, it was concluded that these additional paths from self-regulation to health-promoting behavior and health-risk behavior are also invariant across the God-based group and the non-God based group.

Finally, the model was run with the direct effects of identification and introjection on self-regulation constrained to be equal, the effects of self-regulation on health-promoting behavior and health-risk behavior constrained to be equal, and, in addition, the direct effects of identification and introjection on health-promoting behavior and the direct effects of identification and introjection on health-risk behavior constrained to be equal. The fit of the model remained marginal ( $\chi^2 = 320.50$ ,  $df = 151$ ,  $p < .001$ , RMSEA = .10, SRMR = .12). However, the additionally constrained paths proved to not significantly degrade model fit by the Wald Test ( $\Delta\chi^2 = 2.91$ ,  $\Delta df = 4$ ,  $p = .57$ ). As a result, it was concluded that the direct effects of

identification and introjection on health-risk behavior and health-promoting behaviors are also invariant across the God based group and the non-God based group.

#### **4.0 - Discussion**

Existing literature has established a relation between religiousness and health outcomes. An array of studies has demonstrated that individuals with higher religiousness demonstrate better physical and mental health. However, these prior studies have been lacking in scope in a variety of ways. First, while it has been shown that varying religious motivations, namely more extrinsic versus more intrinsic, have differential associations with outcomes such as deviance, perceived well-being, anxiety, and depression, the motivation of an individual's religiousness has rarely been considered when exploring the connection between religiousness and health behavior in adolescents. Secondly, it is not well known what explains the link between religiousness, of any motivation variety, and health outcomes. It has been theorized that self-regulation is the mediating mechanism between religiousness and health outcomes, 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 which may shed light on the regulatory focus of individuals. These studies have also failed to control for general religiousness in their analyses and, as a result, could not examine the unique contributions of religious motivation independent of the general religiousness levels.

In addition, the effects of introjection (or more extrinsic motivation) and identification (or more intrinsic motivation) have been assumed to be additive. While motivation studies in other domains have concluded that there are no interaction effects between introjection and identification, interaction effects have not been tested for religious motivation. Moreover, despite the importance of examining health behaviors in adolescence due to the increase in risk taking behavior during this developmental period, few studies have addressed the contribution that

religiousness, in particular religious motivation, has on health-risk behaviors during this time. Finally, no study to date has considered the effect of religious denomination. Specifically, all studies considering religious motivation have been with samples that are almost entirely God based, including Christianity, Judaism, and Islam. As a result, it could not be concluded whether these results can be generalized to individuals with non-God based beliefs.

The current study, therefore, sought to address these limitations in the literature. To clarify the differences in religious motivation and their association with health outcomes, identification and introjection simultaneously predicted the outcome variables in order to determine their relative contributions to health behavior. Self-regulation was included as the mediating variable between religious motivation and health behavior in order to determine the explanatory mechanism of the link between religious motivation and health behavior.

Furthermore, health-risk behavior and health-promoting behaviors were simultaneously predicted as the outcome variables in order to determine if there are differences in regulatory focus of the respective types of religious motivation. In order to determine the unique contributions of religious motivation, general religiousness was included as a covariate. In addition, a multiplicative interaction term between introjection and identification was later introduced to the hypothesized model in order to test whether the nature of the effects of introjection and identification are additive and not interactive. The sample consisted of adolescence so that conclusions could be made about health behaviors during a period of development that is susceptible to risk taking. Finally, the issue of generalizability was addressed by fitting two group models of God based religions and non-God based religions and testing the hypothesized model.

Our first hypothesis was that self-regulation mediates the relationship between religious motivation (introjection or identification) and health-risk and health-promotion after controlling for demographic covariates (gender, age, and income). Consistent with our hypothesis, we found that self-regulation mediated the relationship between religious motivation and health-risk behavior in the hypothesized directions. That is, higher identification predicted higher self-regulation and, subsequently, lower health-risk behavior, whereas higher introjection predicted lower self-regulation and, subsequently, higher health-risk behavior. Higher identification also significantly predicted lower health-risk behavior directly; however, identification did not directly predict health-promoting behavior and introjection did not directly predict health-risk behavior or health-promoting behavior. These findings are consistent with prior studies that found higher identification is associated with less health-risk behavior and higher introjection is either unassociated with health-risk behavior or, if it is, associated with more health-risk behavior (Hardy, et al., 2013; Klanjšek, et al., 2012; Neyrinck et al., 2006).

These findings partially support McCullough and Willoughby's (2009) theory that religiousness promotes healthy behavior through self-regulation. As they proposed, religiousness, of any motivated variety, was related to health-risk behavior through self-regulation in the current study. However, their proposition was not comprehensive insofar as the relation of the varying religious motivations were opposite in direction. That is, identification predicted more self-regulation and, thus, less health-risk behavior; however, introjection predicted less self-regulation and, thus, more health-risk behavior. The theory proposed by McCullough and Willoughby included only that there is a positive effect of religiousness on self-regulation and health behavior. The current findings confirmed their proposition for identification as it did indeed predict higher self-regulation and, thus, lower health-risk behavior.

For introjection, however, the opposite of their theoretical prediction was found as introjection predicted lower self-regulation and, thus, higher health-risk behavior. As a result, the present study emphasizes that religiousness is associated with self-regulation and, in turn, health-risk behavior; but, more importantly, the type of motivation an individual has to be religious determines whether that association will be positive or negative.

Furthermore, the present findings provide support for 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, for 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. However, the current study reveals that only religiousness that is motivated through identification is associated with higher self-regulation and religiousness that is motivated through introjection is associated with lower self-regulation. Therefore, it can be concluded that religiousness motivated by identification is demanding of self-regulatory abilities; however, religiousness that is motivated by introjection is not.

These findings demonstrate that those who have not fully internalized their beliefs and are not fully practicing their beliefs are not building the capacity of their self-regulatory strength. As a result, they are not as well prepared to self-regulate in the face of temptation to engage in health-risk behavior as more intrinsically driven believers. It can be posited that this is a result of the more extrinsically motivated believers' unlikelihood to perform the behaviors that are demanding of self-regulatory strength as they only seek external benefits, such as approval from the community. The individuals that only perform for more external rewards, then, can be seen as the "freeloaders," that were proposed to exist by Norenzayan and Shariff (2008). These

individuals only signal to the community that they are believers of the community's religious beliefs in order to gain approval and acceptance of its members without actually internalizing the beliefs. As result, "freeloaders" do not gain the same benefits as the fully internalized believers. Fully 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 of willingness to sacrifice to a greater extent than what is being gained by their group membership.

Surprisingly, religious motivation and health-promoting behavior were not associated through self-regulation. While higher identification predicted higher self-regulation and higher introjection predicted lower self-regulation, self-regulation did not in turn predict health-promoting behavior. There were also no significant direct effects from religious motivation to health-promoting behavior. These findings do not fully support the idea that religious motivation, in terms of Self-determination Theory, is associated with regulatory focus in terms of Self-discrepancy Theory. Rather, these findings demonstrate that religiousness, no matter the motivating context, is associated with health-risk behavior through self-regulation but not health-promoting behavior. Further supporting this, when general religiousness was introduced as a covariate, it significantly predicted health-risk behavior but not health-promoting behavior. As a result, the current study does not corroborate previous studies that found an association between religiousness (of any type) and health-promoting behavior through self-regulation.

The discrepancy between these findings and studies that have found such associations (e.g., Wills, Isasi, Mendoza, & Ainette, 2007) may be a result of differing measures of health-promoting behavior. Wills and colleagues (2007) focused on behaviors including dietary intake, sports participation, vigorous exercise, and sedentary behavior, whereas the present study included teeth-brushing, general health perception, and exercise as health-promoting behaviors.

Thus the discrepancy in the findings may suggest that different health-promoting behaviors may be differentially related to self-regulation, such that dietary intake and vigorous exercise may be particularly demanding high levels of self-regulation ability.

Our second hypothesis was that our first hypothesis would hold true even after general religiousness was controlled for. We expected to see that self-regulation still mediates the relationship between religious motivation (introjection or identification) and health-risk and health-promotion even after controlling for general religiousness. This hypothesis was supported as higher identification still predicted higher self-regulation and, in turn, lower health-risk behavior, whereas higher introjection still predicted lower self-regulation and, in turn, higher health-risk behavior. Notably, the direct effect of identification to health-risk behavior became non-significant in this model. After taking into account the direct association between general religiousness and health-risk behavior, there was no remaining variance in health-risk behavior that was uniquely explained by identification. Therefore, it appears that the properties of the overlap between general religiousness and identification are responsible for the direct effect of identification on health-risk behavior. However, consistent with the first model, identification and introjection were not directly or indirectly associated with health-promoting behavior. Nevertheless, the results demonstrated that religious motivations have an effect on health-risk behavior above and beyond general religiousness.

Furthermore, 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 ( $r = .40, p < .001$ ). As a result, it can be concluded that those that reported higher identification based motivation were more likely to report higher general religiousness than individuals who reported higher

introjection based motivation. This is consistent with the theoretical view proposed by Ryan et al (1993) that identification based individuals are described as those who “live” their religion and fully adopt its beliefs, whereas introjection based 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.

To test our third hypothesis, that the effects of identification and introjection are only additive in nature, an interaction term between identification and introjection was added to the hypothesized model. We hypothesized that the interaction term would not be significant in predicting any of the endogenous variables. The results supported this hypothesis, as the interaction term of identification and introjection did not significantly predict self-regulation, health-promoting behavior, or health-risk behavior. This finding is consistent with empirical literature regarding other motivation-related domains, including exercise (Vlachopoulos & Karageorghis, 2005), and supports the Additive Relationship hypothesis of motivation by Vallerand and Fortier (1998) that proposed the effects of intrinsic motivation and extrinsic motivation are only additive.

Finally, in order to determine the generalizability of the hypothesized model, the current sample was divided into two groups, a God based group and a non-God based group to test if the beta parameters were invariant. A series of Wald Tests on particular parameters suggested that the model fits did not degrade significantly by imposing equality constraints between the two groups. Therefore, the results do not provide evidence to reject the assumption that the hypothesized model can be used to make predictions about health behavior from religious motivation through self-regulation regardless of the God-based nature of religious orientation. As noted, prior studies have focused solely on God based religions (e.g., Christianity, Judaism,

and Islam) in analyzing differing outcomes of religious motivation in terms of Self-determination Theory's identification and introjection constructs. However, the results of the present study provide preliminary evidence suggesting that these conclusions may indeed be applied to religious beliefs that are not God based.

### Limitations and Future Directions

A few limitations of the present study must be noted. First, the cross-sectional nature of the analyses removes the ability to make inferences regarding the causality of religious motivation and self-regulation on health-risk behavior and health-promoting behavior. Future studies would benefit from a longitudinal analysis to address this. 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. 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, 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). Finally, the use of "other" and "none" as options for religious affiliation disallow for separating out individuals that have no religious beliefs at all from those with no religious affiliation, but still some sort of religious beliefs. Future studies would benefit from making this distinction an available option if considering God versus non-God based religious beliefs.

### 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, or more intrinsic religious motivation, contributes to beneficial health behaviors through self-regulation, whereas introjection, or more extrinsic religious motivation, contributes to detrimental health behaviors through self-regulation. Moreover, it can be concluded that there is no interaction effect between identification and introjection so the effects each has on self-regulation and health-behaviors are additive. These relations exist in the population of God based religious individuals as well as non-God based religious individuals. The present findings demonstrated that the relations between religious motivation and health-risk behavior are generalizable to the population of non-God based religious individuals.

Health behaviors that are related to risk-taking, including substance use, are related to religious motivation with self-regulation as a mediator. However, we did not find evidence that health behaviors that are health-promotion focused are related to religious motivation. Thus, it can be concluded that the regulatory focus of religious individuals is risk-prevention (rather than health-promotion), no matter what is motivating the religiousness. The conclusions drawn from this study are particularly informing regarding contributions to health-risk behavior during adolescence. Considering the increased amount of risk taking behavior, including substance use, during this developmental period, identifying factors that may contribute to the development of health risk behavior is beneficial in informing preventative and intervening measures. 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 depending on religious motivation.

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Table 1

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

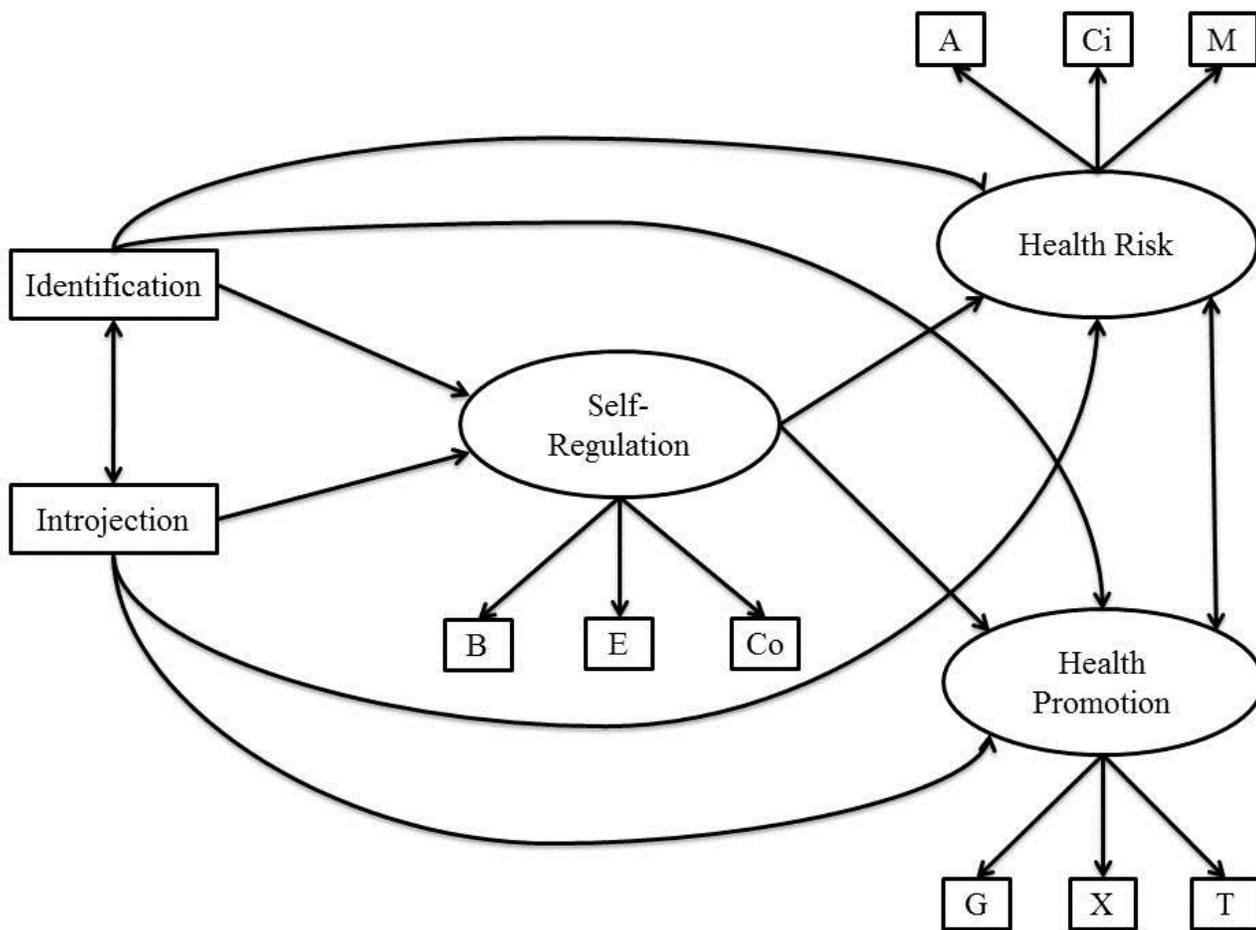
<i>Variables</i>	1	2	3	4	5	6	7	8
1. Identification	-							
2. Introjection	.44***	-						
3. Behavioral regulation	.20**	-.09	-					
4. Emotional regulation	.18**	-.14*	.51***	-				
5. Cognitive regulation	-.08	-.13	.17*	.14*	-			
6. Alcohol use	-.26***	-.05	-.26***	-.06	-.01	-		
7. Cigarette use log transformed	-.23**	-.04	-.32***	-.21**	-.04	.61***	-	
8. Marijuana use	-.23**	-.02	-.29***	-.13	-.01	.55***	.70***	-
9. General health	-.04	-.05	.16*	.19**	.19**	-.00	-.05	-.00
10. Exercise frequency	.06	.02	.06	-.08	.04	.05	.05	.01
11. Teeth brushing frequency	.11	-.02	.23**	.22***	.13	.01	-.17**	-.07
12. General religiousness	.84***	.40***	.15*	.13	.01	-.34***	-.29***	-.29***

Table 1 (cont.)

	<i>Variables</i>	9	10	11	12	<i>M</i>	<i>SD</i>
1.	Identification	-				4.29	1.91
2.	Introjection	-				2.58	1.20
3.	Behavioral regulation	-				3.61	.55
4.	Emotional regulation	-				3.30	.32
5.	Cognitive regulation	-				49.93	7.38
6.	Alcohol use	-				1.81	1.05
7.	Cigarette use log transformed	-				.19	.41
8.	Marijuana use	-				1.35	1.02
9.	General health	-				2.09	.83
10.	Exercise frequency	.32***	-			2.73	1.48
11.	Teeth brushing frequency	.18**	.22**	-		1.48	.66
12.	General religiousness	-.00	.10	.09	-	4.88	1.76

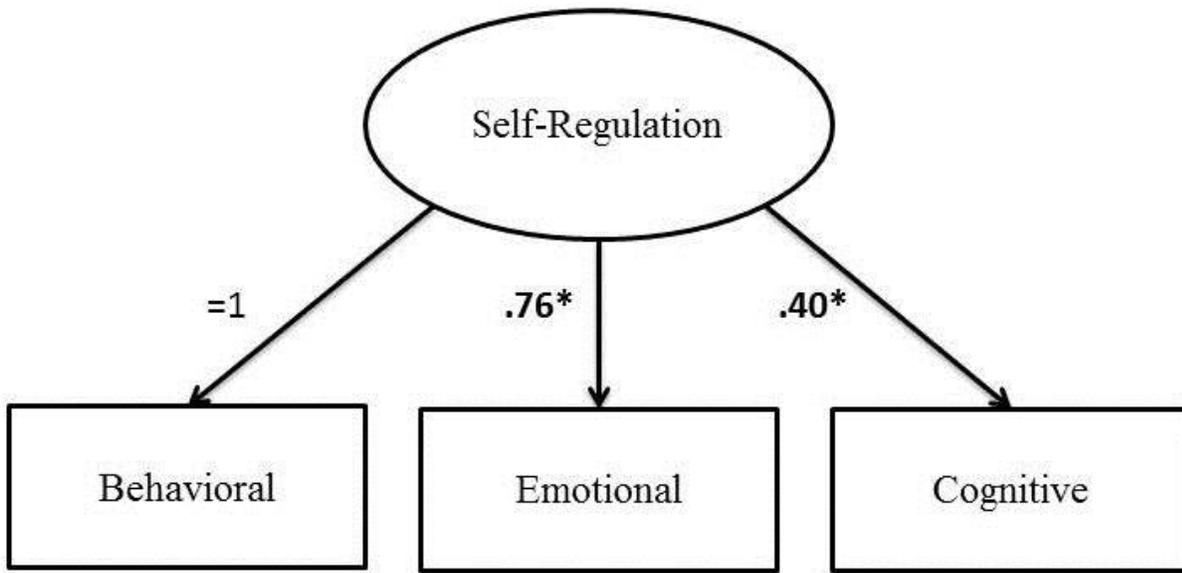
*Note.* n = 212.

\*  $p \leq .05$ ; \*\*  $p \leq .01$ ; \*\*\*  $p \leq .001$

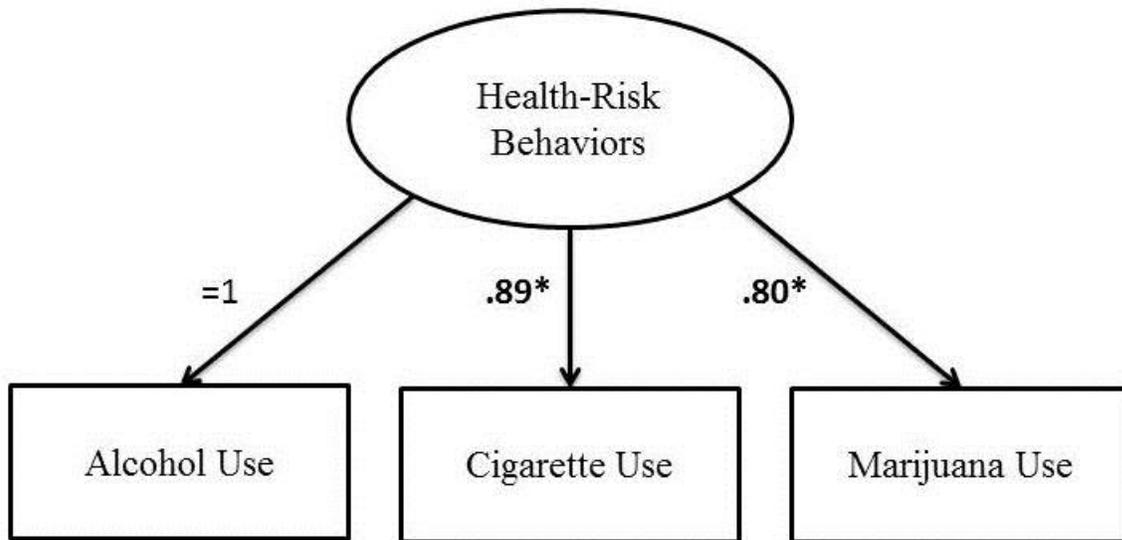


*Figure 1.* Hypothesized cross-sectional model of religious motivation and health-demotion and health-promotion, mediated by self-regulation. B = behavioral, E = emotional, Co = cognitive, Ci = cigarette use (log transformed), A = alcohol use, M = marijuana use, G = general health, X = exercise, T = teeth brushing.

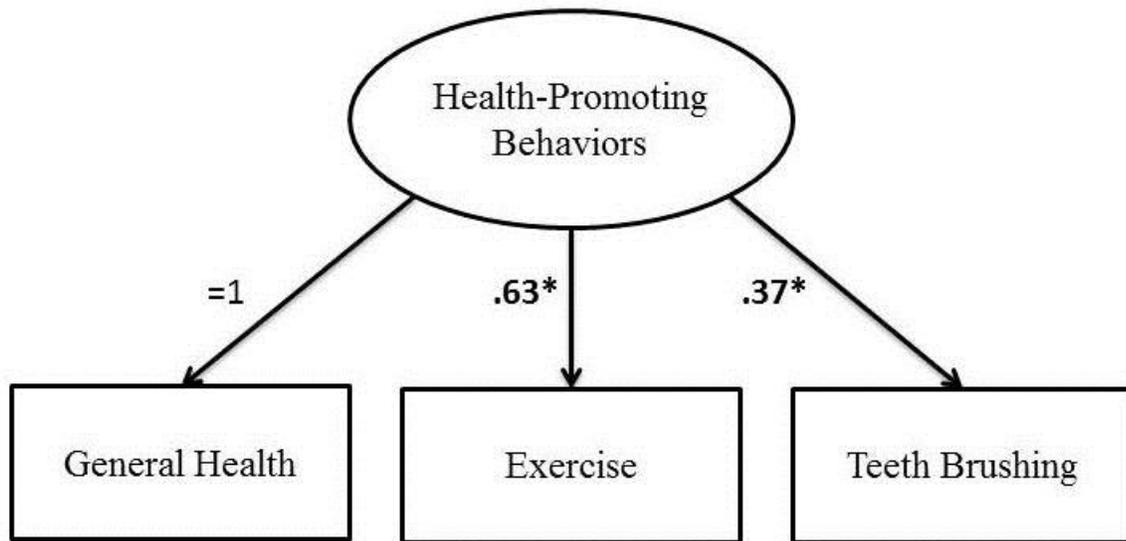
Note: For clarity of presentation, covariates (gender, ethnicity, age, and income) are not shown.



*Figure 2.* Structure of the self-regulation construct from confirmatory factor analysis.  
Note: \* =  $p < .001$



*Figure 3.* Structure of the health-risk behavior construct from confirmatory factor analysis.  
Note: \* =  $p < .001$



*Figure 4.* Structure of the health-promoting behavior construct from confirmatory factor analysis.

Note: \* =  $p < .001$

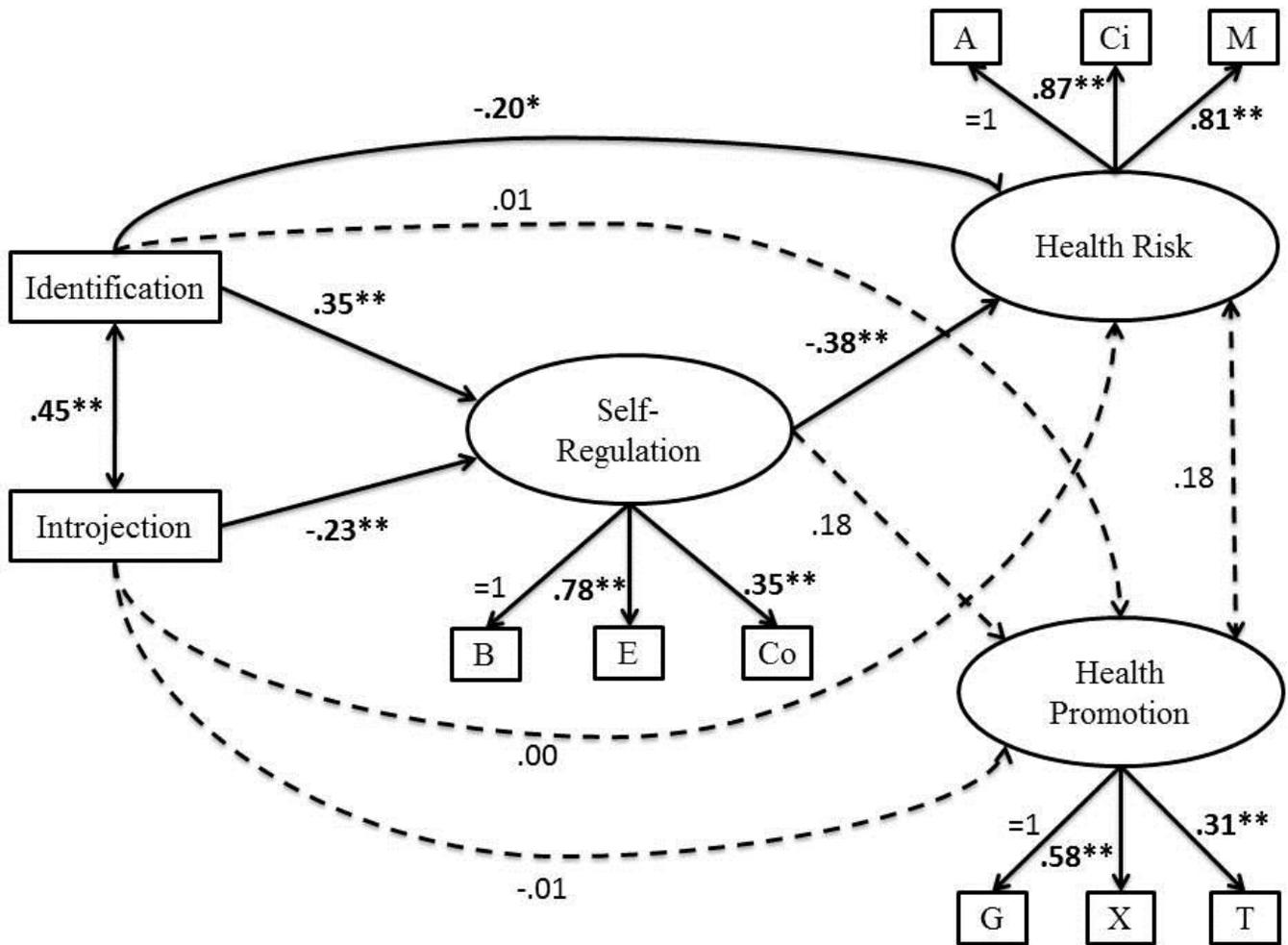


Figure 5. Cross-sectional model of religious motivation and health-demotion and health-promotion, mediated by self-regulation. B = behavioral, E = emotional, Co = cognitive, Ci = cigarette use (log transformed), A = alcohol use, M = marijuana use, G = general health, X = exercise, T = teeth brushing.

Note: For clarity of presentation, covariates (gender, age, and income) are not shown but are reported in text.

\* =  $p \leq .05$ , \*\* =  $p \leq .01$

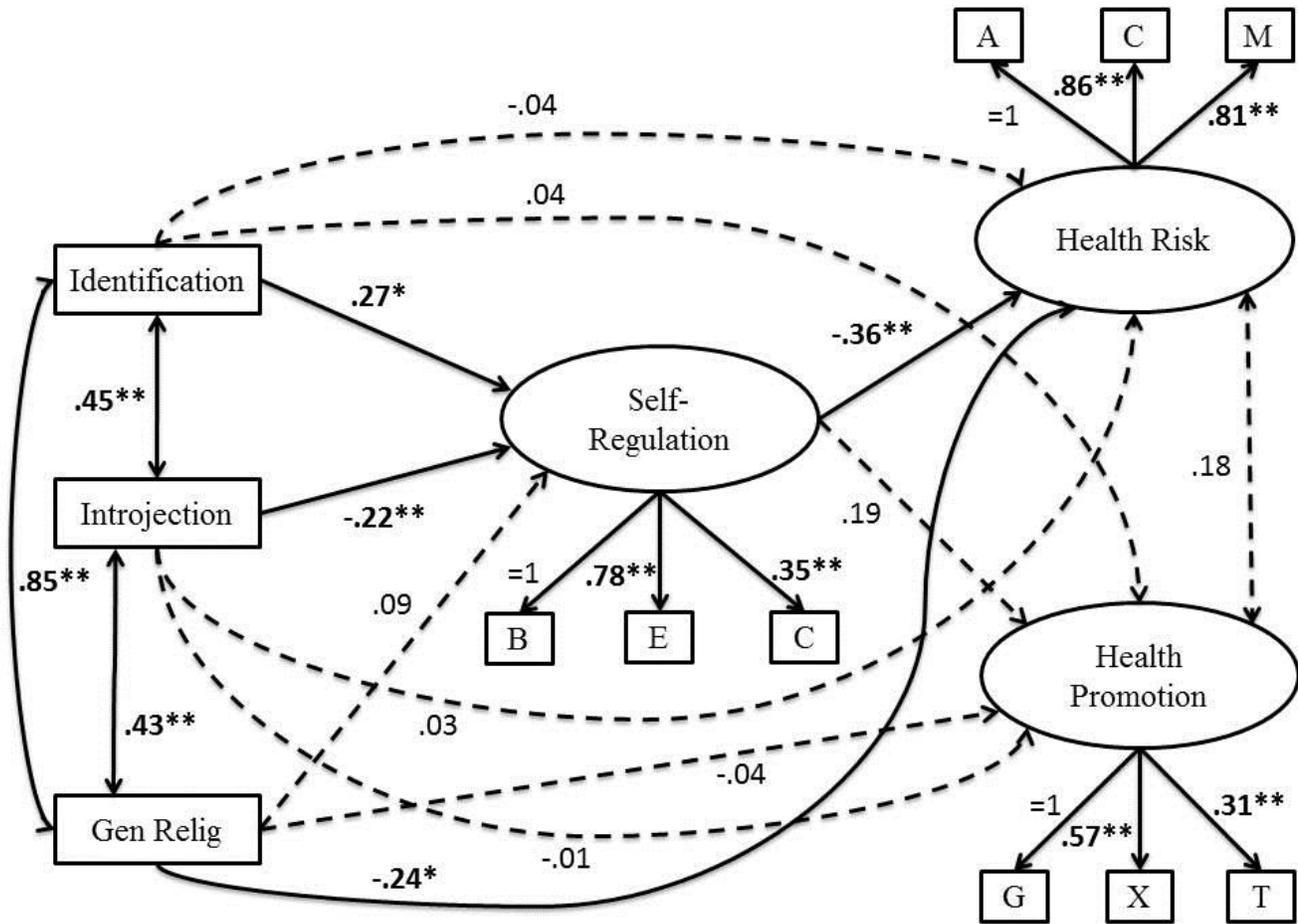


Figure 6. Cross-sectional model of religious motivation and health-demotion and health-promotion, mediated by self-regulation with general religiousness also included as a covariate. B = behavioral, E = emotional, Co = cognitive, Ci = cigarette use (log transformed), A = alcohol use, M = marijuana use, G = general health, X = exercise, T = teeth brushing, Gen Relig = General Religiousness.

Note: For clarity of presentation, covariates (gender, age, and income) are not shown but are reported in text.

\* =  $p \leq .05$ , \*\* =  $p \leq .01$



## Appendix A

### Demographic Interview

1. How old are you? (Record age in years) AGE\_\_\_\_\_
2. What is your gender? Male \_\_\_\_ Female \_\_\_\_
3. How would you describe your own race?
  - 1 = Black
  - 2 = White
  - 3 = Latino or Hispanic
  - 4 = Biracial or Multiracial
  - 5 = Asian or Asian-America
  - 6 = American Indian
  - 7 = Other (Alaskan Native, Middle Eastern, Pacific Islander, or other)Other (please specify) \_\_\_\_\_







## Appendix C

### Brief Self-Control Scale: Adolescents

Using the scale below, please indicate how much each of the following statements reflects how you typically are.

- |  | Not at all |       |   |       | Very Much |       |   |       |   |
|--|------------|-------|---|-------|-----------|-------|---|-------|---|
| 1. I am good at resisting temptation.....  | 1          | ----- | 2 | ----- | 3         | ----- | 4 | ----- | 5 |
| 2. I have a hard time breaking bad habits.....   | 1          | ----- | 2 | ----- | 3         | ----- | 4 | ----- | 5 |
| 3. I am lazy.....  | 1          | ----- | 2 | ----- | 3         | ----- | 4 | ----- | 5 |
| 4. I say inappropriate things.....   | 1          | ----- | 2 | ----- | 3         | ----- | 4 | ----- | 5 |
| 5. I do certain things that are bad for me,<br>if they are fun.....                        | 1          | ----- | 2 | ----- | 3         | ----- | 4 | ----- | 5 |
| 6. I refuse things that are bad for me.....  | 1          | ----- | 2 | ----- | 3         | ----- | 4 | ----- | 5 |
| 7. I wish I had more self-discipline.....  | 1          | ----- | 2 | ----- | 3         | ----- | 4 | ----- | 5 |
| 8. People would say that I have iron self-discipline.....                                  | 1          | ----- | 2 | ----- | 3         | ----- | 4 | ----- | 5 |
| 9. Pleasure and fun sometimes keep me from getting<br>work done.....                       | 1          | ----- | 2 | ----- | 3         | ----- | 4 | ----- | 5 |
| 10. I have trouble concentrating.....  | 1          | ----- | 2 | ----- | 3         | ----- | 4 | ----- | 5 |
| 11. I am able to work effectively toward<br>long-term goals.....                           | 1          | ----- | 2 | ----- | 3         | ----- | 4 | ----- | 5 |
| 12. Sometimes I can't stop myself from doing<br>something, even if I know it is wrong..... | 1          | ----- | 2 | ----- | 3         | ----- | 4 | ----- | 5 |
| 13. I often act without thinking through all<br>the alternatives.....                      | 1          | ----- | 2 | ----- | 3         | ----- | 4 | ----- | 5 |

## Appendix D

### ERC-C

The following statements describe how people respond to different situations. Please circle the number that best describes you. Be sure you give an answer for all of the statements.

**1. I am a cheerful child.**

Rarely/Never	Sometimes	Often	Almost Always
1	2	3	4

**2. I move quickly from a good mood to a bad mood.**

Rarely/Never	Sometimes	Often	Almost Always
1	2	3	4

**3. I respond well (positively) to adults when they act friendly or neutral to me.**

Rarely/Never	Sometimes	Often	Almost Always
1	2	3	4

**4. I don't get angry, worried, distressed, upset, or worked up when changing from one thing to another. I shift well from one activity to another.**

Rarely/Never	Sometimes	Often	Almost Always
1	2	3	4

**5. When I am emotionally upset or frustrated by something that happens, I start to feel better pretty quickly (I don't stay sad or worried for a long time).**

Rarely/Never	Sometimes	Often	Almost Always
1	2	3	4

**6. I am easily frustrated.**

Rarely/Never	Sometimes	Often	Almost Always
1	2	3	4

**7. I respond well (positively) when friends act friendly or neutral to me.**

Rarely/Never	Sometimes	Often	Almost Always
1	2	3	4

**8. It is easy for me to have an angry outburst or temper tantrums when I get angry.**

Rarely/Never	Sometimes	Often	Almost Always
1	2	3	4

**9. I can wait to get something I really want.**

Rarely/Never	Sometimes	Often	Almost Always
1	2	3	4

**10. I like it when other people are upset (for example, I like teasing others or I laugh when another person gets hurt or punished).**

Rarely/Never	Sometimes	Often	Almost Always
1	2	3	4

**11. I don't get carried away during exciting situations or too excited at the wrong time or place.**

Rarely/Never	Sometimes	Often	Almost Always
1	2	3	4

**12. I am whiny or clingy with adults.**

Rarely/Never	Sometimes	Often	Almost Always
1	2	3	4

**13. I often bother other people because I am too active or too excited about something.**

Rarely/Never	Sometimes	Often	Almost Always
1	2	3	4

**14. I get angry when adults set limits (tell me that I cannot do something).**

Rarely/Never	Sometimes	Often	Almost Always
1	2	3	4

**15. I can say when I am feeling sad, angry or mad, fearful or afraid.**

Rarely/Never	Sometimes	Often	Almost Always
1	2	3	4

**16. I feel sad or I have no energy.**

Rarely/Never	Sometimes	Often	Almost Always
1	2	3	4

**17. I get too excited when trying to get other people to play or do things with me.**

Rarely/Never	Sometimes	Often	Almost Always
1	2	3	4

**18. I show very little feeling. People think I don't have feelings.**

Rarely/Never	Sometimes	Often	Almost Always
1	2	3	4

**19. I act negatively (I get scared or speak to friends in an angry tone of voice) when my friends are acting neutral or trying to be friendly.**

Rarely/Never	Sometimes	Often	Almost Always
1	2	3	4

**20. I do things without first thinking them through.**

Rarely/Never	Sometimes	Often	Almost Always
1	2	3	4

**21. I show concern and understanding when others are upset or distressed.**

Rarely/Never	Sometimes	Often	Almost Always
1	2	3	4

**22. My excitement bothers other people.**

Rarely/Never	Sometimes	Often	Almost Always
1	2	3	4

**23. When friends are mean to me or treat me badly, I have normal negative feelings such as anger, fear or frustration.**

Rarely/Never	Sometimes	Often	Almost Always
1	2	3	4

**24. I show negative feelings (anger, fear, or frustration) when I try to get someone to play or do something with me.**

Rarely/Never	Sometimes	Often	Almost Always
1	2	3	4





- A. Never happened
- B. Happened once – twice
- C. Happened three – five times
- D. Happened a few times a month
- E. Happened a few times a week
- F. Happened every day

**The next 5 questions ask about marijuana use.** Marijuana is also known as grass, pot, or weed.

14. Have you ever used marijuana?

- A. Yes
- B. No

15. How much do you think people risk harming themselves (physically or in other ways) if they smoke marijuana?

- A. Great Risk
- B. Moderate (Medium) Risk
- C. Slight Risk
- D. No Risk

16. Which is the most true for you about using marijuana?

- A. Never used
- B. Tried once – twice
- C. Used three – five times
- D. Usually use a few times a month
- E. Usually use a few times a week
- F. Usually use every day

17. How old were you when you tried marijuana for the first time?

- A. I have never tried marijuana.
- B. 8 years old or younger
- C. 9-10 years old
- D. 11-12 years old
- E. 13-14 years old
- F. 15-16 years old
- G. 17 years old or older

18. During the past 30 days, on how many days did you have at least one puff of marijuana?

- A. 0 days
- B. 1 or 2 days
- C. 3 to 5 days
- D. 6 to 9 days
- E. 10 to 19 days
- F. 20 to 29 days
- G. All 30 days

## Appendix F

### Health and Behavior

The following questions ask about your physical activity and health. Please circle the number corresponding with your answer.

1. In general, how would you rate your health?
  - 1) Excellent
  - 2) Very Good
  - 3) Good
  - 4) Fair
  - 5) Poor
  
2. Outside school hours, how often do you do sports or exercise until you are out of breath or sweat?
  - 1) Every day
  - 2) 4-6 times per week
  - 3) 2-3 times per week
  - 4) Once per week
  - 5) 1-3 times per month
  - 6) Less than once per month
  - 7) Never
  
3. How often do you brush your teeth?
  - 1) Several times a day
  - 2) Once a day
  - 3) 2-5 times a week
  - 4) At most once a week (or never)
  
4. On an average school day, how many hours do you watch TV or play videogames?
  - 1) I never watch TV or play videogames on an average school day
  - 2) Less than ½ an hour
  - 3) ½ hour – 2 hours
  - 4) At least 2 hours
  
5. How often do you wear a seat belt when riding in a car driven by someone else?
  - 1) Never
  - 2) Rarely
  - 3) Most of the Time
  - 4) Always

## Appendix G

### Religiosity

Here are some statements that describe religious attitudes and practices. Please answer all questions as honestly as possible. For each question circle the number that best describes your feelings and behaviors regarding religious experience.

1. What is your religion, if any?
  - 1) Protestant (Give denomination): \_\_\_\_\_
  - 2) Roman Catholic
  - 3) Jewish
  - 4) Muslim
  - 5) Other (Specify): \_\_\_\_\_
  - 6) None
  
2. To what extent do you consider yourself a religious person?
  - 1) Very religious
  - 2) Moderately religious
  - 3) Slightly religious
  - 4) Not religious at all
  
3. How often do you go to religious services?
  - 1) More than once a week
  - 2) Every week or more often
  - 3) Once or twice a month
  - 4) Every month or so
  - 5) Once or twice a year
  - 6) Never
  
4. Besides religious services, how often do you take part in other activities at a place of worship?
  - 1) More than once a week
  - 2) Every week or more often
  - 3) Once or twice a month
  - 4) Every month or so
  - 5) Once or twice a year
  - 6) Never

5. How often do you pray privately in places other than at church or synagogue?

- 1) More than once a day
- 2) Once a day
- 3) A few times a week
- 4) Once a week
- 5) A few times a month
- 6) Once a month
- 7) Less than once a month
- 8) Never

6. How often do you watch or listen to religious programs on TV or radio?

- 1) More than once a day
- 2) Once a day
- 3) A few times a week
- 4) Once a week
- 5) A few times a month
- 6) Once a month
- 7) Less than once a month
- 8) Never

7. How often do you read the Bible or other religious literature?

- 1) More than once a day
- 2) Once a day
- 3) A few times a week
- 4) Once a week
- 5) A few times a month
- 6) Once a month
- 7) Less than once a month
- 8) Never

8. How often do you pray or say grace before or after meals?

- 1) At all meals
- 2) Once a day
- 3) At least once a week
- 4) Only on special occasions
- 5) Never

9. How important is religious faith in your life?

- 1) Very important
- 2) Important
- 3) Somewhat important
- 4) Not too important
- 5) Not at all important

10. How important is it to believe in God

- 1) Not at all important
- 2) A little important
- 3) Pretty important
- 4) Very important

11. How important is it to be able to rely on religious teachings when you have a problem.

- 1) Not at all important
- 2) A little important
- 3) Pretty important
- 4) Very important

12. How important is it to be able to turn to prayer when you're facing a personal problem.

- 1) Not at all important
- 2) A little important
- 3) Pretty important
- 4) Very important

13. How important is it to rely on religious beliefs as a guide for day to day living.

- 1) Not at all important
- 2) A little important
- 3) Pretty important
- 4) Very important

14. How important is it to look to God for strength, support, and guidance when you deal with major problems in your life.

- 1) Not at all important
- 2) A little important
- 3) Pretty important
- 4) Very important

*The following questions deal with the relationships you've had with the people in your congregation.*

15. How often do the people in your congregation make you feel loved or cared for?

- 1) Very often
- 2) Fairly often
- 3) Once in a while
- 4) Never
- 5) Not applicable

16. How often do the people in your congregation listen to you talk about your private problems and concerns?

- 1) Very often
- 2) Fairly often
- 3) Once in a while
- 4) Never
- 5) Not applicable

17. How often do the people in your congregation express interest and concerns in your well-being?

- 1) Very often
- 2) Fairly often
- 3) Once in a while
- 4) Never
- 5) Not applicable