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Does Religiosity Enhance Ability to Self-Regulate?

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Abstract

Although previous research has found positive associations between self-regulation and religiosity, very few studies investigating the relationship exist. This study was an attempt to find experimental evidence supporting the prediction that high levels of religiosity enhance ability to self-regulate. Seventy-nine students at Butler University, 15 males and 64 females, were randomly assigned to a depleted or full self-regulatory resources group. Participants in the depleted resources group squeezed a handgrip for as long as possible before working on a difficult task that required self-control. Participants in the full resources group proceeded directly to the self-control task. Time spent persisting on the task constituted the study's primary dependent variable. Participants' religiosity was assessed near the end of the experiment in several ways, including dividing the sample into high and low levels of religiosity based on hours per week spent participating in religious activities When performing only the difficult self-control task, level of religiosity did not affect task persistence. However, after first performing the self-regulatory depletion task, individuals high in religiosity persisted significantly longer on the self-control task compared to participants low in religiosity. This research suggests highly religious individuals possess greater self-regulatory ability, particularly when self-regulatory resources have been depleted. This greater self-regulatory ability, in turn, may help explain why highly religious individuals tend to enjoy high levels of health.

Does Religiosity Enhance Ability to Self-Regulate?

Background

The relationship between religious involvement and health has been well established in numerous studies. Past research consistently shows that high levels of religious beliefs, frequent involvement in religious institutions, and engagement in religious practices are positively associated with longevity (McCullough & Willoughby 2009). In a meta analysis of 42 independent investigations, McCullough, Hoyt, Larson, Koenig, and Thoresen (2000) found that at any given point during follow-up, highly religious people, on average, were 29% more likely to be alive.

While prior research has consistently shown positive associations between religiosity and health, less is known about why this relationship exists. Currently, investigators are attempting to identify the mechanisms or causal pathways that promote health outcomes in religious individuals. Health practices may constitute one explanatory mechanism, since recent findings have shown that youth and adults who score high on measures of religiosity tend to engage in healthier behaviors than their less religious counterparts. For example, one study found that Christians, Jews, and Muslims who reported high levels of religiosity were less likely to smoke and drink. They also were more likely to wear their seatbelts, see their dentists, and take their vitamins compared to individuals who were less religious (T.D. Hill, Burdette, Ellison, & Musick, 2006; Islam & Johnson, 2003; Shmueli & Tamir, 2007; Wallace & Forman, 1998, as cited in McCullough & Willoughby, 2009). Likewise, adherence to healthy behaviors, like dieting and exercise, may stem from respect for the body as a representation of a temple of God (Dull & Shokan, 1995; Strawbridge et al. 1997, as cited in Oman & Thoresen,

2002). Consequently, practicing these healthy behaviors promote longevity.

Highly religious individuals also tend to enjoy greater psychological well-being. McCullough and Poll (2003) conducted a meta-analysis of 147 independent studies and found that multiple measures of religiosity were associated with lower levels of depressive symptoms. Additionally, other meta-analyses have found that religiosity is associated with lower rates of crime, delinquency, and youth sexual behaviors, all of which constitute risk factors for poor health outcomes in adulthood (Baier & Wright 2001, as cited in McCullough & Willoughby, 2009).

Religious individuals may enjoy membership in a large network of other believers. Previous research has already shown that social support has powerful and protective effects on health (House, Landis, & Umberson, 1988, as cited in George, Ellison, & Larson, 2002). Thus, social support, which may depend upon frequency of religious service attendance, may mediate the effects of religiosity on health. George, Ellison, & Larson (2002) cite church attendance as one of the most powerful predictors of health and mortality. Likewise, after reviewing nine studies using samples from the general population, Powell, Shahabi, & Thoresen (2003) found approximately a 30% reduction of mortality in church attendees, even after controlling for demographic, socioeconomic, and health-related confounders.

Lastly, cross-sectional studies (e.g. Pearlin, Lieberman, Mengahan, & Mullin, 1981; Turner & Lloyd, 1999, as cited in George, Ellision, & Larson 2002) have found that psychosocial resources such as self-esteem, self-efficacy, and mastery are associated with better health, and substantial evidence shows that religious participation is associated with higher levels of these resources (Ellison, 1993; Krause, 1995). Likewise,

religious individuals may experience more positive psychological states, like joy, which may serve to buffer stress (Koenig et al., 2001; Pargament, 1997, as cited in Oman & Thoresen, 2002). For example, positive emotional states reduce 'allostatic load' (McEwen, 1998) and cardiovascular reactivity (Fredrickson & Levenson, 1998). Despite the findings supporting these explanatory mechanisms, George, Larson, Koenig, and McCullough (2000) propose that only 35% to 50% of the relationship between religiosity and health can explained by health, social support, and coping variables. Thus, other mechanisms to explain the relationship between religiosity and health must be identified.

I propose that religious individuals may enjoy better health because they possess a greater capacity to self-regulate. Muraven, Tice, and Baumeister (1998) define self-regulation as an individual's attempt to control or alter his/her responses. They liken self-regulation to the concept of willpower, since individuals must actively exert strong self-control in order to resist or delay gratification. Self-regulation has many implications for people who are trying to realize their goals. For example, a dieter may have a "strong but forbidden impulse" (Muraven, Tice, & Baumeister, 1998, p. 774) to eat a piece of chocolate cake. The dieter's capacity to self-regulate would determine whether he/she gratifies or denies the motivational impulse to eat. Therefore, the researchers argue that self-regulation requires effort. Results showing that self-regulation increases physiological arousal support this idea (Funkenstein, King, & Drolette, 1954; Haynes, Feinlieb, & Kannel, 1980; Holroyd & Gorkin, 1983; MacDougall, Dembroski, & Krantz, 1981; Scalling, 1985, cited in (Muraven, Tice, & Baumeister, 1998). Moreover, past research has consistently indicated that high levels of self-regulation promote healthy behaviors. For instance, Baumeister and Vohs (2004) compiled evidence showing people

with high levels of self-control have lower alcohol and substance use, lower levels of crime and delinquency, and better self-assessed health and health-behaviors.

In addition to being associated with health, self-regulation also appears to be related to religiosity. In a recent review, McCullough & Willoughby (2007) cited eleven studies that found positive associations between religiosity and self-control. For instance, Desmond, Ulmer, and Bader (2008) found a positive association between religiosity (measured by self-reported frequency of prayer, church attendance, and self-rated importance of religion) and a multi-item measure of self-control, even after controlling for gender and age.

However, despite the abundance of correlational work demonstrating positive associations between religiosity and self-regulation, little experimental research has been conducted to show that religiosity promotes self-control or self-regulation. McCullough & Willoughby (2003) could find only one experimental study by Fishbach et al. (2003). In this study, participants presented with subliminal temptation/sin related primes had faster reaction times for identifying religious-relevant words, compared to neutral primes. Participants presented with subliminal religious-relevant primes had slower reaction times for identifying temptation/sin related words, compared to neutral primes. Fishbach et al. (2003) interpreted these findings as 'evidence that people automatically recruit religious concepts to help them exercise self-control in the face of temptation'. More experimental studies employing behavioral measures are needed to investigate the relationship between religiosity and self-control.

One approach to self-regulation that may be particularly relevant to religiosity and health is Baumeister's strength model (Muraven, Tice, & Baumeister, 1998). Baumeister

suggests that the capacity for self-regulation is a limited resource. Because there is only a fixed amount of regulatory capacity at any given moment, an attempt to control oneself reduces the amount of self-regulatory resources available. Therefore, an individual who has just self-regulated will show poorer performance on subsequent tasks requiring self-control, due to depleted self-regulatory resources (Muraven et al, 1998). Multiple studies conducted by Muraven and Baumeister have repeatedly verified this prediction (Muraven et al., 1999; Muraven & Baumeister, 2000). After engaging in a depletion task, participants show reduced self-control compared to those who do not perform a depletion task.

Importantly, past research has consistently employed a two task paradigm when identifying individuals with high (and low) levels of self-regulatory resources. An initial task requiring self-control is used to deplete resources; a second self-control task is then administered to identify individuals who can still successfully self-regulate their behavior. Presumably, individuals who possess greater regulatory resources or have better access to regulatory resources will suffer less impairment in regulating their behavior following a depletion task. Baumeister's findings suggest that the self-regulatory capacity of most individuals is relatively small and that resources diminish very quickly. However, Muraven, Baumeister, & Tice (1999) also found that participants who spent two weeks practicing self-control exercises (like actively trying to improve posture) showed significant improvement in their self-regulatory capacity. Likewise, Seeley and Gardner (2003) found that individuals who are chronically motivated to make a good self-impression on others did not show evidence of depletion following a task requiring self-control. Because these individuals continually practice monitoring and

controlling their responses and behavior during their everyday social interactions, they may have built up self-regulatory capacity over time. In the same manner, religious individuals may have better abilities to self-regulate, especially if they have strengthened their resource reservoir by diligently attending services, praying, and adhering to their beliefs.

The purpose of the current study was to investigate if religious participants would show an enhanced ability to self-regulate. I hypothesize that following an initial self-regulatory depletion task, religious individuals will perform better on a subsequent task requiring self-control compared to non-religious participants.

Method

Participants

Seventy-nine students at Butler University participated in this study (15 males, 64 females). Sixty-five of the participants were students who were recruited from upper and lower level psychology classes. They were offered extra credit for their participation. To increase the number of highly religious participants, students who were members of religious groups on campus were also recruited. The student leaders of the organization were contacted through email correspondence and asked if their members would be interested in participating in a study about religiosity. Fourteen were recruited in this manner; these participants were entered in a gift-card raffle. Participants ranged from ages 18 to 37 with a median age of 20.33 years (SD=2.27). The sample consisted of 33 Catholics, 28 non-Catholic Christians, 12 agnostics/atheists, and 6 participants identifying 'Other', such as Jewish, Mormon, or Muslim. The sample demographics were

88.6% Caucasian, 2.5% African American, 3.8% Asian, and 5.1% mixed ethnicities.

Procedure

Overview

During recruitment, participants were told that the study involved examining how lifestyle variables affect the completion of various tasks. Before arriving at the study, participants were randomly assigned to the depleted or full resources condition, which constituted one of the study's independent variables. Participants assigned to the depleted resources group first underwent a self-regulatory resource depletion task (i.e. squeezing a handgrip for as long as possible). All participants were then asked to persist for as long as they could on a second task requiring self-regulatory resources (i.e. an unsolvable anagram puzzle). Persistence at the unsolvable anagram task, operationalized as time spent on the task before giving up, comprised the primary dependent variable. Participants then completed several continuous measures used to assess their levels of religiosity. During analysis, a median split was used to classify participants into high and low religiosity groups. Level of religiosity (high vs. low) constituted the study's other (quasi) independent variable. The effects of resource depletion and religiosity on task persistence were then examined using analysis of variance.

Manipulation of Self-Regulatory Resources

Whether participants initially underwent a self-regulatory resource depletion task or not constituted the first independent variable. Participants assigned to the depleted resource group were first instructed to squeeze a handgrip for as long as possible in their non-dominant hand, a depletion technique commonly used in experiments on self-regulation. Previous research has determined that maintaining a grip on this type of

device depends almost entirely on self-control and not bodily strength (Muraven, Tice, & Baumeister, 1998). According to Muraven, Tice, and Baumeister (1998), squeezing a handgrip depletes resources because it is very difficult to do and requires a great deal of will power. In the current study, participants were told that the handgrip constituted a health-related variable that measured their strength. In order to precisely determine how long participants could squeeze the grip, the experimenter inserted a two-inch wide strip of paper between the two handles. Relaxing the grip caused the paper to fall. Although the experimenter recorded the amount of time the participant held the grip, the primary purpose of the handgrip task was to deplete self-regulatory resources. Participants squeezed the grip for 43.60 seconds on average (SD=45.53). Additionally, high and low religiosity groups did not differ in terms of how long they held the grip (p=.29). Participants in the full resources condition did not squeeze the grip; they proceeded directly to the anagram solving task.

Anagram Solving Task

Time spent on the anagram task was used as an indicator of self-regulatory ability and constituted the primary dependent variable. Participants were presented with a series of anagrams to solve. For each anagram, participants were asked to rearrange a series of letters into an actual word. The experimenter encouraged participants to solve as many anagrams as possible and directed them to stop the task when they felt they had worked long enough. Meanwhile, the experimenter left the room and surreptitiously timed how long participants worked on the task. The first two anagrams were solvable, but unbeknownst to participants, the rest were actually unsolvable in order to prevent more intelligent participants from desisting because they had solved the puzzles, as opposed to

desisting because they had exhausted their self-regulatory resources. The anagram task measures self-control because it requires considerable effort and self-control to keep persisting at a discouraging and failure-ridden task. The desirable and appealing response would be to quit, so continuing requires self-regulation (Muraven, Tice, and Baumeister, 1998).

Division of the Sample into Low vs. High Religiosity Groups

Following completion of the anagram task, participants completed a questionnaire packet containing measures that were used to divide the sample into groups that were high and low in religiosity. Level of religiosity (low vs. high) served as the study's other (quasi) independent variable. Religiosity was assessed near the end of the experiment to reduce demand characteristics. Because there is currently no consensus regarding how best to assess religiosity, I measured this variable in two ways.

1.) The Intrinsic Religious Motivation Scale (IRMS; Hoge, 1972) was the first measure used to assess religiosity. This scale has been previously validated (alpha=.93) and consists of 10 six-point likert-type items anchored by 'Agree' or 'Disagree' (theoretical range 1-6). Example items include "My faith affects all parts of my life" and "My religious beliefs are what really lie behind my whole approach to life". The IRMS measures an individual's level of religious commitment. Specifically, the scale measures the extent to which individuals 'internalize and fully follow [their beliefs]' (Allport & Ross, 1967). Intrinsic religiosity has consistently been shown to predict mental and physical health in a wide variety of populations and is frequently used in studies focusing on religiosity (Cotton, Zebracki, Rosenthal, Tsevat, & Drotar, 2006; Koenig, George, & Peterson, 1998; Koenig et al. 2004; McCullough et al. 2000). A median split on IRMS

scores was used to form the high and low religiosity groups.

2.) Hours per week spent on activities related to religion were also used to assess religiosity. This alternative approach to operationalizing religiosity has also been used frequently by past investigators, who have usually assumed that the more religious someone is, the more likely that individual is to spend time on religious activities (e.g. attending services, reading religious texts, meditating, prayer, self-reflection, etc.). As discussed above, religiosity operationalized as church attendance, was found to predict longevity (Powell et. al 2003). A median split on hours per week was used to form the high and low religiosity groups.

Additional measures

Several ancillary scales and questions were also included in the questionnaire packet to assess other variables of interest. Participants completed a measure of extrinsic religiosity, developed by Gorsuch & Venable, 1983. People with extrinsic orientation tend to use religion as a means to an end, which can be social (e.g. I go to church because it helps me make friends) or personal (I pray mainly to gain relief and protection) reasons (Allport & Ross 1967; Gorsuch & McPherson, 1989). Each item was answered on a 6-point scale, anchored by 'strongly disagree' and 'agree' (alpha=.804). Participants also completed an authoritarianism scale, comprised of four items adopted from the Right Wing Authoritarianism Scale (Altemeyer & Hunsberger, 1992). Participants were asked how much they agreed with four statements (e.g. Our country would be great if we did what the authorities tell us) on a 5-point scale anchored by 'Definitely disagree' and 'Definitely agree' (alpha=.723). Finally, self-regulatory capacity was also assessed using a previously validated thirteen item scale (alpha=.832) entitled the Brief Self-Control

Scale (BSCS; Tangney, Baumeister, & Boone, 2004). Example items include "I wish I had more self-discipline" and "I am good at resisting temptation".

RESULTS

Overview

Analysis Strategy. Time spent persisting on the anagram task, which constituted the dependent variable, was subjected to a 2 (self-regulatory resources: depleted, full) x 2 (religiosity: low, high) between-subjects analysis of variance. Because religiosity was operationalized in two different ways, two separate ANOVA's were conducted. The first identified high and low religious individuals according to their scores on the IRMS; the second identified high and low religious individuals according to hours per week spent engaging in religious activities.

Primary Analyses

When religiosity was operationalized according to IRMS scores, there were no main effects for self-regulatory resources ($p = .18$) or religiosity ($p = .52$) on time spent persisting at the anagram task. Similarly, the interaction between self-regulatory resources and religiosity was also non-significant ($p = .14$), but there was a trend in the predicted direction. Specifically, in the full resources condition, individuals high and low in religiosity tended to be relatively similar in terms of how long they persisted at the anagrams task (15.25 minutes vs. 16.24 minutes, respectively). In the depleted resources condition, individuals high in religiosity tended to persist somewhat longer than individuals low in religiosity (15.40 minutes vs. 12.90 minutes, respectively), although as previously mentioned, this trend did not achieve significance.

When participant religiosity was operationalized according to hours per week

spent on religious activities, there was no main effect for religiosity ($p = .52$) on time spent persisting on the anagram task, but there was a marginally significant main effect for self-regulatory resources, $F(1,76) = 2.87$, $p=.095$, partial $\eta^2 =.04$, such that participants with a full complement of self-regulatory resources persisted longer ($M =$ 15.25 minutes) than participants who were depleted from having first performed the handgrip task ($M = 14.09$ minutes). More importantly, the predicted interaction was significant, $F(1,76) = 4.55$, $p = .036$, partial $\eta^2 =.06$. Follow-up tests revealed that in the full resources condition, individuals high and low in religiosity did not differ in terms of how long they persisted at the anagrams task $F(1,33) = .92$, $p = .35$ (M's = 15.05 minutes and 16.85 minutes, respectively). However, in the depleted resources condition, individuals high in religiosity persisted significantly longer than individuals low in religiosity, $F(1, 43) = 4.72$, $p = .04$, partial $\eta^2 =.10$, (M's = 15.58 minutes and 12.21 minutes, respectively).

Exploratory Analyses

Although the pattern of results generally supports the hypothesis that religious individual possess greater self-regulatory capacity, variables associated with religiosity could conceivably be responsible for the observed effects. For example, past research has shown that authoritarianism and religiosity tend to be correlated, and it is conceivable that being higher on authoritarianism means that one is particularly motivated to follow orders. Thus, the religious participants may have been more motivated to follow the experimenter's request to solve the anagrams and were more persistent for this reason. To investigate this possibility, an analysis of covariance (ANCOVA) was conducted. The same independent variables (i.e., self-regulatory resources and religiosity defined by

hours spent on religious activities) and dependent variable (i.e., time spent persisting at the anagram task) were used, but authoritarianism, assessed using the Right Wing Authoritarianism Scale, was included as a covariate.

After controlling for authoritarianism, the interaction between self-regulatory resources and religiosity remained significant, $F(1,76)=4.35$, $p=.04$, suggesting that authoritarianism cannot account for this effect.

Another possible variable that might contribute to the observed interaction is extrinsic religiosity, which tends to be correlated with most other measures of religiosity. To explore whether extrinsic religiosity might be driving the interaction, another ANCOVA was conducted, with extrinsic religiosity serving as the covariate. After controlling for extrinsic religiosity in this fashion, the interaction remained (essentially) statistically significant, $F(1,74)=3.784$, $p=.056$, suggesting that extrinsic religiosity does not contribute in a meaningful way to the observed effect.

Finally, to investigate the primary hypothesis using a different approach, correlations between religiosity, as assessed by scores on the IRMS and by time spent on religious activities (i.e., the two primary ways religiosity was operationalized in the current investigation), and self-regulatory ability, as assessed by the BSCS, were computed. Whereas intrinsic religiosity and self-regulatory ability were significantly correlated, $r = .33$, $p=.004$, time spent on religious activities and self-regulatory ability were not, $r = .13$, $p = .27$. Although the first correlation supports the hypothesis that being religious facilitates greater self-regulatory ability, the second does not. However, it is worth noting that the aspects of self-regulatory ability measured by the BSCS, a self-report measure, may not necessarily be the same aspects of self-regulation that drove task

persistence, an actual behavior, in the current experiment. In fact, scores on the BSCS were not significantly correlated with time spent persisting on the anagram task, $r = -.03$, $p = .82$. Interestingly, intrinsic religiosity was correlated with time spent on religious activities, $r = .37$, $p = .007$, suggesting that the two measures are related, but the relatively low correlation also suggests the two measures tap somewhat different aspects of religiosity.

Discussion

Evaluation of Predictions. Consistent with the study's hypothesis, participants high in religiosity persisted at the anagrams task longer than participants low in religiosity, but only after first performing a self-regulatory resource depleting task. When participants did not first perform a resource depleting task (i.e., squeezing a handgrip for as long as possible), level of religiosity was unrelated to task persistence. According to Baumeister's strength model of self-regulation, this pattern is exactly what should have occurred if highly religious individuals do indeed possess greater self-regulatory ability. Their enhanced self-regulatory ability should only become apparent under conditions that would deplete most people's self-regulatory resources.

However, the foregoing was only true when level of religiosity was operationalized according to hours per week spent engaging in religious activities. When religiosity was operationalized using the IRMS, a measure of intrinsic religiosity, the hypothesized interaction did not emerge, although a non-significant trend in the predicted direction was observed. One possible explanation for the lack of significance when IRMS scores were used is lack of power. For the ANOVA using IRMS scores to operationalize religiosity, the power to detect the interaction was only .30; for the

ANOVA using time spent on religious activities to operationalize religiosity, power was much higher (i.e., .57). It is likely that a larger sample size would have resulted in a significant finding when IRMS scores were used instead of just a trend in the correct direction. In general, however, the results tended to support the study's hypothesis.

These findings support the idea that sustained participation in religious activities requiring self-control may give religious individuals an enhanced ability to self-regulate. This interpretation is further supported by the finding that the interaction between religiosity and self-regulatory resources remained significant even after controlling for authoritarianism, which suggests that religious individuals' persistence on the task is not explained by willingness to comply with the experimenter's instructions or fear of the experimenters' reaction to early desistence on the task. Also, recall that the interaction remained significant after controlling for extrinsic religiosity. This finding suggests that extrinsic aspects of religiosity are probably not related to the increased self-regulatory ability that may be fostered by ongoing participation in regular religious activities.

Additional Findings. The correlational analyses reported in the Results section also provide some converging support for the idea that highly religious individuals possess greater self-regulatory ability. Specifically, although the positive correlation between time spent on religious activities and self-regulatory ability, as assessed by the BSCS, did not achieve significance, scores from the IRMS were significantly correlated with self-regulation scores. This association may be due to the fact that individuals with high levels of intrinsic religiosity tend to adhere to the tenets of their beliefs and abstain from behaviors that their faith discourages. The self-regulation scale contains items that assess the restriction of 'sinful' behavior, such as "I am good at resisting temptation" and

"I refuse things that are bad for me", so it is not surprising that the two measures were positively correlated. However, scores on the self-regulation scale did not predict time spent working on the puzzle. While the scale may measure some aspects of self-regulation, it may not measure the component of self-regulation that allows for persistence on a frustrating task. Considering that five of the thirteen items involve asking the participant to make some judgment about 'bad' or 'inappropriate' behavior, the scale might be better described as a measure of ability to abstain from desirable but socially unacceptable behaviors, instead of as a valid measure of persisting on challenging and difficult tasks.

Finally, this is the first study that switches the tasks typically employed by researchers addressing the strength model of self-regulatory resources. In the past, Baumeister, Muraven and other strength model proponents have used unsolvable anagrams to deplete self-regulatory resources, and they have always used time spent squeezing the handgrip as the dependent variable. This study shows that alternate tasks can be used to measure self-control. Furthermore, the anagram task may serve as a useful measure for applied research about self-control; persistence on a frustrating task may be more applicable to everyday circumstances than squeezing a handgrip.

Limitations and Suggestions for Future Research. This study has several limitations that should be noted. Perhaps the most important is that although the data are consistent with the idea that being religious fosters greater self-regulatory ability, the reverse could also be true. Having greater self-regulatory capacity might increase one's ability to attend worship services, adhere to standards of behavior and engage in other activities that might, in turn, tend to increase one's religiosity. Longitudinal studies will

be needed to definitively address this particular issue. Another potential limitation that should be noted is that participant responses, particularly responses to the self-report scales, were subject to bias induced by social desirability or impression management concerns. For instance, on the BSCS, participants may have been reluctant to honestly evaluate their behavior and agree with statements that would depict them in an unfavorable light, such as "I am lazy". Likewise, religious orientation and beliefs constitute sensitive subjects, and participants may have felt limited by item statements on the religiosity scale that failed to accurately fit their conception of their religious beliefs and values. These problems could have reduced the variance captured by the self-report measures, which may have reduced the likelihood of detecting significant effects. Additionally, the study consisted mainly of white females with Catholic or Christian faith. Future research should utilize more diverse samples in order to increase the generalizability of the results. .

Before closing, it is worth noting that future research will be needed to determine the precise mechanism underlying religious individuals' ability to persist longer on a task requiring self-control. For example, religious individuals may have a larger capacity of self-regulatory resources, especially if they have strengthened this reservoir by frequent participation in religious activities requiring self-discipline. Alternatively, religious individuals may experience less frustration in the face of failure. They may have perceived the anagrams task as an interesting challenge and not a test of their intelligence, so they may have experienced less negative affect while working on the anagrams. Future studies could also attempt to identify which aspects of religiosity are particularly likely to build self-control. For example, further research should investigate

if religious participants would work longer on the task if primed with religious content. If activation of personally relevant material can help individuals persist longer on a difficult tasks, this research could help people achieve long-term goals.

Summary. This study provided novel evidence that individuals with high levels of religiosity persist longer on a task requiring self-control after self-regulatory resource depletion compared to participants with low levels of religiosity. This finding suggests that, in general, highly religious individuals possess an enhanced ability to self-regulate. This, in turn, may help explain the well documented positive association between religiosity and health – the increased ability of religious individuals to self-regulate may allow them to resist tempting but unhealthy behaviors (e.g., eating a big slice of cheesecake for dessert) while pursuing effortful but healthy activities (e.g., going to the gym on a regular basis). The next step will be to identify exactly *how* religiosity fosters self-regulatory resources. The resulting information could provide critical insights into self-regulation that could conceivably be used to help both the religious and non-religious lead healthier lives.

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APPENDIX A – INFORMED CONSENT

Statement of Informed Consent

Butler University requires that all persons who participate in research projects give their consent to do so. Today, you may be asked to squeeze a handgrip, solve a word related puzzle, and/or complete a short questionnaire about your participation in religious practices. We will use this information for various purposes, including determining how lifestyle variables affect completion of various tasks. As with all research studies, we may withhold some of the study's aims until you have completed participation. Approximately 60 students will take part in this research project.

If you decide to participate, you will be asked to perform various tasks. For example, some participants will be asked to squeeze a handgrip and hold it for as long as possible. Although maintaining a grip is physically difficult, it does not depend on bodily strength. If you are asked to perform this task, you may experience some discomfort while holding the grip. Because of this possibility, if you have any known problems with your hands, we ask that you do not participate in this study. You may also be asked to work on a word related puzzle and to provide some background information about yourself (e.g., age, year at Butler, major, hobbies, etc.) so that we may see if there are any associations between those variables and your completion different tasks. Completing the puzzles and the questions should take between 15 to 30 minutes.

Your participation is completely voluntary, and you should feel free to skip any question(s) that make you uncomfortable. All your responses are confidential. After completion of the study, any identifying information connecting you to your responses will be destroyed, and your responses will become completely anonymous. Data collected from this study may be published in scientific reports or presented at various research meetings.

You will receive no direct significant benefit from participating in this study. There are no risks associated with participation other than some discomfort while holding the grip and potential distress that you might experience as a result of trying to solve some word puzzles. It is expected that most individuals will find the puzzles challenging.

I have had the opportunity to ask questions concerning any and all aspects of the project. I understand that participation is voluntary and that I may withdraw my consent at any time for any reason. Doing so will not affect my relationship with Butler University in any way. Confidentiality of records concerning my involvement in this project will be maintained in an appropriate manner. When required by law, the records of this research may be reviewed by applicable government agencies. I understand that if I have any questions concerning this research, I can ask the investigator conducting the study or contact the supervising faculty member at Butler University.

_____ _____

Signature of participant Date

If you have any questions, please contact:

Brian Giesler, PhD
rgiesler@butler.edu
317-940-9267
Butler University
4600 Sunset Avenue
Indianapolis, IN 46208

APPENDIX B – ANAGRAM TASK

Anagram Puzzles

Anagrams are words that are created by rearranging the letters of that particular word. Unscrambling the letters and putting them in the right order gives you the correct spelling of a particular word. For example, if given the word "glean" the correct rearrangement of the letters would spell the word "angel". Please solve the anagrams below. For each anagram, create **ONE** new complete word by re-arranging the letters.

1.) War

2.) Cork

3.) Praised

4.) Tundra

5.) Gambol

6.) Plastic

7.) Fervid

8.) Gestate

9.) Erudite

10.) Veracity

11.) Sublime

12.) Refute

13.) Analgesia

14.) Crescendo

15.) Iconoclast

16.) Perpetuate

17.) Cohesive

18.) Disparate

19.) Nominal

20.) Credulous

APPENDIX C – INTRINSIC RELIGIOUS MOTIVATION SCALE (IRMS)

Please circle the number that shows how much you agree with each statement.	Strongly Disagree	Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Agree	Not Applic-able
1. My faith affects all parts of my life.	1	2	3	4	5	6	7
2. One should seek God's guidance when making every important decision.	1	2	3	4	5	6	7
3. In my life I experience the presence of the Divine.	1	2	3	4	5	6	7
4. My faith sometimes restricts my actions.	1	2	3	4	5	6	7
5. Nothing is as important to me as serving God as best I know how.	1	2	3	4	5	6	7
6. It doesn't matter so much what I believe as long as I lead a moral life	1	2	3	4	5	6	7
7. Although I am a religious person, I refuse to let religious considerations influence my every day affairs	1	2	3	4	5	6	7
8. Although I believe in my religion, I feel that there are many more important things in life	1	2	3	4	5	6	7
9. I try hard to carry my religion over into all my other dealings in life.	1	2	3	4	5	6	7
10. My religious beliefs are what really lie behind my whole approach to life.	1	2	3	4	5	6	7

APPENDIX D – HOURS PER WEEK SPENT ENGAGING IN RELIGIOUS ACTIVITIES

About how many hours per week do you spend on activities related to your religious beliefs? (for example, attending services, reading religious texts, meditating, prayer, self-reflection, etc.)

_____ hours per week on average

APPENDIX E – EXTRINSIC RELIGIOSITY SCALE

Please circle the number that shows how much you agree with each statement.	Strongly Disagree	Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Agree	Not Applic-able
1. I go to church because it helps me make friends. .	1	2	3	4	5	6	7
2. I pray mainly to gain relief and protection.	1	2	3	4	5	6	7
3. What religion offers me most is comfort in times of trouble and sorrow.	1	2	3	4	5	6	7
4. Prayer is for peace and happiness.	1	2	3	4	5	6	7
5. I go to church mostly to spend time with my friends.	1	2	3	4	5	6	7

APPENDIX F – RIGHT WING AUTHORITARIANISM SCALE

Please circle the number that shows how much you agree with each statement.	Definitely disagree	Disagree somewhat	Neither agree nor disagree	Agree Somewhat	Definitely agree
1. It's important for children to learn to obey authorities.	1	2	3	4	5
2. Our country would be great if we did what the authorities tell us.	1	2	3	4	5
3. People that criticize the authorities create useless doubts in people's minds.	1	2	3	4	5
4. People must, always and for whatever reason, have greater freedom to protest against the government.	1	2	3	4	5

APPENDIX G – BRIEF SELF-CONTROL SCALE (BSCS)

Instructions to the client: Using the scale provided, 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, 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 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 long-term goals.	1	2	3	4	5
12. Sometimes I can't stop myself from doing something, even if I know it is wrong.	1	2	3	4	5
13. I often act without thinking through all the alternatives.	1	2	3	4	5

APPENDIX H – DEMOGRAPHIC QUESTIONNAIRE

Directions: This questionnaire will ask you about different parts of your life. You may skip any question you do not want to answer. After data collection is over, any identifying information will be removed – no one will be able to know how you responded. Thanks for your help!

1. In years, what is your current age? _____ (please write your age on the blank)

2. How would you describe yourself?

Latino/Latina/Hispanic 1
Black/African-American 2
Asian/Oriental/Pacific Islander..... 3
American Indian/Native Alaskan 4
White/Caucasian..... 5
Other (please describe _____) 6

(Circle any number that applies)

4. If you are in college, what year are you in?

First..... 1
Second 2
Third 3
Fourth..... 4
Fifth or greater 5
I am not in college 6

(Circle one number)

5. How would describe yourself? FEMALE MALE (circle one)

Would you describe yourself as any of the following? (please check **any/all** that apply)

___Agnostic ___Atheist ___Buddhist ___Catholic
___Christian ___Hindu ___Jewish ___Mormon
___Muslim ___Protestant ___Shintoist ___Taoist
___Wiccan ___Other (please describe_____)