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Lead us not into temptation: Differential associations of religious identification with self-regulatory traits and abilities

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ABSTRACT

While there has been considerable research on the link between religiosity and self-regulation, the directionality of both constructs remains equivocal. Moreover, little is known regarding the association between religiosity and performance-based measures of self-regulatory abilities, given that past studies have predominantly examined self-regulatory traits via self-reports. Drawing from a 9-year longitudinal dataset (Time 1: $n = 4836$; Time 2: $n = 3467$), cross-sectional findings indicated that religious identification was positively and negatively correlated with self-regulatory traits and abilities, respectively. Longitudinal findings revealed that self-regulatory abilities predicted negative changes in religious identification, and this effect strengthened from middle to late adulthood. No longitudinal relations between religious identification and self-regulatory traits were found. Our findings highlight the differential associations of religious identification with self-regulatory traits and abilities, and how these associations are modulated by advancing adulthood.

1. Introduction

Self-regulation is defined as the ongoing, self-directed processes that modulate one's thoughts, feelings, behaviours, and environmental features to attain desired goals (Boekaerts, Maes, & Karoly, 2005). Seeking to adapt such facets to address one's concerns and goals has been argued to be integral to the formation of one's personality (Morf, 2006), and in a similar vein, personality traits can communicate one's manner of self-regulation and how adept one is at it (Hoyle, 2010). Drawing upon facets from the five-factor model (Costa & McCrae, 1992), Gray (1994) neurophysiological model, and information-processing models (Carver & Scheier, 1981), self-regulation has been empirically studied as the trait-like tendency and the ability to act in goal-directed ways (Duckworth & Kern, 2011; Hoyle, 2010). Specifically, self-regulatory traits are typified by facets of conscientiousness (e.g., achievement striving, self-discipline, cautiousness, deliberation) and impulsivity (e.g., approach-related propensity to act on impulses and emotions without thought or planning; Hoyle, 2010). Self-regulatory abilities can be characterized by the effectiveness and efficiency in planning, monitoring, and maintaining goal-facilitating behaviours, directing attentional resources toward important goals, resisting goal-detracting temptations, updating information related to goal pursuit in one's mind, and changing goals and subgoals when necessary (Ilkowska & Engle, 2010).

A domain that is highly pertinent to the study of self-regulation is religiosity (McCullough & Willoughby, 2009), which can be defined as the strength of one's religious conviction (e.g., importance of religion in daily functioning, participation in regular religious activities; Pearce, Hayward, & Pearlman, 2017). Given that prior research has predominantly investigated self-regulation by way of personality traits (as assessed by self-reports), little is known regarding the relation between religiosity and self-regulatory abilities (as assessed by performance-based tasks). Further, although extant literature has demonstrated associations between self-regulation and religiosity, scholarly opinions on the precedence of these constructs have been mixed (e.g., Bartkowski, Xu, & Levin, 2008; McCullough, Tsang, & Brion, 2003). Moreover, given that the role of religious beliefs in later life is an underrepresented area of research, we focused on religious identification (i.e., importance of religious beliefs, practices, and membership) as an index of religiosity. Therefore, our present study sought to (a) examine how religious identification would be related to self-regulatory abilities and traits, (b) clarify the directionality of associations between these constructs, and (c) investigate how such relations would vary across middle and late adulthood.

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1.1. Religiosity and self-regulation

1.1.1. Effect of religiosity on self-regulatory traits

Since religion provides an organised framework of values, principles, and standards which delineate what is acceptable and unacceptable, adherents may need to constantly control their thoughts and behaviours to obey these specific principles prescribed by religious scriptures and teachings (McCullough & Willoughby, 2009). This can involve resolving conflict among multiple competing goals by prioritising religiously congruent goals, or by overriding distracting thoughts and behaviours that are religiously incongruent. Consequently, prolonged conformity to religious standards possibly facilitates the development of self-regulatory resources, which may generalise to nonreligious contexts that implicate self-regulatory processes (McCullough & Willoughby, 2009).

To date, some research has explored the effects of religiosity on self-regulatory traits. To illustrate, Bartkowski et al. (2008) found that children whose parents attended church and discussed religion frequently were evaluated as possessing better self-control and lower impulsiveness through parent- and teacher-reports. A similar pattern of findings was evidenced in other studies wherein higher religious engagement (e.g., frequency of prayer or religious participation) during adolescence predicted greater self-reported self-control (Desmond, Ulmer, & Bader, 2013), which in turn was associated with increased odds of subsequently graduating from high school as well as enrolling in college (Erickson & Phillips, 2012).

Further evidence demonstrates how religiosity fosters self-regulatory traits, with respect to self-reported risk-taking tendencies. For example, Kim-Spoon, Farley, Holmes, Longo, and McCullough (2014) found that religiosity (e.g., involvement in religious activities, personal importance of religion) predicted higher self-control which, in turn, was associated with decreased substance use 2.4 years later among adolescents. Likewise, other longitudinal studies have shown that higher frequency of religious engagement (e.g., attending religious services and daily prayer) was prospectively associated with lower likelihood of risk-taking behaviours (e.g., sexual behaviours, smoking, alcohol consumption), as mediated by higher self-regulation (e.g., effortful control, executive function, and emotion regulation; DeWall et al., 2014; Holmes, 2016; Whooley, Boyd, Gardin, & Williams, 2002). Collectively, these findings elucidate how cognitive and behavioural adaptations characterized by chronic religiosity may consequently foster self-regulatory traits.

1.1.2. Effect of self-regulatory traits on religiosity

Conversely, extant literature has investigated how personality traits related to self-regulation can influence religiosity. Although numerous traits (e.g., agreeableness, conscientiousness) have been examined, conscientiousness has been postulated to be the most pertinent to self-regulation (Hoyle, 2010); this is attributed to how aspects such as self-discipline, orderliness, and achievement-orientation represent inclinations that underlie successful self-regulation (Roberts, Chernyshenko, Stark, & Goldberg, 2005). For instance, individuals high on agreeableness (i.e., capacity for restraint out of consideration of others' feelings) may be predisposed to invest their personal resources (e.g., time, finances) into institutions that propagate social solidarity (e.g., engaging in congregational prayer and worship). Further, among conscientious individuals, an intrinsic adherence to conventions and preference for organization may motivate religious involvement (McCullough, Enders, Brion, & Jain, 2005), which entails compliance toward a set of principles and rules for daily living. To illustrate, McCullough et al. (2003, 2005) found that self-, parent-, and teacher-reported conscientiousness and agreeableness during adolescence were predictive of greater religiosity (e.g., religious affiliation, interest and involvement in religious activities, attending services, reading religious scripture) in adulthood.

In another three-wave, two-year longitudinal study on high school students, Heaven and Ciarrochi (2007) found that psychoticism at Time 1 and 2—characterized by hostility and aggressiveness, thus reflecting behavioural dysregulation—individually predicted lower religiosity at Time 3 (i.e., adherence to religious values). Further, conscientiousness at Time 1 and Time 2 independently predicted increased religiosity at Time 3. In another one-year longitudinal study, Regnerus and Smith (2005) found that religious adolescents who exhibited lower frequency of parent- and self-reported self-regulatory behaviours (e.g., temper tantrums, risk-taking behaviours) indicated lower religiosity (i.e., frequency of religious service attendance). Together, the abovementioned studies illustrate how self-regulatory traits may be instrumental in promoting individuals' religious development and adherence over the lifespan.

1.1.3. Bidirectionality of religiosity and self-regulatory traits

In light of how prior work has shown that religiosity may increase self-regulatory traits and abilities and vice versa, some research—albeit limited—has sought to ascertain whether a bidirectional relationship between these constructs exists. For example, in a two-wave panel study, Wink, Ciciolla, Dillon, and Tracy (2007) investigated the longitudinal relations between religiosity (i.e., importance of religious beliefs and frequency of religious practices) and self-regulatory traits (i.e., conscientiousness and agreeableness) during adolescence (i.e., 10–12 years old) and late adulthood (i.e., 77 years old). Findings indicated that conscientiousness in adolescence promoted greater religiosity in late adulthood, but not vice versa. Moreover, there was a reciprocal association between agreeableness and religiosity among females; specifically, adolescent agreeableness predicted increased religiosity in late adulthood and adolescent religiosity predicted increased agreeableness in late adulthood. Such gender differences may be ascribed to how the often-espoused values of kindness and compassion in Christianity exerted a stronger impact on women, who tend to be more agreeable, relative to their male counterparts (Wink et al., 2007).

Another seven-year longitudinal study by Pirutinsky (2014) examined associations between religiosity (i.e., integration of religion in daily experiences), self-reported self-control, and self-reported frequency of criminal behaviours among adolescents who had previously committed a serious crime. Results indicated that increases in religiosity were associated with future criminal behaviours via self-control; changes in self-control, however, did not predict future increases in religiosity. Taken together, the findings from both studies allude to the potential bidirectional nature of the relation between religiosity and self-regulatory traits.

1.2. Limitations of extant research

Based on the foregoing review, several limitations exist. First, prior studies on religiosity and self-regulation have mostly relied on self-reports in the assessment of personality traits related to self-regulation (e.g., conscientiousness; McCullough et al., 2003, 2005). Traditionally, self-report and performance-based measures represent two approaches in measuring self-regulation and little distinction has been made between the two (e.g., Gailliot et al., 2007; Richeson & Shelton, 2003). However, while self-report measures may capture dimensions of self-regulation related to traits (i.e., whether one tends, or is motivated, to regulate behaviours), they fail to capture other dimensions that are related to one's abilities, as tapped by performance-based tasks (i.e., ability to regulate behaviours successfully). Notably, self-reported measures tap typical performance within relatively unconstrained situations, which are reflective of goal prioritization and epistemic regulation (Toplak, West, & Stanovich, 2013). Conversely, performance-based measures evaluate optimal performance under highly constrained situations where participants are instructed to maximize performance, thereby reflecting the effectiveness and efficiency of goal pursuit (Toplak et al., 2013). Indeed, a *meta*-analytic investigation of 51 studies found low correlations between performance-based (i.e., executive

function tasks) and self-reported measures of self-regulation (average $r = 0.10$; Duckworth & Kern, 2011), underscoring the possibility that despite presumed conceptual overlaps (Hofmann, Schmeichel, & Baddeley, 2012), the two measures of self-regulation may be distinct from each other.

Notably, while prior studies have yielded positive relations between religiosity and self-reported self-regulation, religious adherence may be negatively related to self-regulatory abilities. Based on the functional equivalence approach (i.e., religious beliefs and practices as driven by need-fulfilment; Sedikides, 2010; Zuckerman, Silberman, & Hall, 2013), needs that are fulfilled by religion can also be satisfied via other means. For instance, the functional benefits of cognitive abilities—such as conferring one with the ability to effectively self-regulate—may obviate the need for religion, which has been suggested to serve a similar function (Zuckerman et al., 2013). Corroborating this idea, *meta*-analytic findings report negative relations between religiosity and cognitive tasks that implicate self-regulatory abilities (e.g., intelligence, mean $r = -0.24$; Zuckerman et al., 2013). As such, it stands to reason that religiosity may be differentially associated with self-regulatory traits and abilities.

Second, few studies have longitudinally examined the bidirectional relations between religiosity and self-regulatory traits and abilities. In particular, the majority of extant longitudinal studies either investigated the predictive value of religiosity on self-regulatory traits, or vice versa (e.g., Bartkowski et al., 2008; McCullough et al., 2003, 2005; Regnerus & Smith, 2005). Given the assertion by McCullough and Willoughby (2009) that longitudinal, along with experimental, studies are instrumental in determining the causal relationships between religiosity and self-regulation, there is a need to clarify currently hazy understandings surrounding the bidirectionality between religiosity and self-regulatory traits and abilities using a longitudinal approach.

1.3. The present study

In view of the abovementioned literature gaps, our research goals were as follows. First, given that self-reported and performance-based measures index distinct dimensions of self-regulation (i.e., traits versus abilities) that may be dissimilarly related to religiosity (e.g., McCullough et al., 2005; Zuckerman et al., 2013), we assessed the associations between religiosity and the two dimensions of self-regulation. Second, to clarify the potential bidirectional associations of religiosity with self-regulatory traits and abilities, we employed latent change score analysis, which grants insights into the directionality of links between constructs by assessing whether one construct at an initial time point predicts changes in another construct over time (i.e., coupling effects).

As an exploratory analysis, we examined whether associations of religiosity with self-regulatory processes would vary among middle-aged and older adults. While self-regulatory traits such as agreeableness tend to be relatively stable in middle and late adulthood (Roberts & DelVecchio, 2000; Terracciano, Costa, & McCrae, 2006), self-regulatory abilities generally decline with advancing age (Moscovitch & Winocur, 1995). Accordingly, older adults with greater cognitive decline may more readily turn to religion to instil a sense of personal control in their lives than do individuals with more intact self-regulatory abilities. Conversely, the link between self-regulatory abilities and religiosity may be less apparent in younger adults, who tend to be at peak levels of self-regulatory abilities (Lachman & Andreoletti, 2006). Indeed, past findings show stronger associations between self-regulatory abilities and psychosocial variables (e.g., perceptions of control) with advancing adulthood (Lachman & Andreoletti, 2006; Soederberg Miller & Lachman, 2000; Toh, Yang, & Hartanto, 2020). Therefore, it is plausible that the link between self-regulatory abilities, but not traits, and religiosity may strengthen with age.

To achieve our research objectives, we analysed a large-scale, longitudinal dataset from the Midlife Development in the United States (MIDUS) study, which allowed for a critical examination of how the relations between religiosity, self-regulatory traits, and self-regulatory abilities would unfold over a 9-year period based on a nationally representative sample of American adults. In the MIDUS study, religiosity was indexed as one's extent of identification with their religion, which encapsulates the centrality of religious beliefs, practices, norms, and membership. Scholars such as Allport and Ross (1967) postulated that religiosity as a construct may comprise both intrinsic (i.e., where religion is seen as an "end in itself") and extrinsic (i.e., utilizing religion to further one's own ends) dimensions; that is, if intrinsic religiosity is about "living the religion", then extrinsic religiosity is about "using the religion". Crucially, intrinsic religiosity, which encapsulates an internalization of one's faith, has been argued to reflect a more "normative, or truer religiosity" (Zuckerman et al., 2013, p. 340). Some evidence suggests that religious identification is well-aligned with such a construct of intrinsic religiosity. For instance, Ysseldyk, Matheson, and Anisman (2010) framed religiosity as a social identity, where group membership through belief systems have been proposed to not only inform one's self-concept, but also afford the group shared epistemological and ontological beliefs toward knowledge and the state of the world, respectively. Thus, religion as an identity is ostensibly an internalized and essential facet of one's self-concept that correspondingly enriches one's understanding of the things around, as opposed being a product of external incentives. Moreover, religious identification reflects privately held, intrinsically motivated religious beliefs (as opposed to overt religious behaviours), which are congruent with the idea of intrinsic religiosity (Zuckerman et al., 2013). Further support for employing religious identification as an index of religiosity can be seen from how extant literature on religiosity in later life has predominantly overlooked the facet of religious beliefs (Krause, 1993). As our participant demographic comprises adults from middle to late adulthood, the measurement of religious beliefs, rather than behavioural tendencies, could address a traditionally neglected methodological issue in this

Table 1
Descriptive Statistics of Predictors, Covariates, and Criterion Variables.

Variable	Time 1 (MIDUS 2)		Time 2 (MIDUS 3)	
	M (SD)	Range	*M (SD)*	Range
Religious identification				
Overall	2.81 (0.80)	1–4	2.78 (0.84)	1–4
Parcel 1	2.67 (0.88)	1–4	2.63 (0.92)	1–4
Parcel 2	2.63 (0.83)	1–4	2.61 (0.86)	1–4
Parcel 3	3.02 (0.87)	1–4	3.00 (0.92)	1–4
Self-regulatory abilities				
Digit span backward	4.97 (1.53)	0–8	4.93 (1.53)	0–8
Category fluency	18.62 (6.13)	2–42	18.44 (6.09)	0–40
Stop-and-go-switch task[1]	−1.07 (0.22)	−2.75–−0.61	−1.39 (0.32)	−4.10–−0.70
Self-regulatory traits				
Selective primary control	3.20 (0.55)	1–4	3.19 (0.55)	1.25–4
Selective secondary control	2.82 (0.59)	1–4	2.76 (0.60)	1–4
Conscientiousness	3.39 (0.46)	1–4	3.39 (0.47)	1.2–4
Covariates				
Gender (% female)	53.34%	–	54.95%	–
Education[2]	7.20 (2.52)	1–12	7.51 (2.51)	1–12
Race (% White)	90.6%	–	89.5%	–

Note. Values in parentheses reflect standard deviation.
[1] Responses on the stop-and-go-switch task were reverse-coded (multiplied by −1) such that higher values represented better performance.
[2] Education was reported on a scale of 1 (*no school*) to 12 (*PhD, EDD, MD, DDS, LLB, LLD, JD, or other professional doctorate*).

domain.

2. Method

2.1. Participants

We examined data from the MIDUS 2 ($n = 4836$; $M_{age} = 55.43$ years, $SD_{age} = 12.45$ years) and MIDUS 3 ($n = 3467$; $M_{age} = 63.64$ years, $SD_{age} = 11.35$ years) studies which investigated various psychosocial predictors of health and well-being (http://www.icpsr.umich.edu).[1] Recruited by random digit dialling in 2004–2006 (MIDUS 2) and 2013–2014 (MIDUS 3), the cohort comprised non-institutionalised, English-speaking, middle-aged and older adults in the United States. Respondents completed a 30-minute phone interview which recorded responses across six subtests tapping different cognitive abilities, followed by a series of self-administered questionnaires that was sent by mail. Table 1 shows the descriptive statistics for all variables of interest.

Relative to participants who left the study at MIDUS 3, returnees who provided responses on at least one of the key variables (i.e., religious identification, self-regulatory traits, or self-regulatory abilities) were generally younger, $t(4533) = 8.17$, $p < .001$; tend to be White, $\chi^2(1) = 26.68$, $p < .001$; had higher educational attainment, $t(4527) = 10.97$, $p < .001$; reported higher levels of conscientiousness and selective secondary control, $ts > 2.60$, $ps < .009$; and performed better on tasks assessing self-regulatory abilities, $ts > 5.25$, $ps < 0.001$. No other differences in demographic factors and core variables of interest were detected between participants who returned and those who left.

2.2. Materials

2.2.1. Religious identification

A 7-item religious identification scale developed by MIDUS researchers assessed the importance of religion in one's life (e.g., "How important is religion in your life?"; 1 = *very*, 4 = *not at all*). The religious identification scale has been used in past research investigating the role of religiosity in a wide range of variables, such as having survived a terminal illness (Costanzo, Ryff, & Singer, 2009), mental health after childhood abuse (Jung, 2018), and volunteering behaviour (Taniguchi & Thomas, 2011). Additionally, the scale has demonstrably high internal consistency (MIDUS 2: Cronbach's α = 0.90; MIDUS 3: Cronbach's α = 0.91) as well as convergent and discriminant validity, as evidenced by moderate-to-strong correlations with other dimensions of religiosity (e.g., religious support, private religious practice, fundamentalism; *r*s = 0.39–0.69) but not with theoretically distinct measures, such as trait openness (Lewis, Ritchie, & Bates, 2011). The excellent internal consistency of the religious identification scale, coupled with its evidence for construct validity, thus deemed it ideal for use in the present study.

2.2.2. Self-regulatory traits

Of relevance to self-regulatory traits—which reflect inclinations towards behavioural control in service of goal pursuit and desired standards (Boekaerts et al., 2005)—within the MIDUS dataset are the primary/secondary and selective/compensatory control scales (Wrosch, Heckhausen, & Lachman, 2000). To capture aspects of goal pursuit, we selected the selective primary control and selective secondary control subscales. As the other subscales for compensatory control appear to tap domains that involve changing one's goals (e.g., disengagement from, or adjustment of, one's goals) instead of goal pursuit specifically, they were excluded. Similar to previous studies (e.g., McCullough et al., 2003; Wink et al., 2007), we also included conscientiousness as it broadly indexes the predisposition to control behaviours in socially acceptable and goal-directed ways. To examine the possibility that other scales may also be reflective of self-regulatory traits, we performed an exploratory factor analysis on all scales that are potentially related to self-regulation (i.e., conscientiousness, primary/secondary and selective/compensatory control) available in the MIDUS dataset. Consistent with our expectations, results indicated that the selective primary control, selective secondary control, and conscientiousness scales most strongly loaded onto the self-regulation factor, while the other scales are more reflective of the other constructs (see Appendix A). Although two of the compensatory secondary control scales (i.e., self-protection and adjustment of goals) loaded significantly onto the self-regulation factor, they were omitted due to low factor loadings (i.e., adjustment of goals) or high cross-loadings with other factors (i.e., self-protection).

Conscientiousness. Conscientiousness was assessed using a 5-item subscale (i.e., organised, responsible, hardworking, careless, and thorough; 1 = *a lot*, 4 = *not at all*) from the Midlife Development Inventory Personality Scales (Lachman & Weaver, 1997; MIDUS 2: Cronbach's α = 0.68; MIDUS 3: Cronbach's α = 0.67).

Selective primary control. Selective primary control, which refers to actions that focus specifically on attaining goals (Heckhausen, 1997), was assessed with five items (e.g., "When I encounter problems, I don't give up until I solve them"; 1 = *a lot*, 4 = *not at all*) from the Wrosch et al. (2000) Persistence in Goal Striving (Primary Control) Scale. The scale has adequate reliability (MIDUS 2: Cronbach's α = 0.78; MIDUS 3: Cronbach's α = 0.78) and convergent validity (Wrosch et al., 2000), as demonstrated by positive correlations with perceived personal mastery in carrying out important goals ($r = 0.47$) and "protective" compensatory secondary control strategies (e.g., positive reappraisal, $r = 0.69$), but negatively related to "adjustment" compensatory secondary control strategies (e.g., lowering one's aspirations; $r = -0.14$).

Selective secondary control. Selective secondary control reflects the promotion of commitment towards a chosen goal (e.g., boosting the value of a specific goal), rather than focusing directly on goal attainment (Heckhausen, 1997). Adapted from Heckhausen, Schulz, and Wrosch (1998), selective secondary control was assessed using three items (e.g., "When I have decided on something, I avoid anything that could distract me"; 1 = *a lot*, 4 = *not at all*), which had acceptable reliability (MIDUS 2: Cronbach's α = 0.61; MIDUS 3: Cronbach's α = 0.60).

2.2.3. Self-regulatory abilities

To index self-regulation abilities, we used tasks assessing general-purpose control processes (i.e., executive function)—such as the updating of information within working memory, inhibition of prepotent impulses, and mental set shifting (Miyake et al., 2000)—which underlie self-regulatory behaviours (Hofmann et al., 2012). Based on exploratory and confirmatory factor analyses from a previous study by Lachman, Agrigoroaei, Tun, and Weaver (2014), we selected the following executive function tasks:

Digit span backward. Participants had to repeat a sequence of numbers in a reverse order. The measure of interest was the highest number of digits recalled up to eight, which provided an index of working memory updating.

Category fluency task. Participants attempted to list as many words as possible for each given category within 60 s. The total number of unique responses afforded a measure of verbal ability, processing speed, and working memory updating.

Stop-and-go-switch task (SGST). In the first single-task block of congruent trials, participants had to respond to the cues "red" and "green" with "stop" and "go", respectively. In the second single-task block of incongruent trials, the rules were reversed, i.e., participants had to answer "stop" when they heard "green", and "go" when they heard "red". In the final mixed-task block, participants alternated between congruent and incongruent rules depending on the given cue (i.e., "normal" and "reverse"). The mean latency of switch and nonswitch trials was employed to reflect inhibitory and task-switching abilities.

For all executive function tasks, we excluded responses that were invalid (i.e., participants did not adhere to task requirements) or had

[1] Data from MIDUS 1 were excluded as measures of self-regulatory abilities (i.e., executive function tasks) were only implemented in MIDUS 2 and 3.

Table 2
Interfactor Correlations between Religious Identification and Self-Regulatory (SR) Abilities and Traits across Time 1 (MIDUS 2) and Time 2 (MIDUS 3).

	Religious identification (T1)	Religious identification (T2)	SR abilities (T1)	SR abilities (T2)	SR traits (T1)
Religious identification (T1)	–				
Religious identification (T2)	**0.89**	–			
SR abilities (T1)	**−0.22**	**−0.26**	–		
SR abilities (T2)	**−0.20**	**−0.23**	**0.89**	–	
SR traits (T1)	**0.10**	**0.09**	−0.01	−0.03	–
SR traits (T2)	**0.09**	**0.09**	0.02	0.03	**0.79**

Note. Significant correlations are marked in boldface, $p < .001$.

technical faults. In line with the recommendations by the MIDUS researchers, we additionally excluded cases that did not reach at least 75% accuracy in each condition of the stop-and-go-switch task.

3. Results

3.1. Analytic approach

To address the question of whether religious identification would be correlated with self-regulatory traits and abilities, we conducted confirmatory factor analysis and examined interfactor correlations for the three focal constructs across Time 1 (MIDUS 2) and Time 2 (MIDUS 3). The three constructs were modelled as latent variables to better account for measurement errors, thereby resulting in more accurate estimates of constructs and their relations. For the indicators of the religious identification latent variable, we created three parcels from the religious identification scale. Parcelling has the advantage of attenuating construct-irrelevant variance (e.g., common-method variance, response biases) and has been advocated for unidimensional constructs, and when relations among constructs, instead of items, are of focal interest (Little, Cunningham, Shahar, & Widaman, 2002). The indicators for the latent variable of self-regulatory traits comprised conscientiousness, selective primary control, and selective secondary control scales. The indicators for the latent variable of self-regulatory abilities were digit span backward, category fluency, and stop-and-go-switch tasks. Residuals of repeated indicators were correlated as item-specific variances of indicators would be expected to covary across multiple assessments (Kievit et al., 2018).

To examine the directionality of associations between the three constructs, latent change score analysis was employed. Latent change score modelling allows for the examination of how levels of a construct at an earlier time point are predictive of changes in the same construct (i.e., proportional change effect) and—more crucial to our research goals—subsequent changes in a different construct (i.e., coupling effect; Kievit et al., 2018). Prior to the latent change score analysis, we assessed longitudinal measurement invariance of the constructs that included equality in factor structures, equality in factor loadings, and equality in intercepts, which indicated configural, weak, and strong factorial invariance, respectively. Following Cheung and Rensvold (2002), we considered a decrement in CFI $\leq$ 0.01 to indicate that the additional constraints imposed were justified. We subsequently controlled for third-variable effects by including time-invariant demographic variables (i.e., gender, education, and race) that have been shown to affect both religiosity and self-regulation (Zuckerman et al., 2013). To explore whether the coupling effects between religious identification and self-regulatory abilities and traits would vary as a function of age, we conducted a multigroup analysis to assess how the coupling effects would differ across age groups (i.e., 28–54 years, $n = 2256$; 55–84 years, $n = 2377$).

All analyses were conducted on *Mplus* 7.4 (Muthén & Muthén, 2015) using full information maximum likelihood estimation, which uses all available information for analyses. In evaluating model fit, we adopted the following criteria as indications of good fit: root mean square error of approximation (RMSEA) $\leq$ 0.05, comparative fit index (CFI) $\geq$ 0.95, and standardized root mean squared residual (SRMR) $\leq$ 0.08 (Hu and Bentler, 1999). All reported coefficient estimates were standardised. Values for all measures were reverse coded such that higher values reflected higher standing in each construct.

3.2. Confirmatory factor analysis

The model comprising the three focal constructs (i.e., religious identification, self-regulatory traits, and self-regulatory abilities) across two time points fitted the data well, $\chi^2(111) = 410.58$, RMSEA = 0.023, SRMR = 0.032, CFI = 0.990, and all indicators significantly loaded onto their intended constructs ($ps < 0.001$; see Appendix B). Across two time

Table 3
Standardised Estimates for Latent Change Score Models.

	Unadjusted models			Adjusted models with covariates		
	Overall	Younger	Older	Overall	Younger	Older
Path coefficients						
SR abilities$_{T1}$ → ΔRI$_{T1→T2}$	**−0.16 (0.04)**	−0.06 (0.05)	**−0.23 (0.05)**	**−0.11 (0.04)**	0.01 (0.07)	**−0.23 (0.07)**
SR traits$_{T1}$ → ΔRI$_{T1→T2}$	−0.01 (0.03)	−0.05 (0.04)	0.07 (0.04)	0.01 (0.03)	−0.04 (0.04)	0.07 (0.04)
RI$_{T1}$ → ΔRI$_{T1→T2}$	**−0.17 (0.03)**	**−0.16 (0.03)**	**−0.20 (0.04)**	**−0.17 (0.03)**	**−0.15 (0.03)**	**−0.20 (0.04)**
RI$_{T1}$ → ΔSR abilities$_{T1→T2}$	−0.02 (0.05)	−0.10 (0.05)	0.19 (0.11)	−0.03 (0.05)	−0.09 (0.05)	0.16 (0.11)
SR traits$_{T1}$ → ΔSR abilities$_{T1→T2}$	−0.06 (0.05)	0.08 (0.06)	**−0.21 (0.10)**	−0.04 (0.05)	0.05 (0.06)	−0.20 (0.10)
SR abilities$_{T1}$ → ΔSR abilities$_{T1→T2}$	−0.10 (0.07)	**−0.32 (0.08)**	0.21 (0.18)	−0.14 (0.09)	**−0.46 (0.10)**	0.25 (0.23)
RI$_{T1}$ → ΔSR traits$_{T1→T2}$	0.02 (0.03)	0.03 (0.04)	0.04 (0.04)	0.02 (0.03)	0.03 (0.04)	0.03 (0.04)
SR abilities$_{T1}$ → ΔSR traits$_{T1→T2}$	0.02 (0.04)	−0.05 (0.06)	0.08 (0.06)	0.04 (0.05)	−0.07 (0.08)	0.08 (0.07)
SR traits$_{T1}$ → ΔSR traits$_{T1→T2}$	**−0.35 (0.03)**	**−0.30 (0.04)**	**−0.38 (0.04)**	**−0.35 (0.03)**	**−0.31 (0.04)**	**−0.38 (0.04)**
Covariances						
ΔRI$_{T1→T2}$ ↔ ΔSR abilities$_{T1→T2}$	0.05 (0.06)	0.02 (0.07)	0.18 (0.14)	0.03 (0.06)	0.04 (0.07)	0.16 (0.14)
ΔSR traits$_{T1→T2}$ ↔ ΔRI$_{T1→T2}$	0.05 (0.03)	−0.01 (0.04)	**0.13 (0.05)**	0.05 (0.03)	−0.01 (0.05)	**0.14 (0.05)**
ΔSR abilities$_{T1→T2}$ ↔ ΔSR traits$_{T1→T2}$	**0.14 (0.07)**	−0.02 (0.08)	0.26 (0.14)	0.10 (0.06)	−0.03 (0.08)	0.24 (0.14)
RI$_{T1}$ ↔ SR abilities$_{T1}$	**−0.22 (0.02)**	**−0.08 (0.04)**	**−0.26 (0.03)**	**−0.18 (0.03)**	−0.06 (0.04)	**−0.21 (0.04)**
SR traits$_{T1}$ ↔ RI$_{T1}$	**0.10 (0.02)**	**0.08 (0.03)**	**0.10 (0.03)**	**0.10 (0.02)**	**0.07 (0.03)**	**0.10 (0.03)**
SR abilities$_{T1}$ ↔ SR traits$_{T1}$	−0.01 (0.03)	0.02 (0.04)	0.05 (0.03)	−0.03 (0.03)	−0.04 (0.05)	0.06 (0.04)

Note. SR = self-regulatory; RI = religious identification. Standard errors are shown in parentheses. Significant values shown in boldface, $p < .05$.

points, the interfactor correlations (see Table 2) showed that religious identification was positively associated with self-regulatory traits (rs = 0.09–0.10, $ps < 0.001$) but negatively related to self-regulatory abilities (rs = −0.20 to −0.26, $ps < 0.001$). Self-regulatory traits were not significantly correlated to self-regulatory abilities (rs = −0.03 to 0.03, $ps > 0.291$). These findings provide cross-sectional evidence that religious identification is divergently related to self-regulatory traits and abilities, and that the two dimensions of self-regulation reflect distinct constructs.

3.3. Latent change score analysis

Our tests of longitudinal measurement invariance supported weak factorial invariance, $\chi^2(117) = 423.00$, RMSEA = 0.023, SRMR = 0.033, CFI = 0.990, ΔCFI < 0.01, but not strong factorial invariance, $\chi^2(126) = 2676.08$, RMSEA = 0.063, SRMR = 0.137, CFI = 0.914, ΔCFI = 0.076. However, partial strong factorial invariance was achieved by relaxing the constraint for the intercepts of the stop-and-go-switch task, $\chi^2(125) = 510.83$, RMSEA = 0.025, SRMR = 0.035, CFI = 0.987, ΔCFI < 0.01. The model with partial strong factorial invariance formed the basis of our subsequent analyses.

Moving on to the latent change score analysis (see Table 3), higher levels of religious identification and self-regulatory traits at Time 1 were associated with smaller subsequent changes in religious identification (β = −0.17, $p < .001$) and self-regulatory traits (β = −0.35, $p < .001$) at Time 2, respectively; proportional change effect for EF was not significant (β = −0.10, $p = .142$). Of greater relevance to our hypotheses, the coupling parameters revealed that self-regulatory abilities at Time 1 significantly predicted negative changes in religious identification at Time 2 (β = −0.16, $p < .001$). None of the remaining coupling effects were statistically significant (βs < 0.06, $ps > 0.29$). We subsequently added time-invariant demographic covariates (i.e., gender, education, and race) to the model, which resulted in a good model fit, $\chi^2(161) = 768.87$, RMSEA = 0.029, SRMR = 0.034, CFI = 0.980. The negative coupling effect between self-regulatory abilities and religious identification remained statistically significant (β = −0.11, $p = .009$). Our longitudinal results highlight that self-regulatory abilities are prospectively associated with negative changes in religious identification.

3.4. Multigroup analysis

We first ensured partial strong factorial invariance across time and age groups, $\chi^2(260) = 644.01$, RMSEA = 0.025, SRMR = 0.037, CFI = 0.987. Subsequently, we included demographic covariates, which resulted in a good fit to the data, $\chi^2(332) = 1026.96$, RMSEA = 0.030, SRMR = 0.038, CFI = 0.977.

Proceeding with the multigroup analysis, we found that the longitudinal association between self-regulatory abilities and religious identification differed across the two age groups, Wald $\chi^2 = 3.917$, $p = .047$. Specifically, self-regulatory abilities at Time 1 predicted negative changes in religious identification at Time 2 for older adults (β = −0.23, $p = .001$) but not for middle-aged adults (β = 0.01, $p = .941$). No other theoretically meaningful age differences were observed for the remaining coupling effects (see Table 3). Our multigroup analysis suggests that the coupling effects of self-regulatory abilities on religious identification are more pronounced among older adults than their middle-aged counterparts.

3.5. Additional analyses

Apart from our main findings, we explored the possibility that the associations of religious identification with self-regulatory abilities and traits may vary across different religious affiliations using multigroup analysis. We first examined differences in longitudinal effects between individuals who belong to a Christian faith ($n = 3264$) and those who do not ($n = 709$). While the multigroup model fitted the data well, $\chi^2(332) = 1116.00$, RMSEA = 0.034, SRMR = 0.046, CFI = 0.970, the coupling effects of religious identification with self-regulatory abilities and traits do not significantly differ between Christians and non-Christians, Wald χ^2s < 0.585, $ps > 0.444$. Amongst individuals belonging to a Christian faith, we further differentiated between those who subscribe to Protestantism or other Protestant denominations (e.g., Pentecostal, Presbyterian, Baptist, Lutheran, Methodist, Evangelical, etc.) versus those who adhere to Catholicism (e.g., Catholic Roman and Catholic Ukrainian). This is motivated by past research (Cohen & Hill, 2007; Li et al., 2012) showing that Protestantism and Catholicism emphasize individualism and collectivism, respectively, and that individualistic- and collectivistic-oriented individuals tend to differ in performance on tasks measuring self-regulatory abilities (Oh & Lewis, 2008; Tran, Arredondo, & Yoshida, 2019). Although the multigroup model showed a good fit, $\chi^2(503) = 1498.32$, RMSEA = 0.039, SRMR = 0.051, CFI = 0.959, none of the coupling effects of religious identification with self-regulatory abilities and traits significantly differed among Protestants ($n = 2260$), Catholics ($n = 1072$), and non-religious individuals ($n = 524$), Wald χ^2s < 3.604, $ps > 0.165$. Therefore, our additional analyses showed that the longitudinal associations between religious identification and self-regulatory abilities and traits did not meaningfully vary as a function of specific religious affiliation.

4. Discussion

Our study yielded several notable outcomes. First, consistent with previous studies (e.g., Desmond et al., 2013; McCullough et al., 2005; Regnerus & Smith, 2005), our cross-sectional findings showed that religious identification was positively related to self-regulatory traits. Two likely hypotheses have been advanced to account for this link. On the one hand, chronic adherence to religious doctrines, which requires effortful behavioural self-regulation, may generalise to nonreligious contexts and augment general self-regulatory traits (McCullough & Willoughby, 2009). On the other hand, self-regulatory traits, such as conscientiousness, may facilitate conformity toward religious practices and beliefs (McCullough et al., 2003, 2005). However, we failed to find longitudinal evidence for either hypothesis, denoting the lack of temporal precedence for the two constructs among middle-aged and older adults.

Notably, this result departs from past findings which indicated bidirectional longitudinal relations between religious identification and self-regulatory traits (Pirutinsky, 2014; Wink et al., 2007). One possible reason could be that longitudinal effects between religious identification and self-regulatory traits may only manifest at specific developmental epochs. Specifically, previous studies have demonstrated longitudinal relations between religious identification and self-regulatory traits among adolescent samples (e.g., Pirutinsky, 2014; Wink et al., 2007). Conversely, the MIDUS cohort constitutes mostly middle-aged adults who may have developed more stable levels of traits, as suggested by studies examining rank-order consistency of personality traits across different age groups (Roberts & DelVecchio, 2000; Terracciano et al., 2006). Moreover, trait changes tend to be more prominent during adolescence and young adulthood relative to midlife and late adulthood (Donnellan & Robins, 2009). Thus, our null longitudinal relations between religious identification and self-regulatory traits can be attributed to how self-regulatory traits are potentially less malleable with advancing age.

Second, our cross-sectional findings indicated that higher religious identification was concomitant with lower self-regulatory abilities, which is congruent with previous research highlighting the negative associations between religious identification and cognitive abilities that involve self-regulation (Zuckerman et al., 2013). Further, our longitudinal findings clarified the directionality of this relation by showing that higher self-regulatory abilities predicted more negative changes in religious identification, even after controlling for time-invariant demographic variables (i.e., gender, education, and race). This is aligned

with the functional equivalence perspective, which posits that individuals with high levels of self-regulatory abilities may have less need for religion (Zuckerman et al., 2013). Our findings disconfirm predictions by McCullough and Willoughby (2009) that chronic religious adherence positively augments self-regulatory abilities, thereby implying that religious adherence does not engender long-term benefits on self-regulatory abilities. Additionally, we found that the negative coupling effect of self-regulatory abilities on religious identification was stronger for older adults. This finding corroborates past research demonstrating that the role of self-regulatory abilities in psychosocial outcomes (e.g., sense of control) becomes more pronounced in late adulthood (e.g., Soederberg Miller & Lachman, 2000; Toh et al., 2020). Specifically, given that age-related cognitive decline is particularly prominant in late adulthood, older adults with more impaired self-regulatory abilities may be more inclined to rely on religion for behavioural guidance. However, considering the limited two-wave assessment of our key constructs, future studies with more extensive longitudinal tracking of religious identification and self-regulatory abilities and traits are warranted to confirm our findings.

Our findings—which demonstrate that religious identification is asymmetrically associated with self-regulatory traits and abilities—converge with the growing census that self-regulation traits (as assessed by self-reported scales) and abilities (as assessed by performance-based tasks) are distinct constructs (e.g., Duckworth & Kern, 2011; Saunders et al., 2018; Toplak et al., 2013). To illustrate, some individuals who are proficient in self-regulatory abilities may be especially motivated to engage in self-regulation regularly (i.e., high levels of self-regulatory traits) as they are relatively successful at it, while other highly skilled regulators may have low levels of self-regulatory traits as typically successful regulatory efforts negate the need for frequent enactments of self-regulation. Likewise, while some individuals with more impoverished self-regulatory abilities may have a lower tendency to self-regulate as they are not particularly successful at it, others may compensate for deficiencies in regulatory abilities by more frequently engaging in regulatory behaviours. In essence, our findings highlight the need to differentiate self-regulatory traits and abilities, as well as to identify moderating factors that determine when and how self-regulatory trait and abilities may be related to each other.

Our study is not without limitations. First, while our latent change score analysis afforded the examination of longitudinal associations between religious identification and self-regulatory abilities and traits, the correlational nature of our findings restricts causal inferences. Therefore, future research adopting more controlled experimental designs would be ideal.

Second, although we modelled education as a demographic covariate, it may function as a mediator in the relation between self-regulatory abilities and religious identification. For instance, individuals with higher cognitive functioning, which includes self-regulatory abilities, may gravitate away from religious conventions and toward secular reasoning of natural phenomena as conferred by educational attainment (e.g., Hoge, 1974; Reeve & Basalik, 2011). However, given that educational attainment in the MIDUS sample likely occurred prior to the measurement of our key constructs (i.e., religious identification, self-regulatory traits and abilities), we were unable to elucidate the possible mediational role of education within a longitudinal context. Therefore, future studies should explore how education may mediate the prospective relation between self-regulatory abilities and religious identification.

Third, although the cross-sectional effect sizes for the link between religious identification and self-regulatory abilities ($rs = -0.21$ to -0.26) are consistent with those reported in past *meta*-analyses (average $r = -0.24$; Zuckerman et al., 2013), the longitudinal effects are somewhat smaller ($\beta s = -0.11$ to -0.23). Considering that, as previously discussed, longitudinal effects may be age-specific, future research should ascertain whether our findings, based on middle-aged and older adults, would differ from those in young adults and adolescents. Relatedly, given that the MIDUS cohort comprised predominantly White Americans who belong to the Christian faith, our findings may have limited generalisability. To this end, more work is needed to replicate and extend our findings to more diverse cultures, ethnicities, and religions.

In summary, through the examination of two facets of self-regulation, our results advance extant literature by highlighting the divergent associations of religious identification with self-regulatory traits and abilities. Further, our findings allude to the role of age in understanding the boundary conditions of the association between self-regulatory abilities and one's religious orientation.

Table A1
Exploratory Factor Analysis of Self-Regulation-Related Scales.

	1	2	3
Conscientiousness	**0.45**	0.03	**−0.14**
Selective primary control	**0.97**	**−0.02**	**0.01**
Selective secondary control	**0.42**	**0.33**	−0.02
Compensatory secondary control (Disengagement)	−0.01	**0.54**	**0.31**
Compensatory secondary control (Self-protection)	**0.40**	**0.51**	**0.01**
Compensatory secondary control (Adjustment of goals)	**0.01**	0.01	**0.97**
Compensatory primary control	0.02	**0.38**	**−0.07**

Note. Values represent factor loadings. Significant factor loadings are shown in boldface, $p < .05$.

Table B1
Factor Loadings of Religious Identification and Self-Regulatory Abilities and Traits Across Time 1 and Time 2.

	Time 1 (MIDUS 2)	Time 2 (MIDUS 3)
Religious identification		
Parcel 1	0.91	0.93
Parcel 2	0.89	0.91
Parcel 3	0.85	0.85
Self-regulatory abilities		
Digits span backward	0.36	0.41
Category fluency	0.57	0.63
Stop-and-go-switch task	0.59	0.39
Self-regulatory traits		
Selective primary control	0.88	0.83
Selective secondary control	0.59	0.58
Conscientiousness	0.52	0.53

Note. All factor loadings are significant ($ps < .001$).

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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The study was not preregistered.

Appendix A

See Table A1.

Appendix B

See Table B1.

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