CHAPTER 6

RELIGION, SELF-CONTROL, AND SELF-REGULATION: HOW AND WHY ARE THEY RELATED?

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Following James (1958), Pratt (1934), and Atran and Norenzayan (2004), we define religion as a broad cultural complex, one characterized by deeply held beliefs as well as the emotions and behaviors that accompany such beliefs. In the case of religion, the beliefs in question arise from awareness of, or perceived interaction with, supernatural agents such as gods and spirits that are presumed to play an important role in human affairs. Individual differences in religiosity are related to a bewilderingly wide array of behaviors and outcomes, including longer life (McCullough, Hoyt, Larson, Koenig, & Thoresen, 2000); fewer depressive symptoms (Smith, McCullough, & Poll, 2003); higher levels of prosocial behavior (Pichon, Boccato, & Saroglou, 2007; Randolph-Seng & Nielsen, 2007; Shariff & Norenzayan, 2007); better marital functioning (Mahoney et al., 1999); less crime, delinquency, and drug use (Baier & Wright, 2001); higher school achievement (Jeynes, 2002); and even more frequent engagement in health behaviors, such as visiting the dentist, using seat belts, and taking vitamins (Hill, Burdette, Ellison, & Musick, 2006; Islam & Johnson, 2003; Shmueli & Tamir, 2007; Wallace & Forman, 1998). These associations are robust and have been replicated with people from many religions and many nations.

In this chapter, we will offer an answer to a "how" question and a "why" question about these associations. The "how" question is straightforward: How does religion obtain its associations with these diverse outcomes? We hypothesize that religion fosters the development and exercise of self-control and self-regulation, which lead to beneficial outcomes in a variety of behavioral and psychological domains. In this chapter, we survey the evidence that is relevant to this "how" hypothesis. We define *self-regulation*, like many other scientists (Baumeister & Vohs, 2004; Carver & Scheier, 1998), as the process by which a system uses information about its present state to change that state toward greater conformity with a desired end state or goal. Self-regulation need not be a deliberative, effortful process: Much of self-regulation occurs in a relatively effortless and automatic fashion (Fitzsimmons & Bargh, 2004), and for that reason, we also wish to understand how religion might be related to automatic or implicit self-regulation (Koole, McCullough, Kuhl, & Roelofsma, 2010).

We reserve the term *self-control* for situations in which people work to override a prepotent response (e.g., a behavioral tendency, an emotion, or a motivation), such as a craving for alcohol, a desire to retaliate against an aggressor, or the temptation to chase a hare instead of remaining with one's hunting group to stalk a stag (Baumeister, Vohs, & Tice, 2007). In other words, when people exert self-control, they modify their response tendencies by suppressing one goal so as to pursue another one that is more highly valued—especially when one is not actively within the thrall of that prepotent motivation to action. For example, when we are setting

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an alarm clock in the evening for the next day, we value getting up early the next morning to a greater extent than we value staying in bed, but our preferences can shift when that alarm goes off at 5:30 the next morning. Applying self-control at 5:30 helps us to behave according to the valuations of the various behavioral options that caused us set the alarm the night before, even if our valuations of those behavioral options are different at 5:30 in the morning. Self-control is therefore a more specific concept than self-regulation, and not all psychological states that are self-regulated involve self-control as we use the term here.

The "why" question about religion and self-control is a bit more involved: Why are religious belief and behavior structured in such a way as to be reliably associated with self-regulation and self-control? Of the many variables with which religious belief and practice might be related, why self-control in particular instead of, say, extraversion, or neuroticism (Saroglou, 2010)? The only ultimate answers to such "why" questions are questions about design, and to ask design questions, one must ask questions about *function* (Richerson & Boyd, 2005; Williams, 1966). We hypothesize that many complexes of religious beliefs and behaviors take their current forms (at least as expressed in the Abrahamic traditions) in part because of cultural selection (Richerson & Boyd, 2005). In other words, we propose that religious beliefs and behaviors produced beneficial consequences for the individuals who adopted them, refined them, and passed them on to their neighbors and offspring as human societies were becoming modern. In other words, we hypothesize that many religious beliefs and behaviors take their contemporary forms in part because evolved psychological mechanisms for cultural learning and transmission caused people to acquire, modify, and retain and (perhaps) transmit those beliefs and behaviors to others in light of their beneficial consequences for self-control (Richerson & Boyd, 2005).

We begin this chapter by addressing the "why" question first. We set out to describe the selection pressures in recent human cultural evolution that might have given rise to religious beliefs and behaviors that were well-suited to boosting humans' self-control. Next, we review the evidence for the links of religion to self-regulation and self-control. Finally, we address some implications of our hypotheses for understanding religion's effects more broadly and applying these insights in the real world.

THE "WHY" QUESTION: SELECTION PRESSURES FOR CULTURAL INNOVATIONS TO BOOST SELF-CONTROL

The "why" question first: Why did religion evolve into its current form? Simply put, we think many of the modern features of the world's religions have evolved as they have to prop up humans' abilities to exert control over their appetites, emotions, and desires. These are all forms of control that became acutely important as human societies become sedentary and reliant on agriculture and animal cultivation as an economic base. Consider one historical illustration of how this cultural–evolutionary process might have worked. On the Eastern side of the Mediterranean in what is now modern-day Syria, Israel, Palestine, and Jordan, a society called the Natufians existed from 15,000 to 11,500 years ago. The Natufians were one of the very first societies to adopt a sedentary lifestyle in which people lived in groups including large numbers of non-kin. They were one of the first societies to begin the transition from foraging to agriculture—harvesting wild cereals such as wheat and barley using sickles with stone blades and wooden handles. They were also the first society to bury their dead in large, concentrated numbers near their own settlements (Bar-Yosef, 1998).

Most important for our purposes here, the remnants of Natufian culture include the first known burial site of a shaman in the Near East. Several years ago, anthropologists discovered a 12,000-year-old gravesite in a cave called Hilazon Tachtit, halfway between the Mediterranean and the Sea of Galilee in Northern Israel. The grave contained the body of a 45-year-old woman whose pelvic and spinal deformities would have caused her to drag a leg or limp when she walked (Grosman, Munro, & Belfer-Cohen, 2008). The gravesite was prepared with care; the body was positioned deliberately and held in position by a series of large stones. The grave

goods included the types of artifacts that characterize shamans' toolkits worldwide: an ox's tail, the forearm of a wild boar, the wing of an eagle, fragments from a basalt bowl, the horn core from a gazelle in association with the bowl fragments, the pelvis of a leopard, the skulls of two stone martens, 50 tortoise shells, and a fully articulated human foot (someone else's; not the shaman's). The burial—a 10-kilometer walk and a 150-meter climb up a steep escarpment from the nearest Natufian settlement—would have been time-consuming and effortful for the community. Clearly, this shaman woman was a person of great importance to her group.

Shamans were the world's first religious professionals, and they are still found almost universally in the world's extant hunter–gatherer societies (Winkelman, 1990). The Natufian shaman's grave is by no means the world's only prehistoric shaman grave, or even the oldest one (Porr & Alt, 2006). It is tempting, however, to view the care with which this particular shaman was treated (and the fact that she was found in association with *this* Near-Eastern society, and not an earlier Near-Eastern society, nor a later one) as related to the unique characteristics of the Natufian society in which she lived and the dramatic social and economic changes it was experiencing. In part because of climate changes, populations were growing. Thus the former lifestyle of seminomadic foraging, with seasonal moves in pursuit of more plentiful food, was giving way to a lifestyle characterized by permanent settlements in which wild cereals could be exploited and animals could be domesticated for their meat, their milk, and their labor.

To gain benefits from their new semipermanent lifestyle and to cope with their growing population base, the Natufians would have experienced pressure to develop new ways of regulating group life, as is often the case when politically autonomous band-level societies are superseded by larger, more complex societies. Specifically, there would have been novel problems related to *cooperating, tolerating,* and *waiting.* In terms of cooperation, for example, the Natufians would have needed to engage in personally costly and trust-intensive interactions with nonrelatives to create new public and private assets such as kilns for producing lime, fences to pen livestock, or the simple gains of trade. Additionally, conflicts of interest are inevitable, and the emotional effects of these conflicts are less easily salved when the psychological affordances shaped by selection pressures for kin altruism are not activated by cues of genetic relatedness (Lieberman, Tooby, & Cosmides, 2007). Therefore, this transition to large, sedentary societies would also have required an increase in the ability to tolerate. Finally, for their descendants—who would specialize almost exclusively in animal domestication and plant cultivation (Bar-Yosef, 1998)—a willingness to wait would have been particularly valuable. Cereal cultivation requires several months between initial preparation and planting to harvest, unlike economies based on hunting and gathering, in which the time between the onset of acquisition and consumption is measured in seconds to days. And problems like these would only get more intense as societies grew larger, and food economies came to involve more and more waiting. Mithen (2007) put some of the novel problems that agriculture, animal husbandry, and sedentism introduce this way:

> The mobile hunter-gatherer lifestyle always looks far more attractive than sedentism, which creates problems of refuse disposal, hygiene and social conflict within [*sic*] one's neighbours—hunter-gatherers solve these problems by simply moving away, whether from their rubbish or other people. That is no longer an option after one has invested in field clearance, irrigation ditches, stock fences and so forth. (p. 710)

We posit that the waiting, tolerating, and cooperating that sedentary lifestyles and agrarian economic activity require draw on specific cognitive abilities that go together under the label *self-control.* Reyes-García et al. (2007) made a similar argument for how self-control (which they called *patience*) facilitates acquisition of forms of human capital (e.g., formal schooling). These forms of human capital enable people to transition from the economic activities that characterize life in self-sufficient societies (e.g., hunting, foraging, small-scale agriculture) to those that characterize market-based economies

(e.g., wage-earning). Consider the following facts about how self-control relates to the sorts of behavioral challenges that we are outlining here.

First, the link between animals' levels of self-control and the specific food ecologies can be viewed as something like an iron law of behavioral ecology: Animals simply cannot exploit food sources that require more waiting than they are capable of enduring, so the ability to exploit food sources that require self-control can exert selective pressure on organisms to attain higher and higher levels of self-control (Stevens, Hallinan, & Hauser, 2005). Second, unfair behavior from others is inevitable in a world in which people's interests never align perfectly. People need to tolerate such unfairness without lashing out against their offenders—a process that draws on cortical areas associated with the top-down suppression of anger and other negative emotions (Jensen-Campbell, Knack, Waldrip, & Campbell, 2007; Tabibnia, Satpute, & Lieberman, 2008). Finally, biologists and psychologists have recently argued that self-control is a cognitive prerequisite both for the evolution of reciprocal altruism (Stevens, Cushman, & Hauser, 2005) and also for its production in real time (Curry, Price, & Price, 2008; Rachlin, 2000; Yi, Buchhalter, Gatchalian, & Bickel, 2007).

Our answer to the "why" question about religion and self-control, then, is this: Changes in religion (particularly, an increasing focus on supernatural entities that possess preferences about modes of human conduct, that monitor human behavior, and that administer punishments and rewards) over the past 10,000 years—in particular, the increasing focus on supernatural agents—reflect the efficacy of belief in these agents to increase self-control. Modern problems related to waiting, tolerating, and cooperating could thus be resolved without exclusive reliance on social or expensive institutional monitoring and policing. Indirect support for this contention comes from Johnson (2005). Johnson documented how the world's distribution of "high gods"—that is, gods with moral preferences that monitor and punish human behavior—correlates positively with various indexes of societal complexity: community size, use of money and credit, police forces, jurisdictional hierarchies, taxation, and—importantly—individual compliance with community norms. These findings suggest that the advent of moralizing gods coincided with increasing concern about the social and emotional challenges that arise when people begin to live in large groups (see also Henrich et al., 2010; Roes & Raymond, 2003).

Our thesis is quite consistent with Johnson's (2005) thesis—and with Norenzayan's and Shariff's, who argued that religious cognition is particularly good at facilitating prosocial behavior that is costly in the short term (Norenzayan & Shariff, 2008; Shariff & Norenzayan, 2007). We think our proposal is also congenial to Robert Wright's (2009) recent description of the connections between the social evolution of economies and the social evolution of religion, and it shares a few similarities with Freud's (1930/2005) notion that humans' religious sentiments function in part to help people stave off undesirable sexual and aggressive urges.

But here is where our thesis departs dramatically from previous ideas: We wish to describe the interplay of (a) an evolved human psychology designed to promote the regulation of impulses and desires and (b) culturally evolved religious beliefs such as belief in moralizing gods and in the afterlife (Bering, 2006). It is at this nexus of adaptively designed psychological mechanisms for self-control and culturally evolved religious innovations that people's capacities for waiting, tolerating, and cooperating might be modified by particular forms of religion. We believe that religious cognitions (especially those involving moralizing gods or the afterlife) have been refined through cultural selection (Richerson & Boyd, 2005) for their ability to promote self-control. Self-control is at a premium in the large, complex, sedentary, agriculturally based societies in which most humans increasingly have been living for the past 8,000 years (Carneiro, 1978).

Human capacities for the control of appetites, impulses, and desires were, we presume, put in place by natural selection acting on neural tissue over many generations in ancestral human populations. The operation of those evolved mechanisms, however, can be influenced by cultural inputs such as religious parental influences (Bartkowski, Xu, & Levin, 2008) or personal involvement in religious institutions (Kenrick, McCreath, Govern, King, &

Bordin, 1990) and practices (Wenger, 2007). This particular aspect of our thesis—that cultural inputs can influence the operation of evolved mental mechanisms—is not particularly controversial (Tooby & Cosmides, 1992, see pp. 114–116).

THE "HOW" QUESTION: RELIGION'S LINKS TO SELF-CONTROL AND SELF-REGULATION

Empirical research on the links of religion to self-control—which addresses our question of how religion affects health and behavior—is in its infancy (McCullough & Willoughby, 2009). Thus, we will limit ourselves here to describing what is currently known about those links. Much of this research is correlational and therefore unable to shed definitive light on religion's ability to foster self-control or self-regulation more broadly. Nevertheless, this research shows that religion as experienced and practiced by many people in the 21st century is associated with higher self-control and specific elements of self-regulation more generally.

The General Connection of Religiosity With Self-Control

Evidence from personality research suggests that religious people tend to score higher on measures of self-control, and measures of personality that subsume self-control, such as conscientiousness and agreeableness, than do their less religious counterparts (Lodi-Smith & Roberts, 2007; Saroglou, 2010). In Eysenck's model of personality, it is psychoticism, which can be thought of as the opposite of Big Five agreeableness and conscientiousness (Costa & McCrae, 1995), that shows consistent negative links with religiosity. This association between psychoticism and low religiosity has been found using a variety of measures and across samples that are diverse in terms of age, religious denomination, and culture (Francis, 1997; Francis & Katz, 1992; Hills, Francis, Argyle, & Jackson, 2004; Lodi-Smith & Roberts, 2007; Wilde & Joseph, 1997). With respect to Cattell's personality system, McCullough and Willoughby (2009) cited studies revealing that scale "G"—known variously as "Conformity," "Superego," and "Expedient Versus Conscientiousness"—is positively associated with church attendance, attitudes toward Christianity, and traditional Christian religious belief.

McCullough and Willoughby (2009) also described 12 studies that reported associations of measures of religiosity with measures of general self-control (e.g., Bouchard, McGue, Lykken, & Tellegen, 1999; Desmond, Ulmer, & Bader, 2008; French, Eisenberg, Vaughan, Purwono, & Suryanti, 2008; Walker, Ainette, Wills, & Mendoza, 2007). Of these 12 studies, 11 reported positive associations between self-report measures of religiosity and self-control, with effect size *r*s ranging from .21 to .38. Since that publication, several additional articles have indicated that some aspects of religiousness (including general measures of religiosity and intrinsic religious motivation) are associated with better self-control or self-regulation (Abar, Carter, & Winsler, 2009; Ahmed, 2009; Vitell et al., 2009). Links of religion with global self-report measures of self-control and self-regulation have been shown not only in studies of U.S. Christians but also in samples of Muslims (e.g., Ahmed, 2009; French et al., 2008).

It is also important to consider the role of *extrinsic religiosity*, a religious orientation characterized by treating religion as a means (as opposed to *intrinsic religiosity*, in which religion is treated as an end; Allport & Ross, 1967). In three of the published studies (Bergin, Masters, & Richards, 1987; Bouchard et al., 1999; Vitell et al., 2009), researchers found extrinsic religious motivation to be negatively associated with self-control. The distinction between intrinsic and extrinsic religion may be an important one to keep in mind as this research area develops, because intrinsic religious motivation is apparently associated with more self-control, whereas extrinsic religious motivation is associated with less self-control.

In the United States, religious families also tend to have children with more self-control (Bartkowski et al., 2008; Brody & Flor, 1998; Brody, Stoneman, & Flor, 1996; Gunnoe, Hetherington, & Reiss, 1999). Parental religiosity, which is variously measured in terms of church attendance, reports of the extent to which religion is discussed in the home, and self-rated importance of religion, is associated with higher parent and teacher ratings of children's self-control and lower impulsivity. These associations

do not appear to result from the confounding effects of gender, age, race, socioeconomic status, education, or religious denomination.

Our confidence that the links between religion and self-control are causally related is limited, in part, by the lack of appropriate longitudinal data—as well as by the limited support for the hypothesis that those available longitudinal data provide. McCullough and Willoughby (2009) found six longitudinal studies that reported evidence bearing on the causal nature of this relationship between religion and self-control or self-control-related personality traits (see also Chapter 9 in this volume). Only one of them (Wink, Ciciolla, Dillon, & Tracy, 2007) revealed that religiousness was associated with increases in a personality trait related to self-control—agreeableness—over the life course. Moreover, this finding held only for women, and no connection between religiosity and later increases in conscientiousness was found. In contrast, five studies found that measures of self-control and relevant personality traits predicted religiosity later in life. In one study, conscientious children reliably became more religious adults, even after controlling for confounds such as gender and religious upbringing (McCullough, Tsang, & Brion, 2003). In a second study, children low in agreeableness tended to become less religious adults (McCullough, Enders, Brion, & Jain, 2005). In a third study, conscientious adolescents and agreeable female adolescents showed increases in religiousness through late adulthood, measured nearly 50 years later (Wink et al., 2007). In a fourth study, religious youths who reported making decisions deliberatively and avoided risk-taking remained more religious a year later than did their less religious and less controlled counterparts (Regnerus & Smith, 2005). In a fifth study, high school boys whose psychoticism declined over two time points, and high school girls with increasing conscientiousness at the same two time points, reported more religiosity at a third time point (Heaven & Ciarrochi, 2007).

Taken together, this body of research suggests that religion and self-control are indeed related at the level of personality. The longitudinal evidence that religion can cause increases or reductions in self-control is currently quite limited, however. The evidence that changes in conscientiousness and similar constructs leads to increases in religiosity over time enjoys quite a bit more empirical support. For this reason, experimental data investigating whether religion can create increases in self-control (whether transient or long-term) would be highly desirable from a scientific point of view. To date, experimental work has shown that religious primes slow people's recognition of temptation-related words (i.e., words related to substance use and premarital sex; Fishbach, Friedman, & Kruglanski, 2003). Religious primes also have been shown to increase persistence on a word search task (Toburen & Meier, 2010). Both of these findings implicate religion as a causal factor in self-regulation. The field would benefit greatly from more experimental research of this nature.

Religion and the Cybernetic Model of Self-Regulation

Aside from religion's general connections to personality-level or behavioral measurements of general self-control, it is instructive to consider how religion might influence self-regulation via basic processes that are necessary for systems to effectively self-regulate. Carver and Scheier (1998) conceptualized self-regulation as a dynamic process by which people bring their behavior into conformity with standards through the operation of integrated negative feedback loops. These negative feedback loops consist of several integrated functions. The *input* function detects the system's state. In human terms, this is equivalent to one's perceptions of the self and the environment. The *comparator* function compares the system's state to a *reference value*. Reference values can be conceptualized as goals or standards. When a comparator indicates that the system's state matches its reference value, nothing changes and the existing state is maintained. When the comparator notes a discrepancy between the system's state and its reference value, an *output* function is activated to reduce the discrepancy. Self-regulating systems continuously self-monitor for goal-behavior discrepancies; when discrepancies are noticed, the systems respond by trying to minimize them via outputs.

According to Carver and Scheier (1998), self-regulation relies on at least three processes. First, it

requires clear *goals* that are organized to permit effective management of conflict among them (Fitzsimmons & Bargh, 2004). Second, it requires *self-monitoring* or self-directed attention so that one can detect discrepancies between one's goals and one's current behavior. Third, it requires effective mechanisms, or *outputs*, for effecting behavioral change (Schmeichel & Baumeister, 2004). Presently, we consider how religion might influence some of these processes and describe some of the research relevant to these concepts.

Religion and Goals

Religious belief encourages people to acquire specific goals and values that differ from those of nonreligious people (Roberts & Robins, 2000; Saroglou, Delpierre, & Dernelle, 2004). For instance, consider these results from a meta-analysis of 12 studies conducted in primarily Christian, primarily Muslim, and primarily Jewish nations (e.g., the United States, Turkey, and Israel). Results showed that religiosity was reliably and positively correlated with the values from the Schwartz Value Survey called Tradition (including traits such as "responsible" and "helpful"; $r = .45$) and Conformity (including qualities such as "self-discipline" and "politeness"; $r = .23$). Conversely, religiosity was negatively correlated with the values measured on scales known as Hedonism ("self-indulgent," "pleasure"; $r = -.30$), Stimulation ("exciting life"; $r = -.26$), and Self-Direction ("freedom," "independent"; $r = -.24$). These results were obtained in all three types of religious nations. Taken together, these results suggest that Jewish, Christian, and Muslim religiosity promote goals related to respect and concern for others, while they discourage goals related to personal gratification and individuality. It seems to us no accident that religiosity is particularly good at increasing people's valuation of Tradition and Conformity-related values if what religion has evolved to do is increase people's ability to wait, tolerate, and cooperate.

One way in which religious thought may encourage the pursuit of certain goals is by "sanctifying" them, or defining the source of those goals as sacred, thereby making them more important (Emmons, 1999). For example, Mahoney et al. (1999) found that husbands and wives who characterized their marriages as "sacred" and "manifestations of God" reported healthier marriages (better adjustment, better conflict resolution). Mahoney et al. (2005) also showed that college students who sanctified their bodies, believing them to be gifts from God, tended to get more sleep, wear their seatbelts, and disapprove of illicit drug use. It seems that religion can be used to sanctify almost any goal, from getting enough exercise to killing civilians. We anticipate, however, that many of the goals that people commonly sanctify through religion will be relevant to waiting (e.g., being patient), tolerating (e.g., being forgiving), and cooperating (e.g., helping the members of one's group or honoring one's obligations).

Religiosity and Self-Monitoring

Awareness of an evaluative audience increases people's self-awareness. When made self-aware, people then compare their behavior to relevant behavioral standards (Carver & Scheier, 1998). Many religious belief systems posit gods or spirits that observe humans' behavior, pass judgment, and then administer rewards or sanctions (Bering & Johnson, 2005). In many of these religions, these beings can also read thoughts and are not fooled by people's attempts to deceive them. Several studies suggest that priming religious concepts produces behavioral effects on measures such as cooperation, generosity, and honesty that can be construed as prosocial in nature (Pichon et al., 2007; Randolph-Seng & Nielsen, 2007; Shariff & Norenzayan, 2007). Such effects could conceivably be mediated by religious cognition's effects on self-monitoring, although this remains an open question.

Such speculation is also consistent with the finding that exposure to images of eyes (i.e., stimuli indicative of the fact that one is being monitored) increases generosity and honesty (Haley & Fessler, 2005). Religion could also promote self-monitoring through introspective religious rituals (e.g., prayer, meditation, reflecting on scripture) during which people monitor for discrepancies between their goal states and their behavior (Wenger, 2007). Correlational evidence that religious people engage in more self-monitoring than do less religious people is limited and mixed, and direct experimental work on the topic is virtually nonexistent. We believe that

this particular question is ripe for research (McCullough & Willoughby, 2009).

Religiosity and Outputs for Self-Change

A final requirement for effective self-regulation is the possession of a suite of effective psychological and behavioral tools for self-change. As discussed, such tools for self-change are called *outputs* (Carver & Scheier, 1998). Religious belief systems, although they do offer uniquely religious outputs, may also encourage effective outputs that are not specifically religious. For example, a person might avoid contact with tempting stimuli, perhaps by avoiding an attractive person with whom a relationship is morally off-limits (Worthington et al., 2001).

Prayer and meditation may have important regulatory effects (Galton, 1872; McNamara, 2002). In one study, Brefczynski-Lewis, Lutz, Schaefer, Levinson, and Davidson (2007) discovered that regions in the brain associated with attention and response inhibition saw more activation in experienced meditators. Also, Chan and Woollacott (2007) found that experienced meditators had less interference during a Stroop task, suggesting that they had more effective regulation of attentional processes. In addition, Koole (2007) conducted five experiments that revealed that when people (particularly religious people) were exposed to a person in need and then instructed to pray for that person, they experienced more reductions in negative affect than did people who were instructed (a) simply to think about the person or (b) to positively reappraise the person's plight.

Other religious behaviors that may be effective outputs for self-change, especially for religious people, include evoking religious imagery (Weisbuch-Remington, Mendes, Seery, & Blascovich, 2005; Wiech et al., 2008) and consulting one's religious scriptures (Wenger, 2007). Rachlin (2000) proposed that behavioral guidance gleaned from religious scripture might be a particularly effective tool for change because of its sacred nature. Wenger's (2007) experiment provided some support for this claim. Participants who were led to focus on religious shortcomings spent longer reading a passage called "How can I know when it is God who is speaking to me?" This finding might illustrate how a self-regulating system can note a discrepancy in behavior relative to a goal state (i.e., not following religious tenets when a goal is to be a good follower of a religious system) and then reduce the discrepancy using a religiously prescribed output function (i.e., reading religious material).

Religion and Implicit Self-Regulation

Recognizing that self-control can occur through automatic mechanisms (Fitzsimmons & Bargh, 2004), Koole, McCullough, Kuhl, and Roelofsma (2010) recently advanced a parallel view of religion's connection to self-regulation that relies on implicit or automatic routes for cognitive processing rather than conscious ones. Implicit self-regulation, as they conceptualized it, operates in three ways that might be influenced by religious cognition. First, religion might help people to form appropriate intentions that can then be translated into effective action (also known as *volitional efficiency*). Second, religion might facilitate *emotion regulation*. Third, religion might help people reconcile new experiences with what has come previously, thereby helping to create and preserve *meaning in life* (see Chapter 8 in this volume).

Many studies in which religious cognition has been primed outside of conscious awareness do indeed suggest that religious cognition can foster self-regulation through implicit processes. As noted, one experiment showed that subliminally presented religious mental content suppressed goals related to temptation (Fishbach et al., 2003). College students were subliminally primed for 50 minutes with either a temptation or sin-related concept (e.g., drugs, temptation, premarital sex), a religion-related concept (e.g., prayer, the Bible, religion, and God), or a neutral word. After each prime, participants were instructed to identify religion-related words or temptation or sin-related words as either words or nonwords as quickly as possible. Fishbach et al. (2003) found that the subliminal presentation of temptation or sin-related primes led to faster recognition of religion-relevant words than did the subliminal presentation of neutral primes. Conversely, subliminally presented religion-relevant primes slowed recognition of temptation or sin-related words in comparison with the neutral primes. These results suggest that people recruit religious concepts

to facilitate self-control in the face of temptation, and conversely, that activating religious mental content can suppress temptation or sin-related content. Interestingly, these regulatory processes took place automatically, implying that regulation occurred on the basis of implicit goals that had been internalized through a religious belief system.

One important effect of implicit regulation is to stabilize people's moment-to-moment responses to emotion-inducing stimuli (Koole, 2009). As described previously, Koole (2007) reported the results of five experiments supporting the hypothesis that prayer can reduce negative affect. Weisbuch-Remington, Mendes, Seery, and Blascovich (2005) also found similar effects in two experiments that evaluated whether religious imagery facilitates emotion regulation. These studies revealed that subliminally exposing Christian participants to positive religious imagery (e.g., images of Christ ascending to heaven; Jesus as an infant) before they completed a stressful task caused physiological responses characterized by greater cardiac output (termed a *challenge* response; Blascovich, Mendes, Tomaka, Salomon, & Seery, 2003). In contrast, Christians exposed to negative religious imagery (e.g., demons; satanic symbols) evinced greater total peripheral resistance (termed a *threat* response). A threat response is thought to occur when resources are evaluated as not meeting situational demands, whereas a challenge response indicates that situational demands have been evaluated as surmountable (Blascovich et al., 2003).

Finally, a more recent study showed that religious people who were primed with thoughts about their religious faith had lower defensive neural responses to errors in the Stroop test (Inzlicht & Tullett, 2010). This finding suggests that religious beliefs may have provided a sense of meaning and security that protected participants from negative affective responses to errors. Taken together, these results remind us that even though self-control has traditionally been considered a conscious, effortful process, we know better now. Therefore, we should expect that many of religion's potential self-regulatory effects will occur through automatic processes and not only through conscious cognitive ones. Research in the future should examine religion's effects on self-regulation through both of these possible routes.

Can religion's links to self-control and self-regulation help to explain religion's associations with behavior? Self-regulation and self-control may help to explain religion's well-established associations with measures of health, well-being, and social behavior such as longevity (McCullough et al., 2000), decreased depression (Smith et al., 2003), improved marital functioning (Mahoney et al., 1999), less crime and delinquency (Baier & Wright, 2001), and higher school achievement (Jeynes, 2002)—outcomes that other research has consistently linked to high self-control (for a comprehensive review, see Vohs & Baumeister, 2011).

For instance, six studies have addressed the proposition that religion's associations with measures of substance use and delinquency are due in part to religion's ability to foster self-regulation or self-control and restraint (Bjarnason, Thorlindsson, Sigfusdottir, & Welch, 2005; Desmond et al., 2008; Walker et al., 2007; Welch, Tittle, & Grasmick, 2006; Wills, Gibbons, Gerrard, Murry, & Brody, 2003). Five of these studies found that self-control partially mediated the associations of religiousness with these outcome variables. In one representative study, Walker, Ainette, Wills, and Mendoza (2007) found that religiousness was negatively associated with self-reported substance use in two different cross-sectional data sets: a sample of 1,273 middle school students and a sample of 812 high school students. The negative association of religiousness with substance use in both samples was significantly mediated by a latent variable measuring good self-control. Also, Desmond, Ulmer, and Bader (2008) found that self-control partially mediated the cross-sectional associations of a three-item self-report measure of religiousness with alcohol use and marijuana use in the Add Health data set (a study of students from a nationally representative sample of 132 middle schools and high schools in the United States). These mediational effects obtained even when controlling for participants' sex, age, race, parental education, socioeconomic status, family structure, students' grades, associations with

delinquent peers, attachment to their schools, religious denomination, and several other variables.

We have speculated that self-control or self-regulation might mediate religion's associations on many domains, including longevity, psychological symptoms, marital and family functioning, school achievement, and prosocial behavior. However, studies have not been conducted on most of these domains. Moreover, all of the extant research on this proposition is correlational (and cross-sectional). Stronger tests of causality, using a broader array of outcomes, would advance this line of research.

Does religion ever lead to self-control failures?

We are occasionally asked whether religious belief and behavior can lead to self-control failures. We think the answer to this question is a qualified "no." The "no" is qualified for three reasons. First, it is possible that extended exertion in the religious domain (e.g., sustained periods of fasting, meditation, or other forms of religious devotion) sometimes temporarily reduces people's willingness to persist in the pursuit of other goals–a state that might be accompanied by a felt sense of fatigue or boredom. This fatigue, however, might be the result of mental and physical exertion more generally instead of indicating anything special about the religious domain. Second, certain forms of religious belief may more readily lead to failures of self-control. As mentioned, extrinsically motivated religious belief is correlated with lower self-control (Bergin et al., 1987; Bouchard et al., 1999; Vitell et al., 2009). This correlation could mean that extrinsic religious motivation reflects an impulsive, poorly controlled approach to life overall such that more impulsive people, if they are religious, tend to be extrinsically motivated (Vitell et al., 2009). It could also reflect the generally unprincipled quality of extrinsic religiousness: When religious involvement is not based on principles (i.e., high-level goals related to the kind of person one is trying to become), low-level life goals may become uncoordinated (Carver & Scheier, 1998). Finally, it is also possible that some ecstatic religious rituals reduce people's self-control or self-regulation for ritual reasons (e.g., to facilitate the experience of spirit possession, speaking in tongues, or ecstatic joy). However, it is unclear that such changes of consciousness are due to failures of self-control or self-regulation. The term *failure* suggests that something has gone wrong; ritual loss of self-control implies that the loss of self-control is deliberate.

It is obvious that not all of religion's effects—even those that are predicated on religion's ability to foster self-control—are beneficial for society. As a matter of fact, we think the links of religion to self-control and self-regulation can explain some of religion's negative effects—not because religion sometimes reduces self-control, but rather, because it is so good at encouraging people to pursue particular goals and to behave nonimpulsively.

Consider religious violence. Religious stimuli can motivate aggression (Bushman, Ridge, Das, Key, & Busath, 2007) and prejudice (Altemeyer & Hunsberger, 2005) at least as effectively as they facilitate cooperation (Shariff & Norenzayan, 2007) and other forms of prosocial behavior (Saroglou, Pichon, Trompette, Verschueren, & Dernelle, 2005)—perhaps especially when the religion is of a fundamentalist, authoritarian variety (Altemeyer & Hunsberger, 2005; Rowatt et al., 2006). Moreover, the religious sanctification of goals such as dying for one's religion or one's ethnic group, or loyalty to one's small group are highly effective tools for recruiting suicide terrorists (Atran, 2003; see also Chapter 26 in this volume and Volume 2, Chapter 18, this handbook). Means-end analysis of terrorism (Kruglanski & Fishman, 2006) implies a role for cultural (including religious) factors that can influence the many facets of self-regulation, including (a) the goals people select, (b) the motivation that becomes attached to those goals, (c) the psychological processes that influence error monitoring as people set out plans for making progress toward their goals, and (d) the outputs at people's disposal for modifying their behavior to create progress toward goal attainment. In other words, a self-regulation analysis of religion suggests that religion is well-suited to motivate any behavior that is predicated on self-control and self-regulation. Such behaviors might range from studying for exams or avoiding drugs to donning a bomb belt and detonating it on a crowded city bus. For example, even after one has decided to become a suicide terrorist, detonating a

bomb must surely involve overcoming some impulse to save oneself. Here again religious socialization may bring about a higher level of self-control that allows people to execute their destructive choices.

POTENTIAL REAL-WORLD APPLICATIONS

We see at least five directions for research that might lead to real-world applications. First, many people wish they had more control over their emotions, appetites, and impulses. Religious rituals such as prayer, meditation, religious imagery, and reading religious scriptures evidently influence the self-control of attention and emotion (McCullough & Willoughby, 2009; see Chapter 18 in this volume). Such rituals might thus be useful to people who want to increase their self-control. Meditation is of special interest here because it might be more broadly applicable (i.e., even to nonreligious people) than prayer. It would be useful to know whether all of these religious rituals could be adapted for use in both religious and nonreligious populations (see Volume 2, Chapter 10, this handbook).

Second, it would be useful to know whether—and if so, how—use of religious beliefs in coping might affect downstream self-control. Pargament, Koenig, and Perez (2000), for example, developed the Religious Coping Inventory (RCOPE), a 17-factor self-report scale of religious coping. This measure taps a wide variety of religious strategies that people use to cope with negative life events. These strategies include (a) taking a religious focus (i.e., engaging in religious activities such as prayer to distract oneself from a stressor), (b) using collaborative religious coping (i.e., seeking control over a stressor through a problem-solving partnership with God), and (c) seeking support from clergy or members of one's religious group. This scale also measures several forms of negative religious coping (e.g., attributing one's problems to demonic influences or God's punishment). It is possible that some of these techniques lead to good short-term responses to stressors but to negative long-term effects on the self-control of emotions or attention. If we knew more about which aspects of religious coping led to better or worse self-control, we could make better predictions (and recommendations) regarding how people under stress might use religious beliefs for coping without encountering unintended negative consequences for self-regulation.

Third, we think there is a potential real-world application that comes from research on subtle environmental primes. Research suggests that priming people with subtle stimuli such as geometric configurations that resemble eyes or faces (Bateson, Nettle, & Roberts, 2006; Haley & Fessler, 2005; Rigdon, Ishii, Watabe, & Kitayama, 2009), reminders of God or religion (Pichon et al., 2007; Shariff & Norenzayan, 2007), and even secular institutions such as contracts and police that regulate prosocial behavior can increase generosity, cooperation, and charitable giving. These effects have been obtained in both laboratory and field experiments, raising the idea that some of the lowest hanging fruit in professionals' efforts to increase prosocial behavior in the real world might be achieved through subtle, nonpreachy stimuli that activate religious cognition without conscious awareness (Pichon et al., 2007; Shariff & Norenzayan, 2007).

Fourth, we view the links of religion and self-control as potentially providing new angles for understanding self-control and self-regulation more generally. Can researchers do a better job of explaining the psychological and behavioral processes by which religious families end up with more self-controlled first graders (Bartkowski et al., 2008), or how people who are religious end up with more self-control by the time they reach adulthood? Can they explain these religion and self-control links in terms of the distinct elements of the parenting that religious people receive as children or the social interactions with adults and peers that they experience in their religious congregations? Can they explain them in terms of the goals that religious adolescents set for themselves? Do religious people end up with more self-control through the accumulation of small, daily choices to exert self-control (e.g., waking up the first time the alarm goes off)? Or is it more important to exercise self-control in high-stakes situations (e.g., resisting peer pressure to experiment with drugs)? The sooner we know how religious people acquire higher self-control over the life course, the sooner such insights might

be applied to efforts to improve human well-being for religious and nonreligious people alike.

CONCLUSION

Research shows that religion is related to many domains of life—so many, in fact, that one can easily get lost in the details. Here, we have tried to focus on a single mechanistic explanation—self-regulation and self-control—for how religion obtains its associations with so many of these life domains. As important, however, we have tried to offer a cultural–evolutionary explanation for why (we think) religion has evolved to be so good at affecting human functioning through this particular mechanism. By focusing on the "how" and the "why," we hope we can generate research on these ideas that will not only help us to understand religion and self-control more generally but also to generate insights that can improve the lives of individuals and the well-being of their relationships and societies.

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