Is Religion "Just" Supernatural Agency, Social Support, or Meaning?

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IS RELIGION “JUST” SUPERNATURAL AGENCY, SOCIAL SUPPORT, OR MEANING?

A Dissertation
Presented to
the Faculty of Social Sciences
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In Partial Fulfillment
of the Requirements for the Degree
Doctor of Philosophy

by
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August 2011
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Abstract

There is longstanding tension in the study of religion between those who believe religion can be reduced to general psychosocial processes and those who think that religion is somehow unique. One way to test these two possibilities is to compare religious versions of mechanisms to nonreligious versions. If religion is somehow unique, then the religious versions should explain variance in outcomes that the nonreligious versions do not. Three studies confirmed religion’s independent predictive power. Exposure to a religious supernatural agent reduced cheating more than exposure to a nonreligious supernatural agent (Study 1), receiving religious social support during a stressful task reduced cardiovascular reactivity (CVR) more than receiving nonreligious social support (Study 2), and exposure to a religious meaning system increased charitable donations more than exposure to a nonreligious meaning system (Study 3). Further, individual differences in beliefs moderated these and other effects, indicating that religion warrants attention at multiple levels. These studies offer the first experimental evidence that religion cannot be fully understood through general psychosocial processes. The psychological study of religion has the potential to make unique contributions to our understanding of human cognition, behavior, and health.
Acknowledgements

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From my boyfriend listening to me blather on about the first ideas for these studies, to my fiancé helping me fix computer problems with data collection, to my husband making me dinner while I stayed up late writing draft after draft, my best friend and all-time favorite person was there. His name should be on this thing (or so he tells me!). So here it is. Thank you, Robert Griffin Lelewski.
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Is religion “just” supernatural agency, social support, or meaning?

Religion is associated with an expanse of psychological, social, and health outcomes including social attitudes (Allport & Ross, 1967; Johnson, Rowatt, & Labouff, 2010), emotional states (Emmons, 2005; Fredrickson, 2002), cognitive processing (Andresen, 2000; McIntosh, Silver, & Wortman, 1993), self-regulation (McCullough & Willoughby, 2009), prosocial behaviors (Norenzayan & Shariff, 2008; Randolph-Seng & Nielsen, 2007), coping strategies (Newton & McIntosh, 2009a; Pargament, 1997), and physical and mental health (Koenig, 2008; Koenig & Larson, 2001; Koenig, McCullough, & Larson, 2001; McIntosh, Poulin, Silver, & Holman, 2011). Studies utilizing longitudinal, prospective, quasi-experimental, and experimental designs have begun to confirm causal effects of religion on various outcomes (Hood & Belzen, 2005).

In short, religion does stuff. Further, because a majority of people nationwide (81.1%) and worldwide (67.3%) consider themselves religious (World Values Survey, 1981-2004), religion has the potential to do stuff for the multitude. This scope is furthered by the personal salience religion tends to have for adherents; effect sizes of religion on outcomes are routinely medium to large (see Paloutzian & Park, 2005). When religion does stuff, it usually does it big. Given such substantive explanatory power, a question naturally arises – how does religion do what it does?

Understanding the mechanisms by which religion influences outcomes is of central concern to scientists who study religion. The preponderance of these potential
mechanisms necessitate thick descriptive volumes of their operationalizations (e.g., Hill & Hood, 1999; recently, Hill & Pargament, 2008). By means of full or partial mediation, these mechanisms demonstrably account for relationships between religion and some outcomes. As will be detailed later, included among the confirmed mediators of religion are general processes in psychology that are not necessarily religious, such as social support, meaning-making, and others, leading some to argue that the mediators of relationships between religion and outcomes are “mundane” (Joiner, Perez, & Walker, 2002, p. 214). By mundane, Joiner and colleagues mean that religious versions of these mediators should have the same effects as nonreligious versions. If this claim is accurate, it would imply that further study of religion is not necessary because we can understand religion by understanding general psychosocial processes. In the following pages, I hope to demonstrate that this conclusion is not (yet) warranted, but rather, whether religion is mundane is an untested empirical question. Additionally, I describe a series of studies designed to test this question by comparing religious versions of general psychosocial mechanisms to nonreligious versions. For example, is religious social support distinct from nonreligious social support? If religious versions of mechanisms exhibit independent predictive power of outcomes compared to nonreligious versions, this would be strong evidence that the mechanisms of religion are not merely mundane.

If evidence points to the independent predictive power of religion, two possible explanations seem likely. First, there may be some property or properties of religion not captured by general psychosocial processes – perhaps a distinctive “religion factor” that modifies general processes is part of the religious schema. This “religion factor” may be
a unique aspect of religion without a nonreligious analogue (e.g., the quality of
transcendence or the sacred, belief in an afterlife, prayer, belief in an omniscient,
onnipotent, omnipresent deity). The second way religion may explain independent
variance is, as the Latin origin of the word suggests (religāre, “to tie together,” Latin
Concise Dictionary, 1st ed., 2003), religion may bind together various general processes
in distinctive combinations. The independent predictive power of religion would then
emerge from additive or interactive effects.

Why are questions about the independent predictive power of religion important?
There is longstanding tension in the study of religion between those who believe religion
can be reduced to general psychosocial processes (i.e., mundane mediators) and those
who think that religion is not fully reducible. This issue is at the heart of this paper.
“Isn’t religion just a bunch of hormones?...Is not religion merely a defense against
anxiety?...Is not religion basically a way to find meaning in life?...Is not religion
fundamentally a way to build social solidarity?” (Pargament, 2002, p. 240). The
motivation behind these questions and the conclusion that the mediators of religion are
mundane seems to be the reduction of religion into a neat package of basic processes that,
per se, have little to do with religion. Put another way, to understand the effects of
religion on outcomes, we need only to understand the general, non-religious mechanisms
that theoretically mediate the effects of religion. There is no reason to think that religious
versions of those mechanisms should have any different effects on outcomes than
nonreligious versions. Some find this approach and its implications objectionable because
it may oversimplify a complex phenomenon just as reducing psychology to “just” biology
loses an important level of analysis (Zinnbauer & Pargament, 2005). The alternative is that the study of religion adds explanatory power to the study of psychology, explaining outcomes beyond general psychosocial processes.

Results of the studies proposed here will speak directly to this controversy. If religious processes do not offer independent explanatory power of outcomes beyond that of general processes, psychologists should focus on the more parsimonious reductionist alternative – why bother to study religion? However, if religious processes do have independent predictive power, adding something psychologically or socially influential, then resources should be directed towards the study of religion in its own right.

**Defining religion**

To begin an analysis of the mechanisms of religion, it is helpful (but difficult) to define what is meant by religion. This task is difficult because definitions of religion almost unfailingly commit one of two errors – inclusion or exclusion. Definitions with inclusion errors tend to be overly broad. For example, some definitions classify anything with a meaning-making function as religion (Barrett, 2001; Lindbeck, 1984), perhaps including systems of belief that adherents would adamantly deny are religious at all, such as atheism and secular humanism. Definitions with exclusion errors tend to be specific to a fault. For example, some definitions of religion identify belief in a supernatural creator god as integral, ruling out non-theistic faiths that do not meet this criterion, such as Buddhism (James, 1916; Nelkin, 2000). Theologians, sociologists, lawyers, neuroscientists, historians, philosophers, anthropologists, and psychologists may all generate different inclusion and exclusion criteria for a definition of religion. All will
have their own biases. As one scholar of religion observed, “any definition of religion is likely to be satisfactory only to its author” (Yinger, 1967, p. 18).

Further muddying the waters, it is possible to draw sharp divides between related concepts including religion and spirituality, personal and institutional religion, ethnic and elective religion, and a host of others (see Paloutzian & Park, 2005 and Hood, Hill, & Spilka, 2009). These distinctions have been and continue to be useful tools for conceptualizing a complex phenomenon. Clearly, religion is multidimensional – not just one thing, but an organization of things. However, there is a real danger of succumbing to an overwhelming proliferation of distinctions in the definition of religion, some of which may be semantic, not actual, with significance that is theoretical, not practical. Other distinctions may be redundant.

One explanation for these pitfalls of defining religion is that religion is a fuzzy concept (Zinnbauer et al., 1997). That is, due to its inherent fuzziness, the content of religion varies by condition, from situation to situation and individual to individual. Thus the boundary conditions of religion are difficult to grasp. A successful operationalization of religion is therefore likely to depend on that which is clearly in the religious domain, rather than marginal conceptions. This is not to suggest that these marginal conceptions are unimportant, or are not about religion, but rather those aspects of religion that are most central to ideas about religion provide the best basis for empirical study. To determine these central aspects of religion, one only need look to the culture. Ideas of religion that are the most widely held and the most frequently transmitted from one person to another are the most important for defining, understanding, and studying
religion. These central aspects of religion are also the most likely to be part of a cognitive schema of religion (McIntosh, 1995).

**Religion-as-schema**

A schema is a mental structure that represents an understanding of a particular domain, including information about how various parts of that structure are related. Precedence of mental activation in a schema is given to attributes of a schema that are the most central and salient (Neisser, 1967). For example, concepts like “used for sitting” and “has four legs” will be more active in a chair schema than less central concepts like “smashed in professional wrestling” and “can have wheels.” Theoretically, a religious schema is no different, bringing a useful benefit to the table of defining religion. The schematic structure of a religion brings to the fore aspects of religion that are most central and salient, those that are most easily accessible. Some of these easily accessible features of religion, important for defining, understanding, and studying religion, will be identified and addressed later.

Conceptualizing religion-as-schema has advantages beyond defining religion, extending to both theory and method. I will first consider the applications of religion-as-schema on theory. Schemata are constructed from experience (Neisser, 1976). Therefore, those who have similar experiences (e.g., are raised in the same culture) will likely have similar schemata. Religion is often deeply personal, but it is also a pervasive group-level, cultural phenomenon (Cohen & Hill, 2007). Most residents of the United States share the experience of constant exposure to religion. Religious people, buildings, and symbols are frequently encountered, regardless of personal religious beliefs. Atheists and theists alike
pass the same religious billboards on the highway and the same religious radio stations on
the dial. One need not be a religious believer to know that the white-haired bearded guy
(provably wearing sandals and sitting in a cloud) in the film or comic strip is God.
Therefore, perhaps it is not necessary for an individual to be personally religious to have
a religious schema. This inference is widely supported by recent experimental research
demonstrating that certain effects of religion are not limited to the religious (Newton &
McIntosh, 2009b; Pichon, Boccato, & Saroglou, 2007; Randolph-Seng & Nielsen, 2007;

Another characteristic of schemata with implications for conceptualizing religi-
as-schema is that specific features of a schema can be embedded in general features
(Neisser, 1976). Applied to religion, specific features of a religious schema (e.g., belief
that God is benevolent) can be embedded in more general features of religion (e.g.,
religion is linked to meaning; McIntosh, 1995). It may be that the more general features
of religion are culturally transmitted and are therefore widely held as part of the cultural
level religious schema. Both atheists and theists would share this cultural level of
religious schema. However, based on previous research indicating the centrality of
individual differences in religion, we know the specific, personal level of religious
schemata is also important. Further, we know that specific religious beliefs can moderate
more general effects of religion (Newton & McIntosh, 2009a; Newton & McIntosh,
2010). Consistent with these results, considering religion-as-schema allows for both
cultural effects of religion and personal religious beliefs.
A final theoretical benefit of a religion-as-schema conceptualization is that it can accommodate different accounts of why religious versions of mechanisms may explain variance that nonreligious versions do not. As described above, there are two possible explanations of religion’s potential independent predictive power. A distinctive “religion factor” may add something transformative to a general mechanism or religion may bind together general processes not typically related outside the rubric of religion. Indeed, a religion-as-schema conceptualization already implies this latter possibility. Under the umbrella of religion-as-schema, these two accounts are not mutually exclusive. It is possible that a schema of religion may contain unique aspects of religion as well as bind together more general psychosocial processes.

Considering religion-as-schema also has an important methodological ramification. Namely, schemata can be primed (Bargh & Chartrand, 1999; Bargh, Chen, & Burrows, 1996). Priming occurs when exposure to a stimulus makes certain content or procedures temporarily more available, or salient, than they would otherwise be. This availability is then recruited in response to a later stimulus, resulting in an effect of the earlier stimulus on the later stimulus, often without the conscious awareness and control of the participant. Priming has been a useful methodology in psychology, illuminating the organization of semantic networks, directional relationships between stimuli, and the active content of schemata (Bargh, 2006; Bargh & Chartrand, 1999). Recently priming has been used successfully in the study of religion, with the priming of religion leading to a wide range of outcomes including less self-attribution for actions with ambiguous authorship (Dijksterhuis, Preston, Wegner, & Aarts, 2008), prosocial behavior (Newton
McIntosh, 2009b, Pichon et al., 2007; Randolph-Seng & Nielsen, 2007; Shariff &
Norenzayan, 2007), prejudiced attitudes (Johnson et al., 2010), mood states and life
satisfaction (Wiegand & Weiss, 2006), and physiological responding (Weisbuch-
Remington, Mendes, Seery, & Blascovich, 2005). With few exceptions, these studies
primed religion at a general, abstract level, usually using iconic religious images or
religious words (e.g., God, sacred, prophet, divine).

Although priming religion at this general level has provided insight into outcomes
affected by religion, it is nonetheless charged with interpretive difficulties. As a colleague
asked, “what in God’s name are we priming?” The short answer is that we are priming
concepts that are part of or related to religion – the religious schema (McIntosh, 1995).
But what constitutes that schema? When religion is primed in general, as in the studies
mentioned above, it is impossible to know exactly which aspects of religion are
responsible for which outcomes. For example, when prosocial behavior is increased
following a general prime of religion, we do not know if the effect was due to thoughts of
a supernatural agent who would want and reward prosocial behavior, a sense of
belonging to a group that engages in prosocial behavior, or perhaps activation of a
meaning system consistent with prosocial behavior. Of course, all these aspects of
religion may combine to lead to increases in virtuous behavior, but even this possibility
remains underspecified when religion is primed in general. The answer to this problem
may be how religion is primed. By contextualizing the religion prime in certain domains
or as specific mechanisms of religion (e.g., a religious supernatural agent), it may be
possible to move toward a more precise understanding of the underlying structure of
religion. In particular, specific primes enable identification of outcomes which are conceptually proximal or distal to the particular manipulation of religion. Conceptually proximal outcomes should be most directly affected by the manipulation, but spreading activation through the religious schema should also affect more conceptually distal outcomes, although effects may weaken as outcomes become increasingly conceptually distal (see Meyer & Schvaneveldt, 1971). Further, this type of contextualized, specific priming allows for a tightly controlled comparison of religious versions of mechanisms to nonreligious versions.

**Selecting mechanisms for comparison**

Researchers in the psychology of religion have come a long way toward explaining relationships between religion and psychological, social, and health outcomes, identifying a multitude of potential mechanisms. Although we may eventually wish to test all these for independent predictive power, it is best to begin with the most promising candidates, the mechanisms that provide the strongest test of differences between religious and nonreligious versions. Three considerations will narrow the field – the type of mechanism, the type of associated outcomes, and how central the mechanism is to religion.

As discussed previously, one way to determine whether religion is reducible to more basic processes is to compare religious versions of those processes to nonreligious versions, testing whether religion adds any explanatory power for outcomes. This method requires identifying the mechanisms of religion that have nonreligious analogues.
an afterlife, prayer, or belief in an omniscient, omnipotent, omnipresent deity, are not
well-suited to this technique. However, aspects of religion that do have nonreligious
analogues are well-suited, including supernatural agency (i.e., God vs. ghost), social
support (i.e., religious v. nonreligious social support), and meaning (i.e., religious vs.
onreligious meaning).

Another consideration for identifying the most promising candidate mechanisms
to test the predictive power of religion is the kind of outcomes they explain. As
summarized above, religion has been linked to a wide expanse of general psychological,
social, and health outcomes including social attitudes, emotional states, cognitive
processing, self-regulation, prosocial behaviors, coping strategies, and physical and
mental health. However, in addition to these general outcomes, religion has also been
linked to religious outcomes, such as religious conversion (Paloutzian, 2005), spiritual
wellbeing (Ando, Morita, Okamoto, & Ninosaka, 2008), attachment to God (Kirkpatrick,
2005), appraisals that God is in control (Newton & McIntosh, 2009a), and feelings of
closeness to one’s religious community (Meisenhelder & Marcum, 2004). Although a
deeper understanding of the interrelations of the mechanisms of religion and religious
outcomes has led psychologists of religion to a critically deeper understanding of religion
itself, the approach is somewhat insular. The relationship between religious variables and
religious outcomes does not fully illuminate the relationship of religion with more
general processes and outcomes. Therefore, the mechanisms that provide the best test of
the independent predictive power of religion are those that explain variance in general,
not just religious, outcomes. For example, exposure to a supernatural agent has been
shown to have effects on cheating behavior (Bering, McLeod, & Shackelford, 2005; Randolph-Seng & Nielsen, 2007). Social support has effects on cardiovascular reactivity (CVR) and wellbeing (Chen & Contrada, 2008; Gallagher & Vella-Brodrick, 2008; O’Donovan & Hughes, 2008). Finally, meaning has an effect on sense of coherence in life (Baumeister, 1991; Kark, Carmel, Sinnreich, Goldberger, & Friedlander, 1996; Pohlmann, Gruss, & Joraschky, 2006).

Finally, we must also consider how central the mechanism is to religion. This consideration is closely tied to the definition of religion and to the content of the religious schema. As noted above, religion is highly variable and is therefore difficult to peg, especially the fuzzier boundary conditions of religion. Therefore, to best test the independent predictive power of religion, the mechanisms most central to religion should be considered. The centrality of the mechanisms of religion can be identified by how persistent they are in the culture. For example, in Western culture, a supernatural agent is consistently part of religion (Guthrie, 1993). Likewise, the communal aspect of religion and the social support it entails is a central part of religion in the culture (Durkheim, 1995). Finally, the provision of meaning is perhaps the most characteristic aspect of religion in the culture (Baumeister, 1991).

Thus, we arrive at three criteria for selecting mechanisms of religion to test religion’s independent predictive power – having nonreligious analogues, with predictive power for general outcomes, and central to cultural concepts of religion. I have selected three mechanisms of religion that meet these three criteria – supernatural agency, social support, and meaning. These may not be the only mechanisms of religion that meet all
three criteria, but they are a good place to start because they have garnered particular attention in the literature. Each of these has been proposed as an explanation for how religion does what it does. However, a question crucial to understanding religion remains outstanding. Are these mechanisms distinct in their religious forms compared to nonreligious forms?

**Supernatural agency**

How does religion do what it does? Part of the answer may be that it provides a supernatural agent (Boyer, 2001; Norenzayan & Shariff, 2008). Supernatural agents may be either religious (e.g., God) or nonreligious (e.g., ghosts). Recent experimental studies have induced thoughts about nonreligious supernatural agents and measured the effects of this induction on various outcomes. In one study participants who were casually told that the ghost of a dead graduate student had been recently seen in the testing room cheated less on a task (Bering et al., 2005). In another study from the same lab, children who were told that Princess Alice, who is invisible, is watching them were less likely to open a box that was previously forbidden to them (Bering, 2006). Experimental manipulation of a religious supernatural agent – priming God – has resulted in similar outcomes including less cheating (Randolph-Seng & Nielsen, 2007) and more generosity (Shariff & Norenzayan, 2007; Pichon et al., 2007; Preston, Ritter, & Hernandez, 2010). These findings have led to a supernatural monitoring hypothesis; thinking about a supernatural agent makes people feel their actions are being watched (Gervais & Norenzayan, under review; McKay, Efferson, Whitehouse, & Fehr, 2011). Bering and Johnson (2005) contend that people tend to think of supernatural agents (religious or nonreligious) as
possessing traits that make cheating inadvisable, such as not being deceivable, caring about moral actions, and meting out punishment for wrong doing. Norenzayan and Shariff (2008) also advocate for a supernatural monitoring explanation, but emphasize reputational concerns over characteristics of the supernatural agent. In support of a watcher effect operating through reputational concerns, simple pictures of eyes, even stylized eyespots, increase prosocial and decrease antisocial behavior (Bateson, Nettle, & Roberts, 2006; Rigdon, Ishii, Watabe, & Kitayama, 2009). Clearly, feeling watched makes people behave better. However, it should be noted that although Gervais and Norenzayan (in press), Bering and Johnson (2005), and Norenzayan and Shariff (2008) lump religious and nonreligious supernatural agents into the same category with the same theoretical explanation, the effects of these two different kinds of supernatural agents have never been directly compared.

In what ways might a religious supernatural agent (i.e., God) be different from a nonreligious supernatural agent (i.e., Ghost)? The supernatural monitoring hypothesis posits that there is not necessarily a difference between the effects of a religious and a nonreligious supernatural agent. This approach is reminiscent of basic social psychology: the presence or imagined presence of others changes the way people think, feel, and act (Allport, 1985). However, just as we know that not all “others” have the same effects on thoughts, feelings, and actions (see Fiske, Gilbert, & Lindzey, 2010), not all supernatural “others” should have the same effects. Indeed, ideas about God are often very different than ideas about ghosts. In Western culture, God is an agent who can possess both anthropomorphic (e.g., benevolence, anger) and transcendent (e.g., omniscience,
omnipotence, omnipresence) qualities and who rewards morality and punishes immorality. Ghosts are much more limited, both in scope and in strength of the cultural concept. Ghosts simply are not as culturally prevalent as God, and what is culturally present about ghosts is scattered. For example, do they care about our morality (e.g., Dickens’ Ghost of Christmas Past) or not (e.g., Slimer from Ghostbusters)? Are they nice (e.g., Casper the friendly ghost) or mean (e.g., Bloody Mary)? In support of the limited effects of ghosts, the studies described above which examined the effects of nonreligious supernatural agents (i.e., Princess Alice and the graduate student ghost) took pains to contextualize the agent to the physical location of the participant. This limitation suggests that simply exposing participants to a “ghost” stimulus may not have much effect on prosocial behavior. Therefore, there is good reason to think the supernatural monitoring hypothesis is an incomplete explanation of the effects of supernatural agents on prosocial outcomes. Although feelings of being watched by a supernatural agent may be experienced and have subsequent effects on outcomes, the effects of God and ghost on prosocial outcomes should differ.

A religion-as-schema conceptualization allows for this possibility in two ways. First, different characteristics of religious and nonreligious supernatural agents described in the previous paragraph are imbued by the culture and are therefore part of cultural schema. The religious schema contains a supernatural agent especially well-suited to encouraging prosociality. Second, religion-as-schema suggests a strong automatic association between religion and prosociality, fostered by cultural transmission (see Norenzayan & Shariff, 2008 and Preston et al., 2010). That is, prosociality is so ingrained
in the cultural idea of religion, that it has become integral to the religious schema. Indeed, the stereotype of religious individuals as especially prosocial strongly affects response strategies in economic games (de Dreu, Yzerbet, & Leyens, 1995). According to religion-as-schema, when exposed to religious stimuli (e.g., a religious supernatural agent), people access related concepts (e.g., prosocial thoughts and actions). This response seems to be at least somewhat automatic or ideomotor; even studies that subliminally prime religion find prosocial effects including less cheating (Randolph-Seng & Nielsen, 2007), more prosocial intentions (Pichon et al., 2007, Study 1), more group cooperation (Ritter & Preston, 2010; Shariff & Norenzayan, 2007). Perhaps even more compelling evidence of a schematic automatic association is that religious stimuli have effects on prosocial outcomes even on those who are not religious (Pichon et al., 2007; Randolph-Seng & Nielsen, 2007; Ritter & Preston, 2010; Shariff & Norenzayan, 2007, Study 1), a finding difficult to explain under the supernatural monitoring hypothesis. Why think that God is watching you if you don’t believe in God?

Religion-as-schema offers an alternative to the supernatural monitoring hypothesis, but more than that, it can explain many effects of religion, not just effects of a religious supernatural agent on conceptually proximal outcomes. Cheating behavior is conceptually proximal to religious supernatural agency because the idea of God as a watchful and moral agent is very strong in the culture. However, according to religion-as-schema, exposure to a religious supernatural agent should also affect conceptually distal outcomes through spreading activation, including sense of coherence in life, prosocial intentions, and subjective wellbeing. Moreover, religion-as-schema indicates that religion
is more than supernatural agency. As mentioned above, another central aspect of religion is the social support it offers.

**Social support**

How does religion do what it does? Part of the answer may be that it offers opportunities for social support (George, Ellison, & Larson, 2002). Social support is a ubiquitous mechanism linked to many positive outcomes including less depression (Zuroff & Blatt, 2002), more effective coping with stressors (Peacock & Wong, 1990), and greater subjective wellbeing (Gallagher & Vella-Brodrick, 2008). In its religious incarnation, social support is often operationalized as religious attendance or participation. As such, religious social support has been linked to the same positive outcomes as social support in general, including less depression (Idler & Kasl, 1992), more effective coping with stressors (see Pargament, 1997), and greater subjective wellbeing (Ellison & George, 1994; Greenfield & Marks, 2007; Koenig & Larson, 2001; Idler, McLaughlin, & Kasl, 2009). Of particular interest to health scientists is the link between social support and mortality. Both general social support (House, Landis, & Umberson, 1988; Williams et al., 1992) and religious social support (Oman & Reed, 1998; McCullough, Hoyt, Larson, Koenig, & Thoresen, 2000; Strawbridge, Shema, Cohen, & Kaplan, 2001) are strong predictors of longer life.

One proposed mechanism of the link between social support and mortality is lower cardiovascular reactivity (CVR) in the face of stress. For example, given the stressful task of giving a speech before evaluators, the presence of a supportive individual can go a long way in relieving both the subjective experience of anxiety as well as
reducing CVR to a more adaptive profile (Chen & Contrada, 2007; Lepore, Allen, & Evans, 1993; O’Donovan & Hughes, 2008; Uchino, Cacioppo, & Kiecolt-Glaser, 1996).

Further, characteristics of the supporter have been shown to moderate the effects of social support. For example, if the confederate is somehow similar to the participant, the social support offered by that confederate has better effects on cardiovascular outcomes (Hilmert, Kulik, & Christenfeld, 2002; O’Donovan & Hughes, 2008). Although similarity can take a number of influential forms (e.g., race, gender), less tangible similarities (e.g., attitudes, group membership) have also been identified as effective moderators of social support in acutely stressful situations (O’Donovan & Hughes, 2008; Stroebe & Diehl, 1988; Wellman & Wortley, 1990). Similarity effects on social support have also been confirmed beyond experimental settings. Individuals with homogenous social networks perceive those networks to offer more support in the face of stress and thereby experience greater wellbeing (Robicheaux, 2003).

In what ways may religious social support be different from nonreligious social support? Fiala, Bjorck, and Gorsuch (2002) suggest two possibilities. First, support from co-religionists may be perceived as support from God. Numerous studies have examined the role of support from God in coping with stress and have found largely positive effects (see Pargament, 1997). The second way religious social support may differ from general social support is that it refers to social support only from persons within one’s faith tradition, those who share similar goals and values relative to ultimate matters (e.g., one’s religious leaders and fellow adherents). Further, because many faith traditions encourage a “brother’s keeper” perspective on mutual support and community, social support from a
co-religionist may have even more of an effect on outcomes. Note that both of these possibilities take into account the similarity of the supporter. The effects of social support from a co-religionist should be different than effects of social support from those with a different religious identification. Therefore, the effect of religious social support on outcomes should be moderated by similarity.

A religion-as-schema conceptualization offers another reason why religious social support may be distinctive. Religion may have an automatic association with social support and its salutatory effects such that simple exposure to religious stimuli may increase the efficaciousness of social support. That is, experiences linking religion and social support are so culturally prevalent, that religion may have automatic effects on outcomes associated with social support. While moderation by similarity may seem contrary to the automatic effects suggested by a religion-as-schema approach, the effects of similarity may also be automatic (see Bargh, 1989).

Differences between religious and general social support, as well as the importance of the similarity of religious social support, were bolstered in a study of American Protestants that found religious social support, including support from fellow congregants, to be associated with positive outcomes like greater life satisfaction, even when controlling for general social support (Fiala et al., 2002). These results were replicated in a similar study examining religious social support in Jews (Lazar & Bjorck, 2008). Among Jews living in religious settlements, religious social support, particularly support from the religious community, explained variance in cognitive and health outcomes distinct from the variance explained by general social support. Therefore, it
seems religious social support positively affects health and wellbeing outcomes not simply because it is social support, but because it is also religious. Further, it seems that not just any religious social support will have these beneficial effects; support from those who are religiously similar seems especially effective.

As discussed earlier, a religion-as-schema conceptualization integrates many aspects of religion into one cognitive structure and is therefore capable of explaining effects of religious social support on many outcomes, not just conceptually proximal outcomes like health and wellbeing. Through spreading activation in the religious schema, religious social support should also have an effect on conceptually distal outcomes (e.g., cheating behavior, prosociality, and sense of coherence in life). Moreover, religion-as-schema submits that religion is more than social support. The provision of meaning is another central aspect of religion.

**Meaning**

How does religion do what it does? Part of the answer may be that it provides meaning in life (Park, 2005a; Park, 2005b). Why are we here? What is life all about? What happens when we die? Answers to these and other existential questions are identified as central to finding meaning in life (see Baumeister, 1991, and Adams, 1979). This meaning can either be general (Baumeister, 1991; Janoff-Bulman, 1992; Koltko-Rivera, 2004) or religious (Batson & Stocks, 2004; McIntosh, 1995; Park, 2005a); both types are associated with positive outcomes including a greater sense of coherence in life and satisfaction with life (Baumeister, 1991; Park, 2005b; Pohlmann et al., 2006).
While both general meaning and religious meaning have effects on similar outcomes, the relationship between religion and meaning is especially strong. In fact, religion is often defined by its relationship to meaningfulness (Batson & Stocks, 2004; Pargament, 1997; Park 2005a), and the provision of meaning has been identified as a key function of religion (Emmons & Paloutzian, 2003; Frankl, 1977; Jonas & Fischer, 2006; Schweiker, 1969). The relationship between religion and meaning may even explain the persistent link between religion and wellbeing (George et al., 2002; Park, 2007; Stenger & Frazier, 2005). Indeed, religion has been identified as particularly adept at providing meaning in life to its adherents, especially when meaning is threatened. For example, positive religious coping was a strong predictor of finding meaning in the violent death of a child (Murphy, Johnson, & Lohan, 2003). Similarly, religious participation and rating religion as important were related to finding meaning in the sudden death of a child, and through finding meaning, more wellbeing and less distress later in time (McIntosh et al., 1993). Experimental results are consistent with these findings. When primed with meaninglessness or thoughts of death, participants reported greater religiousness, suggesting that religious meaning compensates for deficits in general meaning (Norenzayan & Hansen, 2006; Van Tongeren & Green, 2010). The reverse is also true; when made to think about religion, religious participants found reminders of death and meaninglessness less threatening (Jonas & Fischer, 2006).

In support of the uniqueness of religious meaning, one study found that religious appraisals (e.g., attributing a death to God) were significant predictors of finding meaning in life among hospice caregivers, even after controlling for nonreligious appraisals (e.g.,
attributing a death to a doctor; Mickley, Pargament, Brant, & Hipp, 1998). Another study found that religious coping, a kind of religious meaning-making (e.g., “I tried to find the lesson from God in the event”), had effects on outcomes of kidney patients that were not mediated by nonreligious meaning mechanisms (e.g., general cognitive structuring; Tix & Frazier, 1998).

While both these studies hint that religious meaning is distinct from nonreligious meaning, a more direct comparison is desirable. Pohlmann and colleagues (2006) compared individuals who presumably had either a religious or a secular source of meaning, and found that theology students had more differentiated, elaborated, and coherent personal meaning systems than science students. Similarly, a comparison of religious and secular kibbutzim in Israel found that religious kibbutz members had a higher sense of coherence in life than their secular counterparts (Kark et al., 1996).

Although these two studies directly compared groups that presumably derived meaning from either a religious or a nonreligious source, interpretation of these results is limited because the groups were naturally occurring. Individuals with different levels of meaning may have self-selected into different groups, or other group differences might have existed besides the source of their meaning systems. Ideally, a randomized experiment could be used to answer the question of whether religious meaning is distinct from nonreligious meaning.

One way to manipulate and compare religious and nonreligious meaning is to concretize meaning into a meaning system, that is, a conglomerate of beliefs and values that allow individuals to derive meaning and form behavioral motivations. Meaning
systems may also be thought of as worldviews, fundamental assumptions, or philosophies of life (cf. Janoff-Bulman, 1992; Jung, 1942/1954; Koltko-Rivera, 2004). One such meaning system is humanitarianism. Humanitarianism is characterized by benevolence toward all humans and is associated with many prosocial outcomes, including supporting public aid for the poor (Shen & Edwards, 2005) and donations to charity (Fong, 2007). In the form of humanitarianism, meaning can take on religious and nonreligious versions (i.e., religious and secular humanitarianism; see Day, 1952, and Russell, 1925, respectively) which can be manipulated and compared. If religious meaning is distinct from nonreligious meaning, religious humanitarianism should explain variance in outcomes such as charitable giving and sense of coherence beyond that explained by nonreligious humanitarianism.

Why might religious meaning be different from nonreligious meaning? Religious meaning may be unique because it derives from and pertains to that which is divine, numinous, and transcendent, making claims about an ultimate reality relevant to all of human experience. As such, religion has the ability to “interpret each life or each event in a context that runs from the beginning of time to future eternity” (Baumeister, 1991, p. 205). Indeed, the broad interpretive scope of religion has led some to identify religion itself as an especially effective meaning system (Park, 2005b; Schweiker, 1969; Silberman, 2005). Religious meaning may thereby have enhanced effects on meaning-related outcomes due to its vast interpretative power.

Religion-as-schema provides another explanation for different effects of religious and nonreligious meaning. Because religion and meaning are so closely tied in the
culture, an automatic association between the two seems likely, as well as an automatic association between religion and outcomes related to meaning, such as sense of coherence in life. Further, as described above, prior research points to an automatic association between religion in general and prosociality (see Norenzayan & Shariff, 2008 and Preston et al., 2010). This association may drive the effects of religious humanitarianism on prosocial outcomes, such as charitable giving. Conceptualizing religion as a cognitive schema implies automatic effects of religious humanitarianism on conceptually proximal outcomes, including sense of coherence and charitable giving. Because religious meaning draws upon a broader schema of religion, it should also predict conceptually distal outcomes, including cheating behavior and subjective wellbeing, by way of spreading activation.

**Testing religion for independent predictive power**

Funder (2002) argues, “the active ingredients of religion…are shared with many other possible sources…it may be a better strategy to focus on the ingredients rather than on one particular source, even religion” (p. 213). Is he right? Or, as I predict, do religious versions of active ingredients explain variance in outcomes that nonreligious versions do not? To begin this inquiry, I have selected three mechanisms that meet optimal criteria for testing whether religion is distinct: supernatural agency, social support, and meaning. Past research has tested the independent predictive power of religion in three ways – partialing variance explained by religious and nonreligious mechanisms, comparing religious and nonreligious versions of mechanisms within individuals, and comparing groups relying on either religious or nonreligious versions of mechanisms.
The partialing approach for testing the independent predictive power of religion entails the use of partial correlation to statistically isolate the explanatory variance of religion. This approach has largely been implemented with cross-sectional correlational data. For example, Ciarrocchi and Deneke (2004) concluded that there is something more to religion when they found that religiousness made a small but significant contribution in predicting subjective wellbeing over and above the contributions of demographic variables and the five factors of personality. Other studies confirm Ciarrochi and Deneke’s finding with religion explaining one to five percent of variance above other variables such as personality across a number of different outcomes (Golden, 2002; Piedmont, 2001). However, this approach to testing the independent predictive power of religion has several limitations. First, it is not very surprising that religion explains variance above and beyond variables such as the five factors of personality. In fact the lack of redundancy between religion and the five factors of personality is so pronounced that it has been suggested that spirituality and religiousness dimensions together form a sixth personality factor (Piedmont, 2001). The second limitation of the partialing approach is the difficulty of controlling for every possibly relevant variable. Should marital status of parents be controlled? Socioeconomic status? Level of social support? The third limitation of the partialing approach is that it is a much less direct test of religion’s independent predictive power than is comparing a religious version of a mechanism to a nonreligious version.

Emmons, Chueng, and Therani (1998) took the second, more direct approach of comparing religious and nonreligious versions of mechanisms in their study comparing
“spiritual strivings” – a kind of religious motivation – to other kinds of nonreligious strivings within individuals. They found that the correlation between spiritual strivings and wellbeing was stronger than the correlations between other, nonreligious strivings and wellbeing. Religious motivation seems to explain more variance in wellbeing than other motivations. This finding is similar to that of Mickley and colleagues (1998) discussed above; religious appraisals were better predictors of finding meaning in life than nonreligious appraisals.

Two studies utilizing the third way that past research has tested the independent predictive power of religion (i.e., comparing groups relying on either religious or nonreligious versions of mechanisms) have already been described. Theology students with a religious source of meaning had more differentiated, elaborated, and coherent meaning systems than science students with a secular source of meaning (Pohlmann et al., 2006) and religious kibbutz members had a higher sense of coherence in life than their secular kibbutz members (Kark et al., 1996). However, as noted above, without random assignment to condition, it is difficult to isolate the effects of the religious mechanism from individual difference confounds and without manipulation, it is difficult to determine the causal relationships between mechanisms and outcomes. Experimental designs can address these limitations as well as lend convergent validity to the already suggestive results of other studies that religion has independent predictive power.

The lack of experimental designs testing the contributions of religion is understandable. Participants would probably not take random assignment to religion well. However, recent advances in priming and other experimental methods in the study of
religion have shed light on the causal contributions of religion in general and have made it possible to determine the whether the effects of specific mechanisms of religion are unique.

**Present studies**

If the effects of religion are more than mundane mediation, then the effects of religious and nonreligious versions of mechanisms on conceptually proximal outcomes should differ. Specifically, priming a religious supernatural agent should result in less time spent cheating than priming a nonreligious supernatural agent. Receiving religious social support in a stressful task should result in lower CVR and greater subjective wellbeing than receiving nonreligious social support. Finally, priming a religious meaning system should result in larger donations to charity and a greater sense of coherence in life than priming a nonreligious meaning system.

I also predict that religious and nonreligious versions of mechanisms should differentially affect outcomes that are seemingly unrelated to the manipulation, those that are conceptually distal. This should be the case if a religious schema is broader than a nonreligious schema thereby recruiting more domains into a unitary cognitive construct of religion. Specifically, priming a religious supernatural agent should result in greater sense of coherence, more prosociality intentions, and greater subjective wellbeing than priming a nonreligious supernatural agent; receiving religious social support should result in greater sense of coherence, larger donations to charity, and less time spent cheating than receiving nonreligious social support; and priming a religious meaning system will result in less time spent cheating and greater subjective wellbeing than priming a
nonreligious meaning system. However, it should be noted that effects on conceptually distal outcomes may be less powerful than effects on conceptually proximal outcomes (see Meyer & Schvaneveldt, 1971).

Finally, as suggested by a religion-as-schema conceptualization, individual differences in belief should moderate the predicted main effects on both conceptually proximal and distal outcomes. Specifically, I predicted that the effect of the religion manipulation should be greater for more religious individuals. For Study 1, I also predicted that the nonreligious manipulation (i.e., Ghost priming), would have a greater effect on those who have high paranormal beliefs.
Online questionnaire

Before the laboratory session of all studies, participants (N = 216) completed an online questionnaire. Participants completed the questionnaire about one week before the lab session (Study 1: $M = 7.58$ days, Median = 6; Study 2: $M = 7.68$ days, Median = 7; Study 3: $M = 9.36$ days, Median = 6), though time between the online questionnaire and the lab session ranged from 1 day to nearly 6 months in one case (Study 3). The questionnaire assessed demographic variables, individual differences in religion, supernatural beliefs, sense of coherence in life, satisfaction with life, emotional states, and social desirability. Zero-order correlations between these measures can be found in Table 1.

Individual differences in religion

Four individual differences in religiousness were measured: degree of religiousness, intrinsic religiousness, God image, and religious verticality. Degree of religiousness was measured with a single item, “How religious or spiritual do you consider yourself to be?” on a scale of 1 (not at all religious or spiritual) – 10 (extremely religious or spiritual).

Intrinsic religiousness is a committed approach to religion for its own sake, differing from extrinsic religiousness, which refers to religious behavior motivated by instrumental concerns, such as individual and social benefit to the self. This construct was measured with the 8-item Intrinsic Scale (Gorsuch & McPherson, 1989) derived
from the Religious Orientation Scale (Allport & Ross, 1967). Respondents ranked agreement with positively and negatively valenced statements on a scale from (5) strongly agree to (1) strongly disagree. Items on the I-scale include “I enjoy reading about spirituality and/or religion” and “Although I am religious and/or spiritual, I don’t let it affect my daily life” (reverse coded). This scale is widely used and has good psychometric properties (Gorsuch & McPherson, 1989). Consistent with other work, the reliability alpha was .79, here.

God image, the way that people think about God, was assessed by a 36-item measure comprising the most reliable items from Lawrence’s (1997) initial psychometric testing of the God Image Inventory (GII). To make the scale more universally applicable, I replaced all instances of the word “God” with “God, the sacred, or a higher power” (see Newton & McIntosh, 2009). Responses range from strongly agree to strongly disagree, or not applicable. Items include “God, the sacred, or a higher power asks me to keep growing as a person” and “God, the sacred, or a higher power is looking for a chance to get even with me” (reverse coded). We combined items to create an index of overall positivity in God image (α = .94). The higher a person scored on the GII, the more positive that person’s image of God.

Vertical and horizontal dimensions of religion refer to spiritual, deity-focused and humanistic, person-focused aspects of religion, respectively (Benson, Donahue, & Erickson, 1993; see also prayer types described by Ladd & Spilka, 2002). Adherents can focus on either or both of these dimensions. The relative strength of these foci was assessed by the Verticality Scale, a 13-item measure in which participants chose either a
horizontally or a vertically focused response to complete a sentence stem (Newton & McIntosh, 2009). For example, “When I donate money to a church, religious or spiritual organization, or charity, I do it more to…” This stem can be completed with either “give back generously to God, the sacred, or a higher power” (i.e., the vertical response) or “help those less fortunate” (i.e., the horizontal response). Alternatively, participants could indicate that neither option is reflective of their beliefs, or that the item is not applicable to them. Scores were summed across items by scale (items marked “Neither is true for me” were excluded), and totals of the scales for each participant were transformed to a ratio of how vertically focused a person is relative to how horizontally focused that person is. For example, someone who scored a 4 on the vertical scale and a 2 on the horizontal scale would have the same verticality ratio as someone who scored a 6 and a 3, respectively. Because ratio data are bounded by zero and are therefore naturally positively skewed, a base-10 logarithmic transformation was used to improve normality (see Tabachnick & Fidell, 2007).

As seen in Table 1, intercorrelations among degree of religiousness, intrinsic religiousness, and God image were very high (r’s = .65, .70, .73). Correlations between these three measures of religiousness and verticality were also high but consistently lower (r’s = .51, .57, .59), suggesting that the verticality measure may be accessing a related, but distinct dimension of religion. Principal component analyses of these variables also bore out this distinction. All four religion variables yielded one factor explaining 72% of the variance. However, verticality had the lowest factor loading (.77). Principle component analysis without verticality also yielded one factor, this time explaining 80%
of the variance. Degree of religiousness, intrinsic religiousness, and God image had factor loadings higher than .88. Internal consistency of these three religion measures without verticality included was acceptable ($\alpha = .67$), so degree of religiousness, intrinsic religiousness, and God image scales were z-scored and combined into a religion composite. Verticality, given its weaker relationship with the other three religion measures, was kept as a distinct measure.

**Paranormal belief**

Paranormal belief was assessed with the 26-item Revised Paranormal Belief Scale (Tobacyk, 2004). Seven scales measure different kinds of paranormal belief: Traditional Religious Belief, Psi, Witchcraft, Superstition, Spiritualism, Extraordinary Life Forms, and Precognition. Items include "It is possible to communicate with the dead" (Spiritualism) and "Some people have an unexplained ability to predict the future" (Precognition). The measure is psychometrically sound (Tobacyk, 2004). In the current study, although reliability for each of the seven subscales were acceptable ($\alpha = .59 - .89$), reliability for the overall measure very high ($\alpha = .91$). Therefore, I collapsed the subscales into one measure used in subsequent analyses.

**Sense of coherence in life**

Sense of coherence in life was measured with Antonovsky’s (1987) Sense of Coherence Scale. This 29 question scale assesses

“…the extent to which one has a pervasive, enduring, though dynamic feeling of confidence that (1) the stimuli deriving from one’s internal and external environments in the course of living are structured, predictable, and explicable; (2) the resources are available to one to meet the demands posed by these stimuli; and (3) these demands are challenges, worthy of investment and engagement” (Antonovsky, 1987, p. 19).
It typically has high reliability ($\alpha = .82 - .95$; Antonovsky, 1993), replicated here ($\alpha = .89$).

**Satisfaction with life**

Satisfaction with life was measured by the five-item Satisfaction with Life Scale (SWLS; Diener, Emmons, Larsen, & Griffin, 1985), a measure of subjective wellbeing. The SWLS uses a 7-point scale (1 = strongly disagree, 7 = strongly agree), has well documented validity (Diener et al., 1985), and the typically high reliability of the measure ($\alpha$'s $\geq .80$; Pavot & Diener, 1993) was also found in this study ($\alpha = .87$).

**Emotional states**

Emotional states were assessed with a 10-item International Positive and Negative Affect Schedule - Short Form (I-PANAS-SF; Thompson, 2007). Participants rated agreement on a 1-5 scale with five items (alert, inspired, determined, attentive, active) measuring positive affect ($\alpha = .78$) and five items (upset, hostile, ashamed, nervous, afraid) measuring negative affect ($\alpha = .74$).

**Social desirability**

A short form of the Marlowe-Crowne Social Desirability Scale (Crowne & Marlowe, 1960; Ballard, 1992) was used to assess trait social desirability. The scale includes 13 true/false items with socially desirable though improbable responses such as "I’m always willing to admit it when I make a mistake" and "I sometimes feel resentful when I don’t get my way" (reverse coded). In the current study, reliability was acceptable ($\alpha = .69$).
Study 1. Supernatural Watcher Mechanism

I hypothesized that subliminal exposure to a religious supernatural agent would reduce time spent cheating more than subliminal exposure to a nonreligious supernatural agent and a control condition. I further predicted that subliminal exposure to a religious supernatural agent would affect more conceptually distal outcomes, including more prosocial intention, greater sense of coherence in life, and greater satisfaction with life compared to subliminal exposure to a nonreligious supernatural agent. Finally, I predicted that individual differences in religion and paranormal belief would moderate these effects.

Method

Participants. In exchange for course credit, 88 undergraduates completed an online questionnaire and a series of laboratory tasks. Eight participants (9.1%) were not native English speakers and were not included in further analyses, leaving a final sample of 80 (78.8% female; 87.5% white; Age: 17-28, M = 19.94). Participants were religiously diverse; 35% self-identified as nonreligious.

Procedure. Participants were asked to complete a lexical decision task (LDT) aimed at subliminally priming supernatural agents, either religious (i.e., God; N = 24) or nonreligious (i.e., Ghost; N = 28). Subliminal presentation of the neutral word "Glue" (N = 28) served as the control condition. Participants were instructed to judge as quickly as possible whether letter strings presented on a computer screen were words or nonwords
using a keyboard response. Each of the 20 trials of the LDT contained a 250ms premask (i.e., XXXXXX), a 15ms exposure to a subliminal prime (i.e., either the word “God”, “Ghost”, or “Glue”, depending on randomly assigned condition), a 50ms postmask (i.e., XXXXXX), and finally, presentation of the target letter string for 500ms (see Figure 1). The letter strings were words for 10 of the trials and nonword anagrams of those words for the other 10 trials (Pichon et al., 2007). These 10 words were affectively neutral and unrelated to religion. Using a funnel debriefing procedure suggested by Bargh and Chartrand (2000) to probe for experimental awareness of subliminal manipulation, I found that supernatural agency priming occurred outside of conscious awareness for all participants but one. This participant was eliminated from subsequent analyses.

Following the priming LDT, time spent cheating was assessed with a mental rotation task ostensibly designed to measure spatial intelligence (adapted from Bering et al., 2005; see Figure 2 for a sample question). Individuals were assured that their answers would remain anonymous and confidential (to reduce concerns about social detection), but were also told that they were competing for a $25 grand prize to increase competitive motivation. Prior to the administration of the computerized spatial intelligence test, the experimenter read these instructions, also presented on the computer screen, aloud:

“In a moment, you will begin the test on the computer. There are 25 multiple choice items on the test. For each problem, you will be shown a “target” figure (an image) and asked to mentally rotate that image in your head. You will then be asked to select from a group of figures that matches the target object. For example, you might be shown a square and asked how the square would look if it were folded a certain way. You will be given 2 practice questions and will have 30 min to complete this test.”
The experimenter also read aloud the following:

“IMPORTANT NOTE: Because this is a new test, the computer program periodically malfunctions. In some instances, the correct answer may appear on the screen BEFORE the actual problem. If you see the word “ANSWER” at any time, this is a mistake (this is the correct answer to the following problem). **If this happens, please press the space bar immediately so that you can solve the problem honestly.** ONLY BY PRESSING THE SPACE BAR WILL THE SCREEN BE CLEARED. Thank you for your patience while we attempt to fix this problem.”

Thus, the latency of response to press the space bar on these “glitch” items was within the participants control and served as an unobtrusive measure of cheating behavior in a competitive task when the risk of social detection was ostensibly low to absent. Later tests of this measure of cheating in Studies 2 and 3 found a relationship between time spent cheating and performance on this difficult test; the longer participants waited before pressing the spacebar, the greater the number of correct responses ($r(62) = .36, p = .004; r(65) = .31, p = .01$). Computer problems troubled data collection for two participants; these were not included in analyses of the task. Although the computer "glitch" was mentioned as odd for 18 of the participants during debriefing, none realized it was a measure of cheating so none of these were dropped from analysis.

Following the cheating measure, prosocial intentions were assessed with a task designed by Pichon and colleagues (2007) and slightly altered to more plausibly fit the current research context. A table with 20 copies of pamphlets from the University of Denver Center for Civic Engagement and Service Learning (CCESL) was set up in a hallway outside of the lab room. This program encourages students to actively engage with the community and to find ways both in and outside the classroom to accomplish public work that benefits members of the community. As the experimenter walked the
participant from one room to another, s/he gave the participant the opportunity to take as many prosocially oriented pamphlets as s/he wishes by saying:

“I don’t know if you’ve heard, but the psychology department is supporting student involvement in community service. We’d like to take advantage of your presence here to remind you the importance of community engagement and the service learning program. If you wish, you can take as many flyers as you like and distribute them to others to contribute to the greater awareness of the humanitarian objectives of CCESL.”

To avoid self-presentation bias, the experimenter then feigned forgetting a form in the lab room, and left the participant alone at the pamphlet table to retrieve it. Following the lab session, missing pamphlets, taken by the participant, were counted.

After participants had the opportunity to take the prosocial flyers, they completed a questionnaire, including the Sense of Coherence scale (Antonovsky, 1987), Satisfaction with Life Scale (Diener et al., 1985), and the I-PANAS-SF (Thompson, 2007). These scales were used to compute change scores from the prequestionnaire to the lab session. Psychometric characteristics of these measures from the prequestionnaire, the lab session, and the resulting change scores for Studies 1, 2, and 3 can be found in Table 2.

Next, participants completed the Religious Word Completion Task (Raad, 2003) as a manipulation check. Participants were instructed to complete 36 word fragments (e.g., C L O _, F L _ W _ R) of which nine could be completed with either a religious or a nonreligious word (e.g., C _U _ C H can be either CHURCH or CLUTCH). Number of religious word completions was summed as a measure of availability of religious schema.
Finally, participants were led through a funnel debriefing interview designed to ascertain suspicion of the manipulation and measures and to fulfill the ethical obligation of veracity.

Results

Preliminary analyses. The Religious Word Completion Task (Raad, 2003) assessed whether the experimental manipulation had an effect on participants. Four participants who were not able to complete two or more of the critical words from the task were eliminated from analyses. Further, three bivariate outliers in the control condition were also eliminated from analyses. An ANOVA trend suggested that condition did have an effect on religious word completion (Figure 3), $F(2, 70) = 2.34, p = .104$. Tukey post-hoc comparisons suggested that this trend was driven by more religiously completed words by those in the God condition ($M = 2.0, SE = .22$) compared to those in the Glue control condition ($M = 1.36, SE = .21$), $p = .097$. This difference indicates a successful manipulation of religion. The difference between the God and Ghost ($M = 1.8, SE = .21$) and Ghost and Glue conditions were not significant, $p's=.79, .31$.

Emotional states were assessed in both the prequestionnaire and the lab session to determine if the effects of priming were due to emotional processes. Positive and negative emotional states during the lab session were not affected by priming ($p's = .36, .26$), nor were changes in positive and negative emotional states from the prequestionnaire to the lab session ($p's = .24, .78$), indicating that other priming effects are not due to emotional processes.
As seen in Table 3, social desirability was marginally related to the number of prosocial flyers taken by participants in the study, $r(79) = .20, p = .07$. Further, although not significant, social desirability also showed a small relationship with change in satisfaction with life. To ensure that effects described below were not due to social desirability, all analyses controlled for social desirability using ANCOVAs and stepwise regressions. Sometimes including social desirability in the model slightly increased effect sizes, sometimes slightly decreased effect sizes. However, controlling for social desirability did not substantially change the direction or size of any significant effects. Therefore, the reported analyses do not adjust for social desirability.

**Main effects.** I hypothesized that subliminal exposure to a religious supernatural agent would reduce time spent cheating more than subliminal exposure to a nonreligious supernatural agent or a control condition. An ANOVA revealed a significant effect of priming condition on time spent cheating in the mental rotation task (Figure 4), $F(2, 75) = 3.34, p = .041$. Tukey post-hoc comparisons of the three groups revealed those subliminally primed with the word "God" ($M = 9566, SE = 1573$) cheated less than those subliminally presented with the word "Glue" ($M = 15143, SE = 1483$), $p = .012$. Comparisons between those subliminally primed with the word "Ghost" ($M = 12852, SE = 1483$) and the other two groups were not statistically significant at $p < .05$.

I also hypothesized that subliminal exposure to a religious supernatural agent would result in more prosocial flyers taken, greater sense of coherence in life, and greater satisfaction with life than subliminal exposure to a nonreligious supernatural agent or a
control condition. Using ANOVA, I found no evidence of these predicted main effects (overall \( p's = .83, .60, .67 \)).

Interaction effects. I predicted the individual differences in beliefs would moderate effects of condition on time spent cheating, number of prosocial flyers taken, sense of coherence in life, and satisfaction with life. Specifically, I expected that God priming condition would have greater effects on outcomes in the context of higher religiousness and greater vertical orientation in religion. I also expected the Ghost priming condition to have greater effects on outcomes in the context of higher paranormal belief. Zero-order correlations of outcome and moderator variables can be found in Table 4. Relationships of predictors with outcome variables were examined using a series of multiple regression analyses with condition as a 3-level categorical predictor and religiousness, verticality, and paranormal belief as centered continuous moderators. Condition was dummy coded into two variables (Condition: God and Condition: Ghost) with the control level (Glue) as the reference group. Interaction terms were computed by multiplying each of the continuous moderators by the each of the dummy codes. Five terms were entered into each regression testing the interaction of experimental condition and belief variable: the two dummy coded variables of the condition (Condition: God and Condition: Ghost), the continuous moderator, the product of Condition: God and the continuous moderator, and the product of Condition: Ghost and the continuous moderator. Results of regression analyses testing religious beliefs as a moderator can be found in Table 5 and those testing paranormal belief as moderators can be found in Table 6.
There was a trend Condition: Ghost X paranormal belief interaction predicting time spent cheating, $B = -3.975, p = .054$. In the control condition (Glue), as paranormal beliefs increased, so did cheating. However, this increase in cheating was eliminated under the ghost prime condition; those with higher paranormal beliefs no longer showed increased cheating if they were first primed with Ghost. The interaction of paranormal belief with the God prime was not significant ($p = .23$). See Figure 5.

The effect of condition on number of prosocial flyers taken was moderated both by verticality and by paranormal belief (Figures 6 and 7). A trend indicated that those high on verticality in the God condition took more prosocial flyers than those high on verticality in the control condition, $B = 2.92, p = .081$. Further, a significant interaction indicated that those high on verticality in the God condition took more prosocial flyers than those high on verticality in the Ghost condition, $B = 3.595, p = .042$. Paranormal belief also helped to explain the effect of condition on number of prosocial flyers taken. A significant interaction indicated those in the God condition high on paranormal belief took fewer prosocial flyers compared to those high on paranormal belief in the control condition, $B = -0.491, p = .051$. The interaction of paranormal belief with those in the Ghost condition was not significant, $p = .23$.

The effect of condition on change in satisfaction with life from the prequestionnaire to the lab session was moderated by a marginal Condition: Ghost X verticality interaction, $B = -2.236, p = .055$. Compared to the control condition, participants exposed to the Ghost prime experienced a greater increase in satisfaction with life when they had a greater vertical orientation in religiousness. See Figure 8.
Moreover, religiousness also moderated effects of condition on change in satisfaction with life (Figure 9). Specifically, a trend suggested that those high in religiousness in the God condition experienced a greater increase in satisfaction with life than those high in religiousness in the Ghost condition, $B = .38, p = .097$.

Adding the interactions between condition and verticality to the model predicting change in sense of coherence from the prequestionnaire to the lab session resulted in a significant increase in variance explained, $R^2_{\text{Change}} = .166$, $F(2, 73) = 7.35, p = .001$. This increase was driven by a significant Condition: God X verticality interaction, $B = -1.919, p = .002$. Participants high in verticality in religion experienced a decrease in sense of coherence in life when primed with God compared to the control condition. Further, this interaction also holds comparing those in the God condition to those in the Ghost condition, $B = -2.281, p < .001$. See Figure 10.

**Discussion**

These results indicate that religious supernatural agency is distinct from nonreligious supernatural agency. Compared to the control condition, priming God resulted in less cheating whereas priming Ghost did not, offering evidence against a generalized supernatural monitoring hypothesis (see Gervais & Norenzayan, under review); the type of supernatural agent matters.

I also predicted supernatural agent priming would have differential effects on more conceptually distal outcomes, supporting the theory that religion functions as a cognitive schema tying together many aspects of religion (McIntosh, 1995). However, neither the religious or nonreligious supernatural agent priming directly affected the
number of prosocial flyers taken, change in sense of coherence in life, or change in satisfaction with life. There are several possible reasons for the failure to find these effects. Perhaps conceptualizing religion-as-schema is not accurate; tapping one aspect of religion does not generalize to other aspects of religion as expected with spreading activation in a religion schema. Another possibility stems from the design of the study. Number of prosocial flyers taken, change in sense of coherence in life, and change in satisfaction with life were not only conceptually distal to supernatural priming, but were also temporally distal. Therefore, a lack of effects on these distal outcomes could also be because the effects of the prime decayed over time (Bargh & Chartrand, 2000). While time spent cheating was measured immediately following the supernatural agent priming, other outcomes were measured as long as 40 minutes after the prime. Or, perhaps priming God did not adequately activate the religion schema for a significant main effect, but taking individual differences in belief into account would help to reveal effects of supernatural agent priming on these more distal outcomes. Indeed, results of the moderation analyses suggest the later explanation is correct.

The number of prosocial flyers taken was not directly affected by priming condition, but taking individual differences in verticality into account clarified the effect of the God prime. Those in the God priming condition took more prosocial flyers, but only when they were also more vertically oriented in their religiousness. That is, participants who focus more on God in religion than on other people and were exposed to a subliminal God prime responded to that prime as predicted. Therefore, because the supernatural agent prime had an effect on a conceptually distal outcome, albeit a
moderated effect, a religion-as-schema conceptualization is supported. Further, at least by the time participants had the opportunity to take the prosocial flyers, the priming effects were not yet decayed. Indeed, because condition differences existed between the God prime and the control conditions during the final task, the word completion manipulation check, it is reasonable to assume the priming effects persisted to some degree throughout the experimental session.

Individual differences in paranormal belief also moderated the effect of supernatural priming condition on number of prosocial flyers taken. Although I predicted paranormal belief would moderate the effect of the Ghost condition, it instead moderated the effect of the God condition with those higher on paranormal belief in the God prime condition taking fewer prosocial flyers compared to the control condition. Therefore, higher religious belief (i.e., verticality) resulted in more prosocial flyers taken in the God condition while higher paranormal belief resulted in fewer prosocial flyers taken in the God condition. The God prime had the predicted effect, but only in the context of a religious belief. In the context of paranormal belief, the opposite effect was present.

The effect of condition on time spent cheating, the only outcome directly affected by supernatural priming condition, was also moderated by paranormal belief. As predicted, for participants high on paranormal belief, those in the Ghost priming condition spent less time cheating compared to those in the control condition. A match between condition and individual difference in belief (e.g., Ghost condition and paranormal belief) resulted in the predicted effect of less cheating.
Change in satisfaction with life contrariwise showed a mismatch of condition and individual difference; verticality moderated the effect of the Ghost prime. Those high on verticality experienced a decrease in change in satisfaction with life from the pre-questionnaire to the lab session in the Ghost condition compared to those in the control condition. Again, an individual difference in religion, verticality, had the opposite of the predicted effect on the outcome when moderating the Ghost condition. However, in a match of condition and individual difference, participants who scored high on the religion composite in the God condition experienced an increase in satisfaction with life compared to the Ghost condition. Taken together with the findings of the previous paragraphs, these results suggest that predicted moderation effects emerge only in specific circumstances – when individual differences in belief match the priming condition. That is, paranormal belief enhances the effect of the Ghost priming and religious belief enhances the effect of the God priming. Mismatches between type of prime and individual difference resulted in the opposite of predicted effects of condition. This specificity of the effects of religion will be again taken up in the general discussion.

Finally, priming condition and individual difference in belief matched for the change in sense of coherence outcome, but the found effect was opposite of the predicted effect. Those high on verticality in the God prime condition experienced a decrease in sense of coherence from the pre-questionnaire to the end of the lab session. This may be because the sense of coherence is arguably the most conceptually distal outcome. Sense of coherence was also one of the most temporally distal outcomes; intervening measures
may have altered the effect of the manipulation. For example, receiving a God prime and then being tempted to cheat threatened coherence for vertically religious participants.
Study 2. Social Support Mechanism

I hypothesized that those receiving support from a religiously similar confederate in a stressful situation would experience less CVR and more satisfaction with life than those receiving support from a politically similar or dissimilar confederate. Further, I predicted effects on more conceptually distal outcomes. Specifically, that those receiving support from a religiously similar confederate would experience a greater sense of coherence in life, be more prosocial, and cheat less than those receiving support from a politically similar or dissimilar confederate. Finally, I predicted that individual differences in religion would moderate these effects.

Method

Participants. In exchange for 20 dollars, 80 undergraduates completed an online questionnaire and a series of laboratory tasks. Five participants (6.3%) were not native English speakers and were not included in further analyses. Manipulated condition for six participants (7.5%) was lost or not correctly implemented due to experimenter error; these were also eliminated from further analysis. Therefore, useable data were available for 69 participants (79.7% female; 85.5% white; Age: 18-53, \( M = 22.71 \)). Participants were religiously diverse\(^2\); 30.4\% were nonreligious.

Physiological measures. During the experimental session, physiological channels were sampled continuously at 1000 Hz using BioPac hardware and Acqknowledge 4.0 software. Later, customized analysis software (Wilhelm, Grossman & Roth, 1999;
Wilhelm & Peyk, 2005) was used to exclude artifacts in the data and to compute the mean for heart rate and mean arterial blood pressure (MAP) during the baseline period, speech preparation, speech delivery, and recovery period.Heart rate was calculated from the R-R intervals in the electrocardiogram. Following the recommendation of Cacioppo, Tassinary, and Berntson (2007), all analyses of heart rate control for somatic movement. Systolic (SBP) and diastolic blood pressure (DBP) were obtained from a pressure-sensitive cuff on the wrist of the non-dominant hand. These were used to compute MAP (mmHg; 2DBP/3 + SBP/3).

**Procedure.** Upon arrival at the laboratory, participants were greeted by an experimenter who introduced a female confederate as a fellow participant. The experimenter then apologized for a "computer error" resulting in the loss of some data from the online questionnaire about the participants. The experimenter then asked first the confederate and then the participant to answer those lost questions. Depending on condition, the experiment asked about *either* degree of religiousness and religious affiliation or *degree of political mindedness and political affiliation*. Using the participant's responses to the online questionnaire, the confederate, depending on condition, responded to the religion or political questions *either* similarly to the participant’s online responses or dissimilarly. Similar responses included the same affiliation and a similar degree. For example in the religiously similar condition, if a participant was Baptist and a 7 on a scale of 1-10 of religiousness, the confederate claimed to be Baptist and an 8 on a scale of religiousness. The confederate in the similar conditions responded 1 degree higher than the participant unless the participant
responded with a 10 on the scale, in which case, the confederate responded 1 degree lower than the confederate. Dissimilar responses included a different affiliation and dissimilar degree. For example, if a participant was Republican and a 3 on a scale of 1-10 of political mindedness, the confederate claimed to be Democrat and a 10 on a scale of political mindedness. Thus, the confederate was portrayed as religiously similar (N = 18), religiously dissimilar (N = 16), politically similar (N = 18), or politically dissimilar (N = 17) to the participant.

Following this manipulation, a rigged coin toss determined that the participant would "go first" in the procedure and the confederate would watch. The confederate was asked to leave to complete some cognitive tasks as the participant was seated and physiological sensors attached. The participant then watched a 2 minute neutral film clip to establish a physiological baseline.

Following the neutral film clip, the confederate returned to the room with the participant. The participant was then given 2 minutes to prepare a 3 minute speech for a job interview on his or her communication skills. The speech was videotaped and participants were told that they would be later evaluated by a panel of trained judges. Most people find this type of task stressful (Egloff, Wilhelm, Neubauer, Mauss, & Gross, 2002; Hilmert et al., 2002). The religiously or politically similar or dissimilar confederate offered emotional support to the participant as he or she prepared and delivered the speech. Emotional support was made salient by encouraging remarks, open body language, and friendly facial expressions (Suganuma & Ura, 2001). Although the confederates were blind to hypotheses, they were not to blind to condition. Therefore,
there was a potential for bias. Two coders with a high degree of interrater reliability ($\alpha = .84$) and blind to condition, later counted the number of socially supportive interactions between the confederate and the participant using an established coding scheme (Suhr, 1990). Coders found no significant differences among the experimental groups, $p = .67$, suggesting that the confederate, although not blind to condition, did not bias results by offering more social support to participants in one group more than another.

Following the speech task, prosociality was measured when participants were given the opportunity to donate money to a charity. Each participant was given a description of the charity, Action Against Hunger and were told

“As you know, you will be paid $20 for your participation today. I will bring you your money in a moment, but please look over this description of Action Against Hunger, a charity our research lab believes in and supports. You will have the opportunity to donate all, some, or none of your payment today to Action Against Hunger. You are not required to donate anything if you do not wish. Your donation will be kept confidential.”

Participants were then left alone to review information about the charity. After two minutes, the experimenter returned and paid the participant $20 in singles for his or her time and asked “Did you decide to make a donation today?” If so, the donation was accepted and recorded.

After choosing whether and how much to donate, participants completed a questionnaire which included the Sense of Coherence scale (Antonovsky, 1987) the Satisfaction with Life Scale (Diener et al., 1985), and the I-PANAS-SF (Thompson, 2007) followed by the Religious Word Completion Task (Raad, 2003). Finally, participants completed the same mental rotation task designed to measure cheating.
described as part of Study 1 followed by a funnel debriefing interview similar to that given in Study 1.

**Results**

**Preliminary analyses.** To examine whether the speech task was physiologically stressful to the participants, I conducted two repeated measures MANOVAs with experimental stage as the repeated factor (baseline, speech preparation, and speech delivery) and heart rate and MAP each as dependent variables. Heart rate was significantly increased during speech preparation and speech delivery relative to the baseline, Wilks’s $\lambda = .30$, $F(2, 43) = 51.11$, $p < .001$, as was MAP, Wilks’s $\lambda = .51$, $F(2, 31) = 15.09$, $p < .001$ (see Figures 11 and 12).

Emotional states, assessed in both the prequestionnaire and the lab session, were examined to determine if the effects of the religiously or politically similar or dissimilar confederate were due to emotional processes. Confederate identification did not have an effect on positive and negative emotional states during the lab session ($p$'s = .32, .20) or on change in positive or negative emotional state from the prequestionnaire to the lab session ($p$'s = .12, .69). The absence of effects of condition on emotional states suggests that other effects of condition are not due to emotional processes.

Given the significant relationship between social desirability and change in satisfaction with life, $r(66) = .33$, $p = .007$, the trend with MAP during speech preparation, $r(46) = -.26$, $p = .08$, and other nonsignificant small effect sizes seen in Table 3, social desirability was included as a covariate in all analyses using ANCOVA and
stepwise regression. However, controlling for social desirability did not substantively change effects and so statistics reported here do not adjust for social desirability.

The religious word completion task, intended to be a manipulation check of the effect of confederate identification, was not affected by condition, $p = .68$. However, because the religion manipulation was accomplished through a social route (i.e., confederate identification) rather than a cognitive route as in Studies 1 and 3, a word completion task accessing cognitive activation of religion may not have been the most appropriate manipulation check. Therefore, the efficacy of the religion manipulation can be judged by found effects.

**Main effects.** I hypothesized that those receiving support from a religiously similar confederate in a stressful situation would experience less CVR during preparation and delivery of a stressful speech than those receiving support from a politically similar or dissimilar confederate. As participants prepared their speech, the identification of the confederate offering social support affected both heart rate and MAP. A 2 (Type of affiliation: religious, political) by 2 (Similarity of confederate: similar, dissimilar) ANOVA revealed a trend main effect of type of affiliation on heart rate during speech preparation (Figure 13), $F(1, 44) = 3.798, p = .058$. That is, participant heart rate was lower with social support from a religiously identified than a politically identified confederate during speech preparation. Contrast analyses indicated that this effect was driven by the difference between support from a religiously similar versus a politically similar confederate. Specifically, those receiving social support from a religiously similar confederate ($M = 83.75, SE = 2.65$) had a lower heart rate than those receiving social
support from a politically similar confederate ($M = 91.57$, $SE = 2.55$), $F(1, 44) = 4.52$, $p = .039$. MAP during speech preparation was also affected by confederate identification, although along the similarity dimension instead of type of affiliation. Participants receiving social support from a similar confederate, regardless of religious or political identification, experienced lower MAP (Figure 14), $F(1, 42) = 7.95$, $p = .007$. Contrast effects indicated that the effect of similarity was most prominent for religiously identified confederates. That is, those who received support from a religiously similar confederate had lower MAP ($M = 90.92$, $SE = 2.77$) than those who received support from a religiously dissimilar confederate ($M = 102.41$, $SE = 3.58$), $F(1, 42) = 6.66$, $p = .013$.

During speech delivery, heart rate and MAP were also affected by confederate characteristics (see Figures 15 and 16). A 2 (Type of affiliation: religious, political) by 2 (Similarity of confederate: similar, dissimilar) ANOVA found a main effect of type of affiliation such that social support from a religiously identified confederate, regardless of the similarity of that identification, resulted in lower heart rate than social support from a politically identified confederate, $F(1, 43) = 8.43$, $p = .006$. Contrasts showed that this effect was driven more by participants in the similar condition, with those receiving support from a religiously similar confederate ($M = 87.69$, $SE = 3.37$) experiencing lower heart rate during speech delivery than those receiving social support from a politically similar confederate ($M = 100.62$, $SE = 3.31$), $F(1, 43) = 7.42$, $p = .009$. MAP during speech delivery was also affected by confederate characteristics; a significant interaction indicated that the effect of type of affiliation depended on the similarity of confederate. Similarity did not make a difference on MAP for politically identified confederates ($p =$
.64), but it did make a difference for religiously identified confederates ($F(1, 30) = 13.09$, $p = .001$). That is, social support from a religiously similar confederate resulted in lower MAP ($M = 94.12, SE = 3.26$) than social support from a religiously dissimilar confederate ($M = 111.33, SE = 3.46$). Further, a contrast analysis comparing effects of social support from religiously and politically similar confederates found a trend that those who received social support from a religiously similar confederate experienced lower MAP than those who received social support from a politically similar confederate ($M = 102.67, SE = 2.83$), $F(1, 30) = 3.93, p = .057$.

I also hypothesized that those receiving support from a religiously similar confederate in a stressful situation would experience more satisfaction with life (operationalized as change in satisfaction with life from the online measure to the lab measure) than those receiving support from a politically similar or dissimilar confederate. A 2 (Type of affiliation: religious, political) by 2 (Similarity of confederate: similar, dissimilar) ANOVA revealed a significant interaction (Figure 17), $F(1, 64) = 7.75, p = .007$. Participant satisfaction with life increased more with social support from a religiously dissimilar confederate ($M = .58, SE = .18$) than a politically dissimilar confederate ($M = .21, SE = .17$), $F(1, 64) = 6.79, p = .011$. Conversely, a contrast comparing the effects of confederates identified as similar to the participant (whether religious or political) found that participant satisfaction with life increased more with social support from a politically similar confederate ($M = .52, SE = .17$) than a religiously similar confederate ($M = -.07, SE = .17$), $F(1, 64) = 6.07, p = .016$. 

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I predicted that those receiving support from a religiously similar confederate would experience a greater sense of coherence in life, give more to charity, and cheat less than those receiving support from a politically similar or dissimilar confederate. I found no evidence of a confederate effect on change in sense of coherence in life from the prequestionnaire to the lab session. However, a 2 (Type of affiliation: religious, political) by 2 (Similarity of confederate: similar, dissimilar) ANOVA revealed a significant interaction effect on amount donated to charity (Figure 18), $F(1, 65) = 4.06, p = .048$.

Participants receiving social support from a politically similar confederate ($M = 6.61, SE = 1.01$) gave almost $4 more to charity than those receiving social support from a religiously similar confederate ($M = 3.11, SE = 1.01$), $t(22.94) = 2.03, p = .055$.

Participants receiving social support from a politically similar confederate gave over $5 more to charity than those receiving social support from a politically dissimilar confederate ($M = 1.47, SE = 1.04$), $F(1, 65) = 12.64, p = .001$.

A trend main effect of the confederate's type of affiliation was found on time spent cheating (Figure 19), $F(1, 59) = 2.96, p = .091$. Participants receiving social support from a religiously similar confederate ($M = 7875, SE = 1908$) cheated less than those receiving social support from a religiously dissimilar confederate ($M = 12481, SE = 1843$), $F(1, 59) = 3.02, p = .088$. Further, participants receiving social support from a religiously similar confederate cheated less than those receiving social support from a politically similar confederate ($M = 13190, SE = 1682$), $F(1, 59) = 4.37, p = .041$.

**Interaction effects.** I predicted the individual differences in religion would moderate effects of condition on CVR, satisfaction with life, amount donated to charity,
time spent cheating, and sense of coherence in life. Specifically, I expected that higher religiousness and greater vertical orientation in religion would increase the effect of social support from a religiously identified confederate compared to a politically identified confederate (regardless of similar or dissimilar identification). Zero-order correlations of outcome and moderator variables can be found in Table 7. Relationships of predictors with outcome variables were examined with a series of multiple regression analyses with type of affiliation (religious = 1, political = 0) as a 2-level categorical predictor and religiousness and verticality as centered continuous moderators. The interaction term was computed by multiplying each of the continuous moderators by the categorical predictor. Three terms were entered into each regression testing the interaction of condition and religion variable: type of affiliation (religious or political), the continuous moderator, and the product of the type of affiliation and the continuous moderator. Results of all regression analyses can be found in Table 8. Each regression analysis was also run separately for participants in the similar condition and in the dissimilar condition. However, results for the two groups were akin to combined results, albeit weaker, so combined results are reported.

The effects of condition on time spent cheating, amount donated to charity, and change in sense of coherence from the prequestionnaire to the lab session were all moderated by verticality. Specifically, a significant condition X verticality interaction, \( B = -26592, p = .003 \) indicated that participants high in verticality in religion cheated less after receiving social support from a religiously identified confederate compared to those who received social support from a politically identified confederate. See Figure 20.
As shown in Figure 21, a trend indicated participants who were high on verticality and received social support from a religiously identified confederate donated more to charity than those who were high on verticality and received social support from a politically identified confederate, $B = 11.314$, $p = .059$.

Finally, a trend indicated that, compared to those who received social support from a politically identified confederate, participants who received social support from a religiously identified confederate and were high on vertical religiousness experienced a greater decrease in sense of coherence, $B = -0.768$, $p = .069$. See Figure 22.

Heart rate and MAP during speech preparation and delivery were not moderated by individual differences in religion, nor was change in satisfaction with life.

**Discussion**

These results indicate that social support from a religiously identified confederate, especially a confederate who identified as religiously similar, is distinct from social support from nonreligiously identified confederate. CVR (heart rate and MAP) during both speech preparation and delivery was lower for participants receiving social support from a religiously identified confederate versus a politically identified confederate, with those receiving support from a religiously similar confederate consistently presenting the best cardiovascular profile. That the effect of religious social support on CVR is moderated by the similarity of the confederate’s religious identification to the participant’s religious identification is consistent with others’ findings that social support is more effective from ingroup members and people who have similar attitudes (see O’Donovan & Hughes, 2008; Stroebe & Diehl, 1988). In fact, the cardiovascular patterns
for religiously similar and religiously dissimilar social support suggested entirely
different subjective experiences. Those who received religiously similar social support
had relatively low heart rate and low blood pressure during speech preparation and
delivery, a pattern linked with overall lower stress (Lepore et al., 1993; Mendes, 2009).
On the other hand, those who received religiously dissimilar social support had relatively
low heart rate and high blood pressure during speech preparation and delivery, a pattern
linked with perceiving the stressful event as threatening (Blascovich, Mendes, Hunter, &
Salomon, 1999; Mendes, 2009). The importance of these findings is amplified by the link
between cardiovascular response to stress and long term cardiovascular risk (Lovallo &
Gerin, 2003). Indeed, the privileged role religious social support seems to play in CVR to
stress could help to explain the robust correlation between religion and physical health
(Koenig et al., 2001; McIntosh et al., 2011) and even lower mortality rates among
religious adherents (McCullough et al., 2000).

Characteristics of the supporting confederate also affected satisfaction with life,
though not entirely as predicted. While participant satisfaction with life increased more
with social support from a religiously identified confederate compared to a politically
identified confederate as predicted, this was only true for confederates purporting to be
dissimilar from the participant. For participants receiving support from a similar
confederate the opposite pattern emerged; satisfaction with life decreased with religious
identification compared to a political identification. This pattern may have emerged
because the participants felt negatively aroused due to the stressful speech task, but did
not fully attribute those feelings to the situation. Then, in the presence of someone similar
to them on a dimension thought to be related to satisfaction with life (i.e., religion) and who did not seem to be experiencing the same negative arousal (indeed, someone who seems quite comfortable and even able to offer social support), satisfaction with life decreased.

Beyond effects on CVR and satisfaction with life, more conceptually distal outcomes were also directly affected by confederate characteristics, in support of a religion-as-schema conceptualization. These more distal outcomes included amount of money donated to charity and time spent cheating. Contrary to expectation, those receiving social support from a politically similar confederate donated most to charity, more than those receiving support from a religiously similar confederate or politically or religiously dissimilar confederates. Although prosociality charitable giving is often linked with religion (and was in Studies 1 and 3), this study failed to find an effect of religion. Several explanations are possible. First, although both politicality and religiousness have both been associated with giving to charity (Lee & Farrell, 2003 and Lincoln, Morrissey, & Mundey, 2008, respectively), an experimental comparison of the effects of politics and religion on charitable giving has never before been undertaken. Perhaps political affiliation, particularly in the highly partisan United States, is more linked to charitable giving than religious affiliation. Second, because the effect of political identification on amount donated to charity was only present when the confederate was similar to the participant, a general priming effect is unlikely. However, the specificity of the effect, that social support from a politically identified confederate only increases donation to charity when the confederate is similar to the participant, suggests social comparison may
drive the effect (Suls, Martin, & Wheeler, 2002). In other words, spending time with a fellow partisan may inspire more competition to do a good deed than spending time with a fellow religious adherent. Another explanation is that this study was conducted spring and summer of 2010 during the run-up to state elections in fall 2010, including a hotly contested and highly publicized gubernatorial race. Calls for donations to political parties and fundraising connected to the elections were common during data collection for Study 2. Although the donations in the current study were to a nonpartisan organization dedicated to finding solutions to hunger, it is possible that repeated calls for donations during the election season forged a stronger link between giving money and partisan politics than usual, explaining the link between politically similar social support and donation to charity.

As predicted, participants who received social support from a religiously similar confederate cheated less than those who received support from a religiously dissimilar or politically similar or dissimilar confederate. Because the effect was again limited to the similar condition, social comparison may also be a helpful explanation here. While spending time with a fellow partisan seemed to lead to a competition to do good (i.e., donate to charity), spending time with a fellow religious adherent lead to a compulsion not to do bad (i.e., spend less time cheating; see Rhoades et al., 2007 for a similar pattern).

CVR, satisfaction with life, amount of money donated to charity, and time spent cheating were all affected by the religious or political, similar or dissimilar identification of the confederate, even though sense of coherence was not. Social support is not just
social support. Characteristics of the supporter matter and social support from a religiously identified individual, especially a religiously similar individual, resulted in overall better outcomes than support from a nonreligiously identified individual.

Taking individual differences in religion into account further clarified the effects of confederate identification on outcomes. CVR and satisfaction with life (the more proximal outcomes) were not moderated by individual differences in religion, but amount of money donated to charity, time spent cheating, and sense of coherence (the more distal outcomes) all were. As predicted, higher levels of religiousness enhanced the effect of religious social support. Those who were high on verticality and who received social support from a religiously identified confederate cheated less and gave more to charity compared to those who received social support from a politically identified confederate.

Finally, as in Study 1, those high on verticality in the religion condition experienced a decrease in sense of coherence from the prequestionnaire to the lab session. Again, sense of coherence is arguably the most conceptually distal outcome for religious social support. The next study examines the role of religion in a meaning system, a manipulation that is conceptually proximal for the sense of coherence outcome.

**Limitations.** The CVR measures used in this study were incomplete. Heart rate and MAP during the neutral film, meant to establish a baseline level of reactivity, were not subtracted from heart rate and MAP during speech preparation and speech delivery. Because confederate identification took place before applying the physiological sensors to preserve the plausibility of the deception, group differences already existed during the baseline. Future research should use a different procedure that enables both plausible
deception and establishing a physiological baseline before the social support manipulation.

While the diversity of participants’ religious affiliation is a benefit for generalizability of these results, it also posed a limitation for understanding the results. The confederate in the religiously similar condition always purported to be the same religious affiliation as the participant, whether that was Jewish, Episcopalian, or atheist. It would have been interesting to break down the effects of religiously similar social support by religious affiliation. For example, does social support from a fellow atheist have the same effects as social support from a fellow Episcopalian or a fellow Jew? Unfortunately, small cell sizes precluded answering this question. Future studies should use purposive sampling to delve further into potential differential effects of religious social support of various religious affiliations.
Study 3. Meaning Mechanism

I hypothesized that those exposed to a religious humanitarian meaning system would donate more to charity and would experience more sense of coherence than those exposed to a nonreligious humanitarian meaning system. Further, I predicted effects of the religious humanitarian meaning system on more conceptually distal outcomes. Namely, that those primed with a religious meaning system would cheat less and have greater satisfaction with life than those primed with a nonreligious meaning system. Finally, I predicted that individual differences in religion would moderate these effects.

Method

Participants. In exchange for 20 dollars, 70 undergraduates completed an online questionnaire and a series of laboratory tasks. Three participants (4.3%) were not native English speakers and were not included in further analyses, leaving 67 participants (62.7% female; 73.1% white; Age: 18-33, M = 19.5). Participants were religiously diverse; 28.4% self-identified as nonreligious.

Procedure. Participants evaluated three websites with an eye for characteristics such as ease of navigability, organization, and visual appeal, completing scales identifying the strengths and weaknesses of the website design. Two of the websites were about neutral topics (i.e., car repair and a music festival); one of the websites contained content implicitly priming either religious humanitarianism (N = 22), secular humanitarianism (N = 23), or neutral content serving as a control (i.e., manufacturing; N
The religious humanitarianism, secular humanitarianism, and control websites shared the same color scheme and organizational structure. Both the religious and secular humanitarianism websites touted humanitarianism as a meaningful perspective on life, but the religious website used religious language throughout the website. See Figure 23. Following the evaluation of each website, participants completed a three question quiz about the content of each website to ensure attendance to the material.

After the website evaluation priming task, participants were given the same opportunity to donate money to charity described above as a part of Study 2. Following this measure of prosociality, participants completed a questionnaire, including the Sense of Coherence scale (Antonovsky, 1987), the Satisfaction with Life Scale (Diener et al., 1985), and the I-PANAS-SF (Thompson, 2007) followed by the Word Completion Task (Raad, 2003) and the same mental rotation cheating measure in previous studies. Finally, participants were led through a funnel debriefing interview described above as a part of Studies 1 and 2.

Results

Preliminary analyses. An ANOVA was used to determine whether the manipulated type of website influenced how participants performed on the content quizzes, an indicator of how closely participants paid attention to the websites. No such effect was found ($p = .62$), indicating that effects of condition are not due to differences in attention.

To test the success of the manipulation, an ANOVA was used to compare the number of religiously completed words by website condition. Three bivariate outliers
were dropped from analysis. An effect of condition on religious word completion was found (Figure 24), $F(2, 61) = 6.09, p = .004$. Tukey post-hoc tests indicated a successful manipulation of religion; those in the religious humanitarianism meaning condition completed more word stems with religious words ($M = 2.09, SE = .24$) than those in the control condition ($M = 1.05, SE = .25$), $p = .003$. Curiously, those in the nonreligious humanitarianism meaning condition also completed more word stems with religious words ($M = 2.09, SE = .24$) than those in the control condition, $p = .003$, suggesting that humanitarianism, whether religious or nonreligious, may activate religious schemas.

To determine if the effects of type of website were due to emotion processes, ANOVAs were conducted on positive and negative emotion states during the lab session and on changes in positive and negative emotion states from the prequestionnaire to the lab session. None of these were significant ($p$'s = .26 - .92), indicating that effects of condition are not due to emotional processes.

Although not significant, there was a medium sized relationship between social desirability and amount of money donated to charity (see Table 3). To ensure that effects described below were not due to social desirability, all analyses controlled for social desirability using ANCOVAs and stepwise regressions. Results were not much changed by controlling for social desirability; sometimes effects were slightly enhanced, sometimes slightly diminished. Therefore, reported statistics do not adjust for this social desirability.

**Main effects.** I hypothesized that those exposed to a religious humanitarian meaning system would be more prosocial than those exposed to a nonreligious
humanitarian meaning system. One bivariate outlier from the nonreligious condition on the prosociality measure ($ donated to charity) was deleted. During funnel debriefing, nine participants indicated suspicion of a connection between the website evaluation task and the opportunity to donate money to charity; these were deleted from subsequent analyses. An ANOVA revealed a trend of the effect of condition on amount of money donated to charity, though not entirely in the direction anticipated (Figure 25), $F(2, 52) = 2.95, p = .061$. Tukey post-hoc comparisons of the three groups revealed a trend indicating that those in the control condition ($M = 7.35, SE = 1.24$) gave more money to charity than those exposed to the nonreligious humanitarian meaning system ($M = 3.1, SE = 1.24; p = .02$). Comparisons between those in the religious humanitarianism condition ($M = 4.87, SE = 1.43$) and the control and nonreligious humanitarianism condition were not statistically significant at $p < .05$. Comparing the religious and the nonreligious humanitarian meaning systems alone, a trend indicated that those in the religious condition donated more than the nonreligious condition, $t(33) = 1.7, p = .099$ (Figure 26).

I also hypothesized that those exposed to a religious humanitarian meaning system would experience more sense of coherence than those exposed to a nonreligious humanitarian meaning system. I found no evidence of this effect ($p = .73$). Further, I predicted that those primed with a religious meaning system would cheat less and have greater satisfaction with life than those primed with a nonreligious meaning system. Neither prediction was supported by ANOVA analyses of the data ($p$'s = .33, .86).

**Interaction effects.** I predicted the individual differences in beliefs would moderate effects of condition on amount donated to charity, sense of coherence in life,
satisfaction with life, and time spent cheating. Specifically, I expected that the religion meaning system condition would have greater effects on outcomes in the context of higher religiousness and greater vertical orientation in religion. Zero-order correlations of outcome and moderator variables can be found in Table 9. Relationships of predictors with outcome variables were examined with a series of multiple regression analyses with condition as a 3-level categorical predictor and general religiousness, God image, and verticality as centered continuous moderators. Condition was dummy coded into two variables (Condition: religious and Condition: nonreligious) with the control condition as the reference group. Interaction terms were computed by multiplying each of the continuous moderators by the each of the dummy codes. Five terms were entered into each regression testing the interaction of experimental condition and belief variable: the two dummy coded variables of the condition (Condition: religious and Condition: nonreligious), the continuous moderator, the product of Condition: religion and the continuous moderator, and the product of Condition: nonreligious and the continuous moderator. Results of all regression analyses can be found in Table 10.

The effect of condition on change in sense of coherence from the prequestionnaire to the lab session was moderated by religiousness. Adding the interaction terms to the model predicting change in sense of coherence resulted in a trend increase in variance explained, $R^2_{\text{Change}} = .088$, $F(2, 59) = 2.901$, $p = .063$. A trend Condition: religion x religiousness interaction, $B = .208$, $p = .077$, showed that, compared to the control condition, participants exposed to the religious meaning system experienced a greater increase in sense of coherence when they were more religious. Furthermore, those high
on religiousness in the religious meaning system condition also experienced a greater increase in sense of coherence compared to those in the nonreligious meaning system condition, $B = .277, p = .022$. The interaction of religiousness with the nonreligious meaning system compared to the control was not significant ($p = .52$). See Figure 27.

The effect of condition on change in sense of coherence from the prequestionnaire to the lab session was also moderated by verticality. Adding the interaction terms resulted in a marginal increase in variance explained, $R^2_{\text{change}} = .077$, $F(2, 60) = 2.52, p = .089$. This was driven by a Condition: religion X verticality interaction, $B = 3.27, p = .051$.

That is, compared to the control condition, participants exposed to the religious humanitarian meaning system experienced an increase in sense of coherence when they were more vertical in their religiousness. In addition, compared to the nonreligious meaning system, a trend indicated that participants exposed to the religious humanitarian meaning system also experienced an increase in sense of coherence when they were more vertical in their religiousness, $B = 2.433, p = .08$. The interaction of verticality with the nonreligious meaning system condition was not significant ($p = .64$). See Figure 28.

Individual differences in religion did not moderate effects of condition on amount donated to charity, satisfaction with life, or time spent cheating.

Discussion

These results indicate that a religious meaning system is distinct from a nonreligious meaning system. Exposure to a religious meaning system resulted in more money donated to charity than exposure to a nonreligious meaning system (though less than the control condition). Meaning system did not have the predicted direct effect on
sense of coherence; however, both religiousness and verticality moderated the effect of meaning system on sense of coherence. The more religious and the more vertically oriented an individual, the more exposure to the religious meaning system increased sense of coherence from the prequestionnaire to the lab session. This result is the opposite of the moderation of the effect of condition on sense of coherence by verticality found in Studies 1 and 2. In both cases, those high on verticality in the religious condition (God prime in Study 1, religious social support in Study 2) experienced a decrease in sense of coherence. One explanation may be that sense of coherence was a conceptually distal outcome in Studies 1 and 2 and a conceptually proximal outcome in Study 3. Sense of coherence, an outcome indicative of a meaningful live, increased only when religious individuals were exposed to a religious meaning system, not a religious supernatural agent and not religious social support. The specificity of these results suggests that religion is not one-dimensional; different aspects of religion have different outcomes. This theme will again be taken up in the general discussion.

Exposure to the religious meaning system was also predicted to affect more distal outcomes, namely to increase satisfaction with life and to decrease time spent cheating; no directed or moderated effects were found on these, offering some evidence against conceptualizing religion-as-schema, in contrast to the findings of Studies 1 and 2. However, the word completion manipulation check may offer some insight into this missing finding. Recall that religious and nonreligious humanitarianism had identical effects on number of religiously completed words near the end of the lab session (see Figure 24). Differences between the two were present for the conceptually proximate
outcomes, which closely followed the manipulation. However, the effects of religious and nonreligious humanitarianism on outcomes both conceptually and temporally distal may have decayed over the course of the lab session, until differences between the two were nonexistent. Future research can test this possibility by measuring conceptually distal outcome immediately following the religion manipulation.
General discussion

Religion is not “just” supernatural agency, social support, or meaning; religious versions of these mechanisms are distinct from nonreligious versions. Exposure to a religious supernatural agent reduces cheating more than exposure to a nonreligious supernatural agent (Study 1), receiving religious social support during a stressful task reduces CVR more than receiving nonreligious social support (Study 2), and exposure to a religious meaning system increases charitable donations more than exposure to a nonreligious meaning system (Study 3). The independent predictive power of religion beyond more general mechanisms demonstrates that religion cannot be reduced to so-called “mundane mediators” (Joiner et al., 2002, p. 214). Therefore, the psychological study of religion has the potential to make unique contributions to our understanding of human cognition, behavior, and health. Future research should be dedicated to fully understanding these contributions.

The primary concern of this work was whether religious mechanisms differ from nonreligious mechanisms. Future work should address the deeper psychological questions of how religious mechanisms differ. Several potential accounts of the differences between religious and nonreligious mechanisms were proposed. Qualities of God as anthropomorphic, transcendent, and moral distinguish God from ghost. The ability of religious social support to potentially recall support from God and support from those who care about the same ultimate matters distinguishes religious social support from
nonreligious social support. The transcendent nature of religious meaning distinguishes religious meaning from nonreligious meaning. However, none of these possibilities were directly tested in the present studies. If these accounts of the unique effects of religion on outcomes were measured or manipulated, a greater understanding of the causal effects of religion could be gained. Further, to determine that religion *per se* is responsible for differences between religious and nonreligious versions of mechanisms found in these studies, the question must be answered whether adding religion to the general mechanisms has more of an effect, or a different effect, than adding anything else in particular to the general mechanisms. Is the observed effect because participants were presented with [particular type] mechanism vs. general mechanism, or because it was a religious mechanism vs. general mechanism? Unpacking the reasons why the religious versions of mechanisms had different outcomes than the nonreligious versions will help address this concern.

One account of the unique effects of religion tested here was a religion-as-schema conceptualization. Current results were highly suggestive of this account. As discussed in the introduction, those who have similar experiences are likely to have similar schemata through cultural transmission. In the United States, religion is a very common experience, shared by everyone in the culture, including those without personal religious beliefs. Therefore, the most central aspects of religion, those that are most persistently encountered in the culture (e.g., God is watching you, religion is a source of support, religion is a source of meaning) should be the most efficacious and the responses most conceptually proximal to these cultural ideas of religion (e.g., do not cheat, be less
stressed when receiving social support, find a sense of coherence in a meaning system) should be the most affected, regardless of individual differences in religion. With the exception of change in sense of coherence in Study 3, all conceptually proximal outcomes (Study 1: time spent cheating; Study 2: CVR to stress and change in satisfaction with life; Study 3: amount donated to charity) were directly affected by the religion condition. Also with the exception of change in sense of coherence in Study 3, all conceptually proximal outcomes were not moderated by individual differences in religion, despite about a third of participants identifying as nonreligious in all three studies. That is, for outcomes that are closely tied with the manipulated aspect of religion (i.e., a religious supernatural agent and cheating behavior; religious social support and responses to stress; religious humanitarianism and charitable giving) it did not matter how religious participants were or how they were religious. The religion manipulation, for conceptually proximal outcomes, had the predicted effect regardless of individual differences in religious belief.

On the other hand, responses more conceptually distal to the ideas about religion in the culture (e.g., donating more money to charity after receiving religious social support) should not necessarily be a part of a general cultural level of the religious schema. Rather, a specific religious schema, solidified by personally held religious beliefs and intentional experiences, should result in effects of a religion manipulation on both conceptually proximal and distal responses. This was so. While there was no moderation of the effect of the religion condition on conceptually proximal outcomes, individual differences in religious beliefs were imperative to explaining the effects of the
religion condition on more conceptually distal outcomes (Study 1: number of prosocial flyers taken, change in satisfaction with life, and change in sense of coherence; Study 2: time spent cheating, donation to charity, and change in sense of coherence), either by enhancing an existing main effect or by revealing an otherwise invisible effect. Furthermore, offering additional evidence for the specific level of the religious schema, effects of the religion manipulations on conceptually distal outcomes seemed constrained to specific situations, such as a match between the type of belief and the manipulation (as in Study 1) or a match between the type of outcome and the manipulation (as in Study 3). The specific level of the religious schema apparently requires some congruence of individual difference, manipulation condition, and outcome while the general level does not.

Conceptualizing religion as a cognitive schema with both general and specific levels has far-reaching implications for the psychology of religion. As McIntosh (1995) notes, a religion-as-schema conceptualization has the potential to combine previous work in the psychology of religion into a unified framework. One specific benefit of religion-as-schema is that it has the ability to explain a particular perplexity in current priming research. Sometimes individual differences in religion moderate priming effects (e.g., Dijksterhuis et al., 2008; Shariff & Norenzayan, 2007, Study 2; Weisbuch-Remmington et al., 2005) and sometimes they do not (e.g., Newton & McIntosh, 2009; Pichon et al., 2007; Randolph-Seng & Nielsen, 2007; Ritter & Preston, 2010; Shariff & Norenzayan, 2007, Study 1). In line with religion-as-schema, when individual differences in religion did not moderate priming effects, it is because the sample was religiously homogenous or
because the religion prime was linked to the measured outcome at the level of a general
religion schema, one that everyone in the sample possessed regardless of personal
religious beliefs. When individual differences in religion did moderate the religion prime,
it is theoretically because the religion prime was linked to the measured outcome at the
level of a specific religious schema, one that only those with particular religious beliefs
possessed.

One goal of future research in the area of religious schema should be to identify
which outcomes are linked to a general religious schema and which are linked to specific
religious schemas. These links likely differ by culture. For example, the general religious
schemas in highly religious countries (e.g., Egypt, Indonesia, Sierra Leone) are likely to
be robust, while highly irreligious countries (e.g., Sweden, Vietnam, Denmark) are likely
to have scant general religious schemas. The content of those religious schemas are also
likely to differ by culture. For example, largely Islamic cultures would form different
general religious schemas than largely Christian cultures. At the individual level,
different specific religious schema should be as manifold as the specific religious beliefs
they comprise; there is much work to be done to understand the effects of religion on
cognitive, behavioral, and health outcomes.

Another conclusion of these studies concerns the multidimensionality of religion.
As described in the introduction, the call for increasing specification of religious
variables (Hood, Hill, & Spilka, 2009) has been answered with success in correlational
studies. Distinctions in degree of religiousness, types of religious affiliation, and
especially specific religious beliefs have yielded rich understandings of the varied roles
of religion in cognition and behavior. However, the trend has largely not extended to experimental manipulations. Particularly, priming studies of religion have primed religion in general rather than specific aspects of religion. While this approach has demonstrated that religion is not just associated with outcomes, but has causal effects, exactly which aspects of religion are behind those effects are usually unknown. The current studies have shown that while specific manipulations of religion (i.e., supernatural agent priming, provision of religious social support, and exposure to a religious meaning system) have some common effects (e.g., time spent cheated decrease in the religion condition in both Study 1 and Study 2), specific manipulations of religion also have differential effects on outcomes (e.g., sense of coherence decreased for those high in verticality in Studies 1 and 2, but increased in Study 3). Care should be taken in future studies to design manipulations of religion which will allow shared and unshared effects to be parsed. Further, in addition to addressing the multidimensionality of religion with specific manipulations, future studies should continue to measure individual differences in religion to test them for moderation of these manipulations. It is a complex approach, but then, religion is a complex topic of study.

**Conclusion**

The findings of the three studies described here demonstrate that religious versions of mechanisms are capable of explaining independent variance in outcomes and are therefore unique. Religion is not “just” supernatural agency, social support, or meaning. One important implication of these results is that religion cannot be fully understood through general psychosocial processes. Therefore, resources should be
dedicated to the study of religion in its own right. Hopefully, these efforts will result in a fuller understanding of this important aspect of human experience and the psychological, social, and health outcomes it affects. Because religion is multidimensional and fuzzy, understanding religion is not an easy task. However, the present studies, by demonstrating that religion has unique effects on outcomes and by suggesting characteristics of religion that may be responsible for these unique effects, provide a good start.
Notes

1. Study 1 participants were 43.8% Christian, 18.8% None, 13.8% Jewish, 8.8% Atheist, 7.5% Agnostic, 2.6% Buddhist, 1.3% Muslim, 1.3% Deist, and 1.3% No answer given.

2. Study 2 participants were 52.2% Christian, 13% Atheist, 11.6% Agnostic, 5.8% Jewish, 5.8% None, 2.8% Buddhist, 1.3% Muslim, and 7.2% Other (spiritualism, deism, and holism).

3. Although it is common to compute change scores for psychological variables during speech preparation and speech delivery by subtracting the respective values from baseline, controlling for baseline is not necessary for this study because all hypotheses hinge upon comparisons of randomly assigned condition s. Further, because the baseline necessarily followed the experimental manipulation, differences in condition were already present at baseline, making change scores even less meaningful.

4. Mean arterial pressure (MAP) is often preferred as a measure of blood pressure to diastolic or systolic pressure alone because it reflects the average pressure during the entire cardiac cycle (Andreassi, 2006).

5. All participants’ contributions were donated to Action Against Hunger (see actionagainsthunger.org). The description of the charity read:

   Action Against Hunger is an international relief and development organization committed to saving the lives of malnourished children and families while seeking long-term, sustainable solutions to hunger. Recognized as a world leader in the fight against hunger and malnutrition, Action Against Hunger specializes in responding to emergency situations of war, conflict, and natural disaster. Their innovative programs in nutrition, water and sanitation, food security, health care, and advocacy reach more than 5 million people in over 40 countries, helping vulnerable populations regain their self-sufficiency.

6. Here and following, when degrees of freedom contain decimal points, Levene's test was significant, so equal variances were not assumed.

7. Study 3 participants were 62.7% Christian, 11.9% Agnostic, 9% Atheist, 7.5% None, 4.5% Jewish, 3% Universalist, and 1.5% No answer given.

8. The high degree of suspicion is likely due to the relative transparency of the relationship between the manipulation (evaluating humanitarianism websites) and the outcome measure (donating money to charity). In support of this interpretation, only participants in the religious (N = 7) and nonreligious humanitarianism conditions (N = 2) indicated any suspicion. Nevertheless, such a large number of participants
deleted from analysis is cause for concern. However, analyses comparing the religious and nonreligious conditions with and without the suspicious participants yielded the same direction of effect, albeit nonsignificant with the suspicious participants included, $t(42) = 1.1$, $p = .279$.

9. Either the control condition in this study, the manufacturing website, increased the amount of money participants donated to charity or the religious and nonreligious humanitarianism meaning system websites decreased the amount of money participants donated to charity. In fact, those in the control condition gave an average of $3.26 more to charity than those in the religious and nonreligious humanitarian meaning system conditions. Although it is difficult to know with certainty whether the control increased donations or the humanitarianism websites decreased donations, one explanation for the former is that because the manufacturing website mentioned a contributing a large amount of money in the first paragraph (“Manufacturing… contributes more than $1.6 trillion to the U.S. economy annually.”), the control website inadvertently primed giving away money instead of providing a neutral comparison condition. One research study has shown that priming money decreases rather than increases amount of money donated (Vohs, Mead, & Goode, 2006). However, a key difference exists between that study and Study 3; in Vohs and colleagues (2006), money was primed generally without regard to the amount or what was done with the money whereas the control condition in Study 3 mentioned a large amount of money being contributed to the U.S. economy. This difference could have led to the opposite effect of Vohs and colleagues (2006).
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**Appendix A**

**Table 1**

Zero-order correlations of prequestionnaire measures.

<table>
<thead>
<tr>
<th></th>
<th>Intrinsic religiousness</th>
<th>Positive God image</th>
<th>Verticality</th>
<th>Paranormal belief</th>
<th>Sense of coherence</th>
<th>Satisfaction with life</th>
<th>Positive emotion</th>
<th>Negative emotion</th>
<th>Social desirability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree of religiousness</td>
<td>.70***</td>
<td>.73***</td>
<td>.59***</td>
<td>.35***</td>
<td>.21**</td>
<td>.13*</td>
<td>.10</td>
<td>-.16*</td>
<td>.00</td>
</tr>
<tr>
<td>Intrinsic religiousness</td>
<td>-</td>
<td>.65***</td>
<td>.57***</td>
<td>.17**</td>
<td>.16*</td>
<td>.14*</td>
<td>.14*</td>
<td>-.17*</td>
<td>-.01</td>
</tr>
<tr>
<td>Positive God image</td>
<td>-</td>
<td>.51***</td>
<td>.35***</td>
<td>.32***</td>
<td>.22***</td>
<td>.06</td>
<td>-.22***</td>
<td>-.07</td>
<td></td>
</tr>
<tr>
<td>Verticality</td>
<td>-</td>
<td>.18**</td>
<td>.05</td>
<td>-.01</td>
<td>-.08</td>
<td>.04</td>
<td>-.14*</td>
<td>.01</td>
<td>-.04</td>
</tr>
<tr>
<td>Paranormal belief</td>
<td>-</td>
<td></td>
<td>.64***</td>
<td>.31***</td>
<td>-.51***</td>
<td>.28***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sense of coherence</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td>.36***</td>
<td>-.34***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Satisfaction with life</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.22***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive emotion</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative emotion</td>
<td>-</td>
<td></td>
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<td></td>
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</tbody>
</table>

*Note.* df’s = 206 - 215; Verticality is base-10 log transformed; †p < .10; * p < .05; ** p < .01; *** p < .001
Table 2

Mean, standard deviations, and N's for the prequestionnaire, lab session, and change scores of sense of coherence and satisfaction with life from Studies 1, 2, and 3.

<table>
<thead>
<tr>
<th>Study</th>
<th>Sense of coherence</th>
<th>Prequestionnaire</th>
<th>Lab session</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mean (standard deviation)</td>
<td>N</td>
<td>Mean (standard deviation)</td>
</tr>
<tr>
<td>Study 1</td>
<td>4.65 (.64)</td>
<td>79</td>
<td>4.91 (.71)</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td>4.96 (1.24)</td>
<td>79</td>
<td>5.26 (.28)</td>
<td>80</td>
</tr>
<tr>
<td>Study 2</td>
<td>4.52 (.69)</td>
<td>69</td>
<td>4.66 (.74)</td>
<td>69</td>
</tr>
<tr>
<td></td>
<td>4.81 (1.48)</td>
<td>69</td>
<td>5.10 (1.39)</td>
<td>68</td>
</tr>
<tr>
<td>Study 3</td>
<td>4.57 (.75)</td>
<td>67</td>
<td>4.69 (.83)</td>
<td>67</td>
</tr>
<tr>
<td></td>
<td>4.92 (1.24)</td>
<td>67</td>
<td>5.24 (1.24)</td>
<td>67</td>
</tr>
</tbody>
</table>
Table 3

Zero-order correlations of social desirability and outcome variables from Studies 1, 2, and 3.

<table>
<thead>
<tr>
<th></th>
<th>Study 1 Social desirability</th>
<th>Study 2 Social desirability</th>
<th>Study 3 Social desirability</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td># of prosocial flyers taken</td>
<td>$ donated to charity</td>
<td>Time spent cheating</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>.20†</td>
<td>-</td>
<td>.07</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>-.00</td>
<td>.11</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>.22</td>
<td>.03</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note.* df's = 35-79; HR = heart rate, MAP = mean arterial blood pressure; †p < .10; **p < .01
Table 4

Zero-order correlations of outcome variables and predicted moderators from Study 1.

<table>
<thead>
<tr>
<th>Outcome variables</th>
<th>Predicated moderators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time spent cheating</td>
<td># of prosocial flyers taken</td>
</tr>
<tr>
<td></td>
<td>- .08</td>
</tr>
<tr>
<td># of prosocial flyers taken</td>
<td>-</td>
</tr>
<tr>
<td>Change sense of coherence</td>
<td>-</td>
</tr>
<tr>
<td>Change satisfaction with life</td>
<td>-</td>
</tr>
</tbody>
</table>

Note. df's = 74-79; Verticality is base-10 log transformed; †p < .10; * p < .05
Table 5

Hierarchical regressions testing verticality and religiousness as moderators of the effects of priming condition on outcome variables from Study 1.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Moderator</th>
<th>Comparison</th>
<th>B</th>
<th>(\Delta R^2)</th>
<th>(R^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time spent cheating</td>
<td>Verticality</td>
<td>God v. Glue</td>
<td>9151</td>
<td>.007</td>
<td>.086</td>
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<tr>
<td></td>
<td></td>
<td>Ghost v. Glue</td>
<td>7272</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>God v. Ghost</td>
<td>1879</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Religion composite</td>
<td>Verticality</td>
<td>God v. Glue</td>
<td>337</td>
<td>.001</td>
<td>.017</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ghost v. Glue</td>
<td>728</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>God v. Ghost</td>
<td>-391</td>
<td></td>
<td></td>
</tr>
<tr>
<td># prosocial flyers taken</td>
<td>Verticality</td>
<td>God v. Glue</td>
<td>2.919†</td>
<td>.057</td>
<td>.075</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ghost v. Glue</td>
<td>-.675</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>God v. Ghost</td>
<td>3.595*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Religion composite</td>
<td>Verticality</td>
<td>God v. Glue</td>
<td>.119</td>
<td>.012</td>
<td>.030</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ghost v. Glue</td>
<td>-.156</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>God v. Ghost</td>
<td>.274</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change SOC</td>
<td>Verticality</td>
<td>God v. Glue</td>
<td>-1.919**</td>
<td>.166**</td>
<td>.174*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ghost v. Glue</td>
<td>.362</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>God v. Ghost</td>
<td>-2.281***</td>
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<tr>
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<td>God v. Glue</td>
<td>-.082</td>
<td>.012</td>
<td>.026</td>
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<tr>
<td></td>
<td></td>
<td>Ghost v. Glue</td>
<td>.002</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>God v. Ghost</td>
<td>-.084</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change SWLS</td>
<td>Verticality</td>
<td>God v. Glue</td>
<td>-.943</td>
<td>.049</td>
<td>.059</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ghost v. Glue</td>
<td>-2.236†</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>God v. Ghost</td>
<td>1.293</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Religion composite</td>
<td>Verticality</td>
<td>God v. Glue</td>
<td>.121</td>
<td>.039</td>
<td>.054</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ghost v. Glue</td>
<td>-.262</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>God v. Ghost</td>
<td>.382†</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note.* \(N = 80\); SOC = sense of coherence, SWLS = satisfaction with life scale; B’s are unstandardized regression weights at the final step of the equation; Verticality is base-10 log transformed; †\(p < .10\), *\(p < .05\), **\(p < .01\), ***\(p < .001\)
Table 6

Hierarchical regressions testing paranormal belief as a moderator of the effects of priming condition on outcome variables from Study 1.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Comparison</th>
<th>B</th>
<th>$\Delta R^2$</th>
<th>$R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time spent cheating</td>
<td>God v. Glue</td>
<td>-2696</td>
<td>.045</td>
<td>.178*</td>
</tr>
<tr>
<td></td>
<td>Ghost v. Glue</td>
<td>-3975†</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>God v. Ghost</td>
<td>1279</td>
<td></td>
<td></td>
</tr>
<tr>
<td># prosocial flyers</td>
<td>God v. Glue</td>
<td>-.491*</td>
<td>.052</td>
<td>.084</td>
</tr>
<tr>
<td>taken</td>
<td>Ghost v. Glue</td>
<td>-.297</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>God v. Ghost</td>
<td>-.194</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change SOC</td>
<td>God v. Glue</td>
<td>-.004</td>
<td>.002</td>
<td>.010</td>
</tr>
<tr>
<td></td>
<td>Ghost v. Glue</td>
<td>.027</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>God v. Ghost</td>
<td>-.031</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change SWLS</td>
<td>God v. Glue</td>
<td>-.072</td>
<td>.003</td>
<td>.032</td>
</tr>
<tr>
<td></td>
<td>Ghost v. Glue</td>
<td>.024</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>God v. Ghost</td>
<td>-.095</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note. N = 80; SOC = sense of coherence, SWLS = satisfaction with life scale; B’s are unstandardized regression weights at the final step of the equation; Verticality is base-10 log transformed; †p < .10; * p < .05
Table 7

Zero-order correlations of outcome variables and predicted moderators from Study 2.

<table>
<thead>
<tr>
<th></th>
<th>$ donated to charity</th>
<th>Change satisfaction with life</th>
<th>Change sense of coherence</th>
<th>Time spent cheating</th>
<th>Religion composite</th>
<th>Verticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speech prepare</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HR</td>
<td>.14</td>
<td>.08</td>
<td>-.15</td>
<td>.16</td>
<td>-.01</td>
<td>-.04</td>
</tr>
<tr>
<td>MAP</td>
<td>-.10</td>
<td>-.07</td>
<td>-.24†</td>
<td>-.05</td>
<td>.16</td>
<td>.22†</td>
</tr>
<tr>
<td>Speech deliver</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HR</td>
<td>.16</td>
<td>.14</td>
<td>.06</td>
<td>.31*</td>
<td>-.03</td>
<td>-.02</td>
</tr>
<tr>
<td>MAP</td>
<td>.03</td>
<td>-.28*</td>
<td>-.08</td>
<td>.17</td>
<td>.14</td>
<td>-.21</td>
</tr>
<tr>
<td>$ donated to charity</td>
<td>-</td>
<td>-.11</td>
<td>.09</td>
<td>-.22†</td>
<td>-.00</td>
<td>-.12</td>
</tr>
<tr>
<td>Change satisfaction with life</td>
<td>-</td>
<td>.27*</td>
<td>-.06</td>
<td>-.03</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change sense of coherence</td>
<td>-</td>
<td>.07</td>
<td>.01</td>
<td>-.27*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time spent cheating</td>
<td>-</td>
<td></td>
<td>.20</td>
<td>.35**</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. df's = 36-68; HR = heart rate, MAP = mean arterial blood pressure; Verticality is base-10 log transformed; †p < .10; * p < .05; ** p < .01
Table 8

Hierarchical regressions testing verticality and religiousness as moderators of the effects of social support from a religiously identified versus a politically identified confederate on outcome variables from Study 2.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Moderator</th>
<th>B</th>
<th>ΔR²</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speech prep HR</td>
<td>Verticality</td>
<td>8.226</td>
<td>.004</td>
<td>.066</td>
</tr>
<tr>
<td></td>
<td>Religion composite</td>
<td>2.621</td>
<td>.012</td>
<td>.070</td>
</tr>
<tr>
<td>Speech deliver HR</td>
<td>Verticality</td>
<td>-9.512</td>
<td>.004</td>
<td>.211*</td>
</tr>
<tr>
<td></td>
<td>Religion composite</td>
<td>2.696</td>
<td>.009</td>
<td>.215*</td>
</tr>
<tr>
<td>Speech prep MAP</td>
<td>Verticality</td>
<td>-9.242</td>
<td>.007</td>
<td>.085</td>
</tr>
<tr>
<td></td>
<td>Religion composite</td>
<td>.794</td>
<td>.001</td>
<td>.043</td>
</tr>
<tr>
<td>Speech deliver MAP</td>
<td>Verticality</td>
<td>-31.539</td>
<td>.047</td>
<td>.057</td>
</tr>
<tr>
<td></td>
<td>Religion composite</td>
<td>2.054</td>
<td>.007</td>
<td>.039</td>
</tr>
<tr>
<td>Time spent cheating</td>
<td>Verticality</td>
<td>-26592**</td>
<td>.114**</td>
<td>.278***</td>
</tr>
<tr>
<td></td>
<td>Religion composite</td>
<td>-2449</td>
<td>.029</td>
<td>.114†</td>
</tr>
<tr>
<td>$ donated to charity</td>
<td>Verticality</td>
<td>11.314†</td>
<td>.053†</td>
<td>.133*</td>
</tr>
<tr>
<td></td>
<td>Religion composite</td>
<td>.781</td>
<td>.006</td>
<td>.048</td>
</tr>
<tr>
<td>Change SOC</td>
<td>Verticality</td>
<td>-.768†</td>
<td>.045†</td>
<td>.146*</td>
</tr>
<tr>
<td></td>
<td>Religion composite</td>
<td>-.110</td>
<td>.026</td>
<td>.048</td>
</tr>
<tr>
<td>Change SWLS</td>
<td>Verticality</td>
<td>1.204</td>
<td>.024</td>
<td>.051</td>
</tr>
<tr>
<td></td>
<td>Religion composite</td>
<td>.184</td>
<td>.017</td>
<td>.035</td>
</tr>
</tbody>
</table>

Note. N = 69; HR = heart rate, MAP = mean arterial blood pressure, SOC = sense of coherence, SWLS = satisfaction with life scale; B’s are unstandardized regression weights at the final step of the equation; Verticality is base-10 log transformed; †p < .10; *p < .05, **p < .01, ***p < .001
Table 9

Zero-order correlations of outcome variables and predicted moderators from Study 3.

<table>
<thead>
<tr>
<th></th>
<th>Outcome variables</th>
<th>Predicted moderators</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Change sense of</td>
<td></td>
</tr>
<tr>
<td></td>
<td>coherence</td>
<td></td>
</tr>
<tr>
<td>$ donated to charity</td>
<td>-.07</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Change satisfaction with life</td>
<td>.23†</td>
</tr>
<tr>
<td></td>
<td>-.01</td>
<td>-.02</td>
</tr>
<tr>
<td></td>
<td>Time spent cheating</td>
<td>.06</td>
</tr>
<tr>
<td></td>
<td>-.21</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Religion composite</td>
<td>.07</td>
</tr>
<tr>
<td></td>
<td>-.32*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Verticality</td>
<td>-.04</td>
</tr>
<tr>
<td></td>
<td>-.07</td>
<td></td>
</tr>
<tr>
<td>$ donated to charity</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-.23†</td>
<td>-.15</td>
</tr>
<tr>
<td></td>
<td>-.02</td>
<td>.07</td>
</tr>
<tr>
<td></td>
<td>-.01</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-.15</td>
<td>-.20</td>
</tr>
<tr>
<td></td>
<td>-.02</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-.20</td>
<td>.04</td>
</tr>
</tbody>
</table>

*Note. df's = 42-66; Verticality is base-10 log transformed; †p < .10; ** p < .01*
Table 10

Hierarchical regressions testing verticality and religiousness as moderators of the effects of website condition on outcome variables from Study 3.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Moderator</th>
<th>Comparison</th>
<th>B</th>
<th>ΔR²</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>$ donated to charity</td>
<td>Verticality</td>
<td>Religious v. control</td>
<td>8.271</td>
<td>.034</td>
<td>.136</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nonreligious v. control</td>
<td>12.026</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Religious v. nonreligious</td>
<td>-3.754</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Religion</td>
<td>Religious v. control</td>
<td>-0.920</td>
<td>.007</td>
<td>.174†</td>
</tr>
<tr>
<td></td>
<td>composite</td>
<td>Nonreligious v. control</td>
<td>.384</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Religious v. nonreligious</td>
<td>-1.304</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change SOC</td>
<td>Verticality</td>
<td>Religious v. control</td>
<td>.555</td>
<td>.072</td>
<td>.092</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nonreligious v. control</td>
<td>-.507</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Religious v. nonreligious</td>
<td>1.062*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Religion</td>
<td>Religious v. control</td>
<td>.208†</td>
<td>.088†</td>
<td>.102</td>
</tr>
<tr>
<td></td>
<td>composite</td>
<td>Nonreligious v. control</td>
<td>-.069</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Religious v. nonreligious</td>
<td>.277*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time spent cheating</td>
<td>Verticality</td>
<td>Religious v. control</td>
<td>-3381</td>
<td>.007</td>
<td>.033</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nonreligious v. control</td>
<td>-5695</td>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Religious v. nonreligious</td>
<td>2314</td>
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</tr>
<tr>
<td></td>
<td>Religion</td>
<td>Religious v. control</td>
<td>569</td>
<td>.002</td>
<td>.046</td>
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<tr>
<td></td>
<td>composite</td>
<td>Nonreligious v. control</td>
<td>-207</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Religious v. nonreligious</td>
<td>776</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change SWLS</td>
<td>Verticality</td>
<td>Religious v. control</td>
<td>-.471</td>
<td>.006</td>
<td>.009</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nonreligious v. control</td>
<td>-.497</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Religious v. nonreligious</td>
<td>.026</td>
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</tr>
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<td>Religion</td>
<td>Religious v. control</td>
<td>-.339</td>
<td>.038</td>
<td>.044</td>
</tr>
<tr>
<td></td>
<td>composite</td>
<td>Nonreligious v. control</td>
<td>-.127</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Religious v. nonreligious</td>
<td>-.213</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. N = 67; SOC = sense of coherence, SWLS = satisfaction with life scale; B’s are unstandardized regression weights at the final step of the equation; Verticality is base-10 log transformed; †p < .10; * p < .05
Appendix B

**Figure Captions**

Figure 1. The sequence and timing of events in the lexical decision task priming supernatural agency in Study 1.

Figure 2. Sample problem from the mental rotation task. Items were rotated along both the x and y axes and options appear very similar, presenting a very difficult choice and encouraging cheating in the face of difficulty.

Figure 3. The effect of priming on the religious word completion task in Study 1. Error bars represent the standard error.

Figure 4. The effects of priming on time spent cheating on the mental rotation task in Study 1. Error bars represent the standard error.

Figure 5. The moderation of the effects of supernatural priming on time spent cheating by individual differences in paranormal beliefs in Study 1.

Figure 6. The moderation of the effects of supernatural priming on the number of prosocial flyers taken by individual differences in verticality in Study 1.

Figure 7. The moderation of the effects of supernatural priming on the number of prosocial flyers taken by individual differences in paranormal beliefs in Study 1.

Figure 8. The moderation of the effects of supernatural priming on the change in satisfaction with life from the prequestionnaire to the lab session by individual differences in verticality in Study 1.
Figure 9. The moderation of the effects of supernatural priming on the change in satisfaction with life from the prequestionnaire to the lab session by individual differences in religiousness in Study 1.

Figure 10. The moderation of the effects of supernatural priming on the change in sense of coherence from the prequestionnaire to the lab session by individual differences in verticality in Study 1.

Figure 11. The effects of experimental stage on heart rate in Study 2 controlling for somatic movement. Error bars represent the standard error.

Figure 12. The effects of experimental stage on blood pressure in Study 2. Error bars represent the standard error.

Figure 13. The effects of confederate type on heart rate during speech preparation in Study 2 controlling for somatic movement. Error bars represent the standard error.

Figure 14. The effects of confederate type on blood pressure during speech preparation in Study 2. Error bars represent the standard error.

Figure 15. The effects of confederate type on heart rate during speech delivery in Study 2 controlling for somatic movement. Error bars represent the standard error.

Figure 16. The effects of confederate type on blood pressure during speech delivery in Study 2. Error bars represent the standard error.

Figure 17. The effects of confederate type on change in satisfaction with life from the prequestionnaire to the lab session in Study 2. Error bars represent the standard error.

Figure 18. The effects of confederate type on amount donated to charity in Study 2. Error bars represent the standard error.
Figure 19. The effects of confederate type on time spent cheating in Study 2. Error bars represent the standard error.

Figure 20. The moderation of the effects of type of social support on the amount of time spent cheating by individual differences in verticality in Study 2.

Figure 21. The moderation of the effects of type of social support on the amount of money donated to charity by individual differences in verticality in Study 2.

Figure 22. The moderation of the effects of type of social support on change in sense of coherence from the prequestionnaire to the lab session by individual differences in verticality in Study 2.

Figure 23. Screenshots of the websites used in Study 3 to prime (a) religious humanitarianism or (b) nonreligious humanitarianism and the control website on manufacturing (c).

Figure 24. The effect of priming on the religious word completion task in Study 3. Error bars represent the standard error.

Figure 25. The effects of website type, including the control condition, on amount donated to charity in Study 3. Error bars represent the standard error.

Figure 26. The effects of the religious and nonreligious humanitarian websites on amount donated to charity in Study 3. Error bars represent the standard error.

Figure 27. The moderation of the effects of website condition on change in sense of coherence from the prequestionnaire to the lab session by individual differences in verticality in Study 3.
Figure 28. The moderation of the effects of type of website condition on change in sense of coherence from the prequestionnaire to the lab session by individual differences in religiousness in Study 3.
Figure 1
Figure 2
Figure 3

# of religiously completed words

- God
- Ghost
- Glue
Figure 4

Time spent cheating (ms)

- God
- Ghost
- Glue
Figure 5
Figure 6

![Graph showing the relationship between the number of prosocial flyers taken and verticality ratio (log transformed). The graph includes three lines labelled God, Ghost, and Glue. The vertical axis represents the number of prosocial flyers taken, ranging from 0 to 3. The horizontal axis represents the verticality ratio (log transformed), ranging from 0.00 to 1.00.]
Figure 8

Change in satisfaction with life

Vertically ratio (log transformed)
Figure 9
Figure 10

The diagram shows the relationship between change in sense of coherence and verticality ratio (log transformed). The lines represent different groups:

- God
- Ghost
- Glue

The y-axis represents change in sense of coherence, ranging from -1.50 to 1.00, and the x-axis represents verticality ratio, ranging from 0.00 to 1.00.
Figure 11

Heart rate (beats/minute)

Neutral film baseline  Speech preparation  Speech delivery
Figure 12

Mean arterial pressure (mmHg)

Neutral film baseline  Speech preparation  Speech delivery
Figure 13

Heart rate (bpm)

Religious

Political

Similar

Dissimilar
Figure 15

![Bar chart showing heart rate (bmp) for religious and political topics, with bars indicating similar and dissimilar conditions.](chart.png)

- Religious
- Political

Heart rate (bmp)

- Similar
- Dissimilar
Figure 16

Mean arterial pressure (mmHg)

Religious  
Political

Similar  
Dissimilar
Figure 17

Change in satisfaction with life

Religious
Political

Similar
Dissimilar
Figure 18

The graph shows the amount donated to charity for religious and political causes, comparing similar and dissimilar conditions. The y-axis represents the amount donated to charity, ranging from $0 to $9. The x-axis has two categories: Religious and Political. The bars indicate that people tend to donate more to political causes when the conditions are similar compared to when they are dissimilar. Conversely, for religious causes, the amount donated does not seem to vary much between similar and dissimilar conditions.
Figure 19

Time spent cheating (ms)

Religious  Political

Similar  Dissimilar
Figure 20

![Graph showing the relationship between Verticality ratio (log transformed) and Time spent cheating (ms) for Political and Religious activities.](image-url)
Figure 21
Figure 22

Change in sense of coherence vs. Verticality ratio (log transformed)

- Political
- Religious
Figure 23

a. Social responsibility

Excerpt from "The Declaration of a Global Ethic" given at the Parliament of World Citizens, 1993

"We are interdependent. Each of us depends on the well-being of the whole, and so we have respect for the community of living beings, for people, animals, and plants, and for the preservation of Earth, the air, water and soil.

We take individual responsibility for all we do. All our decisions, actions, and failures to act have consequences.

b. Social responsibility

Excerpt from "The Declaration of a Global Ethic" given at the Parliament of World Religions, 1993

"We are interdependent. Each of us depends on the well-being of the whole, and so we have respect for the community of living beings, for people, animals, and plants, and for the preservation of Earth, the air, water and soil.

We take individual responsibility for all we do before God. All our decisions, actions, and failures to act have consequences on earth and in the afterlife.

c. Manufacturing

Excerpt from "The Declaration of Modern Manufacturing" given at the National Association of Manufacturers Meeting, 1993

"The National Association of Manufacturers (NAM) is the preeminent US manufacturers association as well as the nation’s largest industrial trade association, representing small and large manufacturers in every industrial sector and in all 50 states.

Manufacturing employs nearly 12 million workers, contributes more than $1.5 trillion to the U.S. economy annually, is the largest driver of economic growth in the nation and accounts for the lion’s share of private sector research and development."
Figure 24

# of religiously completed words

Religious | Nonreligious | Control

0 | 0.5 | 1 | 1.5 | 2 | 2.5
Figure 26

A bar graph showing the amount donated to charity by religious and nonreligious individuals. The graph indicates that religious individuals donate more than nonreligious individuals.
Figure 27

Change in sense of coherence vs. Religion composite (z-scored)

- Religious
- Nonreligious
- Control
Figure 28