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Testing the causal relationship between religious belief and death anxiety

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ABSTRACT

Religion has long been speculated to function as a strategy to ameliorate our fear of death. Terror management theory provides two possible causal pathways through which religious beliefs can fulfil this function. According to the "worldview defence" account of terror management, worldviews reduce death anxiety by offering symbolic immortality: on this view, only people who accept the religious worldview in question should benefit from religious beliefs. Alternatively, religious worldviews also offer literal immortality, and may do so independently of individuals' worldviews. Both strands of thought appear in the terror management theory literature. In this paper, we attempt to resolve this issue experimentally by manipulating religious belief and measuring explicit (Study 1) and implicit (Study 2) death anxiety. In Study 1, we found that the effect of religious belief on explicit death anxiety depends critically on participants' own religious worldviews, such that believers and non-believers reported greater death anxiety when their worldview is threatened. In Study 2, however, we find that religious belief alleviates implicit death anxiety amongst both believers and non-believers. These findings suggest that religious beliefs can alleviate death anxiety at two different levels, by offering symbolic and literal immortality, respectively.

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KEYWORDS Terror management theory; death anxiety; implicit measures; unconscious emotion

Testing the causal relationship between religious belief and death anxiety

Religious belief – the belief in supernatural agents or events – is a prominent and enduring feature of human psychology (Atran, 2002; Barrett, 2004; Boyer, 2001; Pyysiainen, 2009; Whitehouse, 2004). Billions of people worldwide, both historically and currently, hold religious beliefs, and even those who explicitly repudiate such beliefs often reveal some implicit acceptance of them (Jong, Halberstadt, & Bluemke, 2012; Uhlmann, Poehlman, & Bargh, 2008). The ubiquity of religiosity is surprising, not least given the elusiveness of religious entities and the cost of religiously prescribed lifestyles in terms of time, tangible and cognitive resources, and, arguably, reproductive opportunity (e.g., Jackson, Halberstadt, Jong, & Felman, 2015). Why then, given the sacrifices associated with adhering to religious beliefs, and the lack of evidence that any are true, do so many worldwide continue to believe?

The enigma of religious belief is neither new nor uncharted. Although the underpinnings of belief are no doubt multiply determined, terror management theory (TMT; Greenberg, Pyszczynski, & Solomon, 1986) has prominently linked religious belief to the fear of death (Vail et al., 2010).

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According to TMT, humans are uniquely aware of their own vulnerability and inevitable death, which, were it not for strategic psychological buffers, would cause debilitating anxiety. Religion provides a particularly effective buffer by addressing death anxiety in two ways. First, like any venerable cultural institution, religious groups provide "symbolic immortality" by allowing individuals to belong and commit to entities that are larger and more enduring than themselves (Landau, Greenberg, & Solomon, 2004; Vail et al., 2010). Second, *unlike* other secular alternatives, many major belief systems (including Christianity, Hinduism, and Islam, which together claim more than half the world's population) offer opportunities for *literal* immortality (e.g., in the form of an afterlife or reincarnation; Atran, 2002). Thus, from this perspective, these religions provide a unique, twofold solution to the problem of death anxiety.

Despite the intuitive appeal of religiosity as an effective buffer against death anxiety, previous research has produced mixed support for this claim. Several correlational studies have found religious people to be less fearful of death than their non-religious counterparts (Avarado, Templer, Bresler, & Thomas-Dobson, 1995; Feifel & Branscomb, 1973; Harding, Flannelly, Weaver, & Costa, 2005; Wen, 2010). However, there are also studies that have found correlations in the opposite direction (Cohen et al., 2005; Dezutter, Luyckx, & Hutsebaut, 2009; Donovan, 1994; Ellis, Wahab, & Ratnasingan, 2013). Still other studies have found no association at all (Rasmussen & Johnson, 1994; Templer & Dotson, 1970), or a non-linear association, such that committed theists *and* committed atheists *both* report less death anxiety than individuals with more moderate beliefs (Jong, Bluemke, & Halberstadt, 2013; Nelson & Cantrell, 1980). Studies manipulating mortality salience to examine religiosity have produced similarly mixed results, finding alternatively that mortality salience increases religious belief universally (Norenzayan & Hansen, 2006, studies 1 and 2), and that it only increases belief amongst individuals who are already highly religious (Norenzayan & Hansen, 2006, studies 3 and 4; Jonas & Fischer, 2006; Osarchuk & Tatz, 1973).

A direct experimental test of the buffering effects of religious belief on death anxiety is conspicuously absent (though see Heflick & Goldenberg, 2012 for an indirect test). One reason for this gap in the literature is undoubtedly that religious beliefs are strongly held and difficult to change (McCullough, Enders, Brion, & Jain, 2005; Wink & Dillon, 2001). When Batson (1975) tried to do so, using a "news article" reporting that the New Testament was a fake, he found that participants who believed the article reported *stronger* religious belief afterwards (see also Festinger, Riecken, & Schachter's, 1956, classic account of The Seekers, a doomsday cult that redoubled its faith upon disconfirmation of their prophecy). Tetlock (2000) found that participants were reluctant even to *contemplate* a challenge to their religious beliefs. Christians rejected "heretical" biblical counterfactuals (e.g., "If Jesus had not chosen Judas as one of his 12 disciples, Jesus would not have been betrayed or crucified"), responding with "moral outrage" and expressing their intention to support the church in the future.

Some researchers have responded to the challenge of shifting religious beliefs by manipulating the accessibility of religious concepts (see Shariff, Willard, Andersen, & Norenzayan, 2015, for a meta-analysis), but such efforts, in theory, only make salient the beliefs participants already hold; they do not change them. (Consistent with this interpretation, Shariff et al.'s meta-analysis found that religious priming influences behaviour only for religious individuals.) Others have attempted to challenge beliefs directly, with unclear results. For example, Shariff, Cohen, and Norenzayan (2008) found that participants who read a brief anti-religion passage by prominent atheist Richard Dawkins reported less religiosity on both explicit and implicit measures compared to controls. Because participants' prior religious beliefs were not reported, however (only their religious identities, i.e., Christian, Muslim, etc.), it is not clear the extent to which Dawkins' arguments were actually counterattitudinal. In contrast, Friedman and Rholes (2007) challenged a group of religious believers by pointing out contradictions in the Gospels' account of Jesus' resurrection. Their manipulation was successful, in the sense that participants were more willing to acknowledge the contradictions after reading about them, but there was no direct evidence that the acknowledgement changed their beliefs about the resurrection, much less their religious beliefs more generally (e.g., belief in God). In any case, none of these manipulations have been explored in the context of death anxiety.

A further complication for testing the buffering hypothesis is that both "religious belief" and "death anxiety" are multifaceted constructs, and each comprises explicit and implicit elements. Indeed, previous studies have shown that people do not always have conscious access to their beliefs (Greenwald & Banaji, 1995), and that implicit and explicit measures do not always correspond to or predict behaviour to the same degree (Hofmann, Gawronski, Gschwendner, Le, & Schmitt, 2005). This distinction between the explicit and the implicit does not apply only to beliefs, but also to more affective states such as attitudes and goals. Recent research has found that unconscious emotions can affect our behaviour even when we do not consciously experience them (Winkielman & Berridge, 2004).

There is also now some evidence that explicit and implicit religious belief are dissociable states. Using an explicit measure of belief, Jong et al. (2012) found a "worldview defence" pattern in response to death anxiety, such that self-described religious people reported greater belief and non-religious people reported reduced belief. However, using an implicit measure of religious belief (a single target-implicit association test; ST-IAT; Bluemke & Friese, 2008), which measures the strength of association between religious and "existence" concepts, Jong et al. (2012) found that all participants' religious belief increased, regardless of their stated religious identity (see also Heflick & Goldenberg, 2012).

Jong et al.'s (2012) results are consistent with the idea that religious belief provides two complementary antidotes to death anxiety: symbolically via explicit worldview defence; and literally, via an implicit association with between religious concepts and immortality. However, the fact that individuals bolster religious beliefs when reminded of death is no evidence at all that they are justified in doing so. The purpose of the reported research was therefore to provide a first, direct test of religiosity's *effectiveness* in reducing death anxiety, measured both explicitly and, for the first time in this context, implicitly. In the process we designed a novel manipulation of religious belief that relies on the well-documented "ease-of-retrieval" effect (Schwarz & Vaughn, 2002; Wänke, 2013), in which people's beliefs are influenced by the ease with which they are able to generate reasons for them (see Tversky & Kahneman, 1973). For example, Schwarz and Vaughn (2002) asked participants to list either 6 or 12 assertive behaviours. Although those in the list-12 condition listed more behaviours overall, they nevertheless judged themselves as less assertive than participants in the list-6 condition, apparently because they interpreted the difficulty of the task as evidence that they seldom showed assertiveness. Schwartz et al.'s research concerns shifts in participants' self-concept, but analogous procedures have been used to produce attitude change (e.g., Hansen & Wänke, 2008).

In the current studies, we use an ease-of retrieval paradigm to temporarily manipulate participants' religious belief, in order to test the causal effect of such belief on death anxiety. The presumption, as in previous work, is that religious belief will be undermined to the extent that one finds it difficult to justify this belief. To determine just what level of justification participants would find difficult, we conducted a pilot study, the results of which informed a manipulation of religiosity, which we then implemented before measuring death anxiety explicitly (Study 1) and implicitly (Study 2). To determine whether the influence of religiosity depended on participants' prior beliefs, we assessed those beliefs directly (rather than relying on self-reported religious identity) and included them as a second factor in all analyses.

Pilot study

Method

Participants

Thirty female and seven male psychology undergraduate students at the University of Otago in New Zealand participated in exchange for partial course credit.

Materials and procedure

In all studies reported herein, participants were tested in light- and sound-attenuated experimental rooms containing an Apple iMac 21-inch computer workstation. After providing informed consent

and some demographic information, and completing another, unrelated procedure, participants were given an argument-listing task. Instructions at the top of a sheet of paper explained our interest in "the reasons people provide to support different sides of an issue," and that the participant's topic was "The existence of God." They were asked to list as many reasons as possible to support the statement that "God exists," and, below that, to list reasons to support the statement that "God does not exist" (the order of topics was counterbalanced). When they could think of no more reasons for either proposition, participants were instructed to contact the experimenter, who debriefed them on all procedures they completed.

Results and discussion

Participants listed an average of 4.5 arguments for God's existence (SD = 2.7; range = 1–12), compared to 5.0 arguments for God's non-existence (SD = 2.5, range = 1–16), values that did not differ significantly, $t(36) = 1.30$, $p = 0.21$.

Participants were coded as religious (10 "Christian," 5 "other") or non-religious ($n = 22$) based on their responses to a question about their "religion" (Christian, None, Other) on the demographics questionnaire. The numbers of arguments listed were analysed in a 2 (argument type: for God's existence versus non-existence) × 2 (argument order: pro-God arguments first versus second) × 2 (participant religiosity) mixed model analysis of variance (ANOVA), with the first factor treated as a repeated measure. The analysis revealed an interaction between argument type and participant religiosity, $F(1,33) = 4.50$, $p < 0.05$, $\eta_p^2 = 0.12$. Non-religious participants listed more arguments against God's existence than for God's existence (*M*s = 5.2 versus 4.0, $p < 0.05$), while religious participants listed numerically, though non-significantly, more arguments for God's existence than against (*M*s = 5.1 versus 4.7, $p = 0.51$). Argument type also interacted with argument order, $F(1,33) = 4.23$, $p < 0.05$, $\eta_p^2 = 0.12$. All participants listed more arguments for the first proposition they considered than for the second, but the difference was only significant when the second proposition was God's non-existence (*M*s = 4.9 versus 3.7, $p < 0.005$).

Most important for the subsequent studies, most participants spontaneously listed fewer than five arguments, and only one participant (2.7% of the sample) listed more than 12, for either proposition, suggesting that generating 12 arguments is a subjectively difficult task. However, because the number of arguments listed did vary with participant religiosity, religiosity will be treated as a second, pseudo-independent variable in subsequent analyses, and the number of arguments generated will be treated as a covariate.

Study 1

Having found a degree of argumentation that participants find difficult (but presumably not unreasonable), we exploited this difficulty as a subtle manipulation of religious belief. Thus, in Study 1, participants listed 12 reasons *for* the existence of God or *against* the existence of God. Because both tasks, according to the pilot study, are well beyond what participants spontaneously achieve, we expected either to be experienced as difficult, and taken as evidence against the target belief; thus, arguing for and against God's existence represents, in this case, the "disbelief" and "belief" conditions, respectively. Our question was whether experimentally manipulated believers report less death anxiety than disbelievers, either as a main effect or qualified by participants' pre-existing religious beliefs.

Method

Participants

Ninety-one female and 29 male native English-speaking volunteers between the ages of 17 and 41 years ($M_{age} = 21.3$, $SD = 4.2$) served as participants. Seventy-four were first- or second-year

undergraduate psychology students of the University of Otago who received course credit in exchange for their participation. The remainder were non-psychology students recruited via the University of Otago's Psychology Department research participation website, and were reimbursed NZ $15 to cover their travel expenses. An additional 13 participants who were non-native English speakers, and/or who indicated relatively less proficiency in English, were run in the study, but their data were not analysed.

Materials

Religious belief was manipulated using the argument generation task described in the pilot study, except that participants listed arguments for only one proposition, either that "God exists" (disbelief condition), or that "God does not exist" (the belief condition). In addition, because recent research indicates that ease-of-retrieval effects are sensitive to context, and particularly to the difference between experienced and *expected* ease (Lick & Johnson, 2015), participants in the disbelief and belief conditions were told that "most religious [non-religious] individuals find it easy to generate 12 reasons in about five minutes," although, we added, participants could take as long as they liked. These instructions were added to increase the likelihood that participants made an internal attribution after failing to list the sufficient number of reasons.

Pre-existing religious beliefs were measured using the Supernatural Beliefs Scale (SBS; Jong et al., 2013), a highly reliable measure of religious belief (Cronbach's $\alpha = 0.93$). The SBS consists of 10 items related to religious supernatural agents, events, and places (e.g., "There exists an all-powerful, all-knowing, loving God"). Participants indicated their agreement with each statement on a nine-point Likert scale ranging from –4 (strongly disagree) to 4 (strongly agree), and SBS scores were established by calculating the mean of the 10 ratings. A score of zero is indicative of agnosticism, while a score less than or greater than zero is indicative of disbelief or belief, respectively, in supernatural religious concepts, a core aspect of religiosity (Jong et al., 2013).

Death anxiety was assessed using the Death Anxiety Questionnaire (DAQ; Conte, Weiner, Marcella, & Plutchik, 1982), a brief, well-validated measure of fear of various (correlated) aspects of death. The scale consists of 15 statements (e.g., "Does it bother you that you may die before you have done everything you wanted to do?"), to which participants respond on a three-point scale: 0 ("not at all"), 1 ("somewhat"), or 2 ("very much"). A mean of these responses (Cronbach's $\alpha = 0.83$) was calculated to establish a single death anxiety score.

Procedure

The experiment was run among several other unrelated studies. Participants completed a demographics questionnaire and the SBS, followed by the experimental manipulation and then the DAQ. All measures were completed on paper, and the procedure took approximately 30 minutes. Participants were debriefed at the conclusion of all tasks.

Results and discussion

Following Jong et al. (2012), participants were categorized based on their SBS scores as either "religious" (SBS > 0; 40% of the sample) or "non-religious" (SBS < 0; 56% of the sample). Four percent of participants recorded SBS scores of exactly zero and were not included in the following analyses. Men and women did not differ in their religiosity in either Study 1 or Study 2. Figure 1 shows the full distribution of participant religiosity.

Arguments

Overall, participants listed an average of 8.2 arguments ($SD = 3.5$), with the majority (64%) listing fewer than 12. The numbers of arguments were analyzed in a 2 (experimental condition: belief versus disbelief) × 2 (participant religiosity: religious vs. non-religious) between-subjects ANOVA,

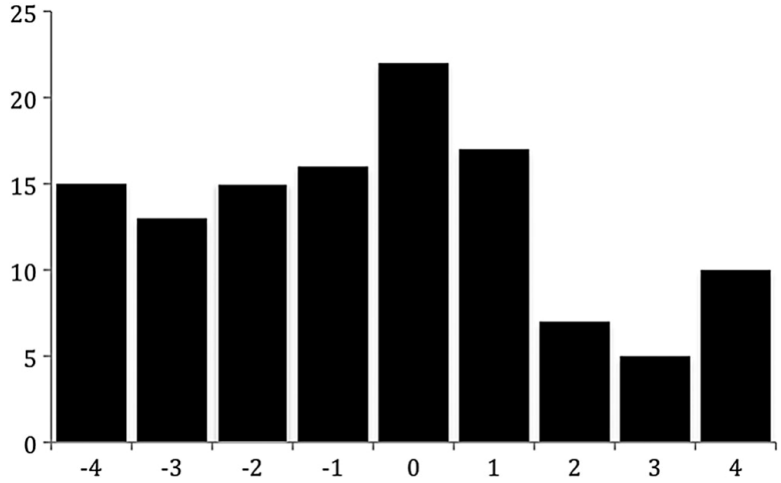

Figure 1. Distribution of participants' religious belief.

revealing that religious participants listed more arguments (M = 9.0, SE = 0.50) than non-religious participants (M = 7.6, SE = 0.42), $F(1,111) = 4.63$, $p = 0.03$, $\eta_p^2 = 0.04$. Additionally, a marginal main effect of experimental condition emerged, such that participants in the belief condition (arguing, with effort, against the existence of God) listed more arguments (M = 8.9, SE = 0.46), than participants in the disbelief condition (M = 7.7, SE = 0.46), $F(1,111) = 3.68$, $p = 0.06$, $\eta_p^2 = .01$. There was no interaction ($p >$ 0.40).

Death anxiety

The same model was used to analyse death anxiety scores (data from two participants who did not complete the DAQ were not included in this analysis), with number of generated arguments as a covariate. The analysis revealed only a significant interaction, $F(1,108) = 5.96$, $p = 0.02$, $\eta_p^2 = 0.05$, depicted in Figure 2. Separate one-way ANCOVAs clarified that non-believers were significantly more death anxious in the belief condition (M = 0.96, SE = 0.06) than in the disbelief condition (M = 0.75, SE = 0.06), $F(1,62) = 5.51$, $p = 0.02$, $\eta_p^2 = 0.08$. Believers were non-significantly less death anxious in the belief condition (M = 0.80, SE = 0.08) than in the disbelief condition (M = 0.91, SE = 0.08), $F(1,45) = 1.05$, $p = 0.31$, $\eta_p^2 = 0.02$. Seen from another perspective, compared to non-religious individuals, religious individuals were less anxious in the belief condition (p = 0.08), but *more* anxious in the disbelief conditions (p = 0.054).

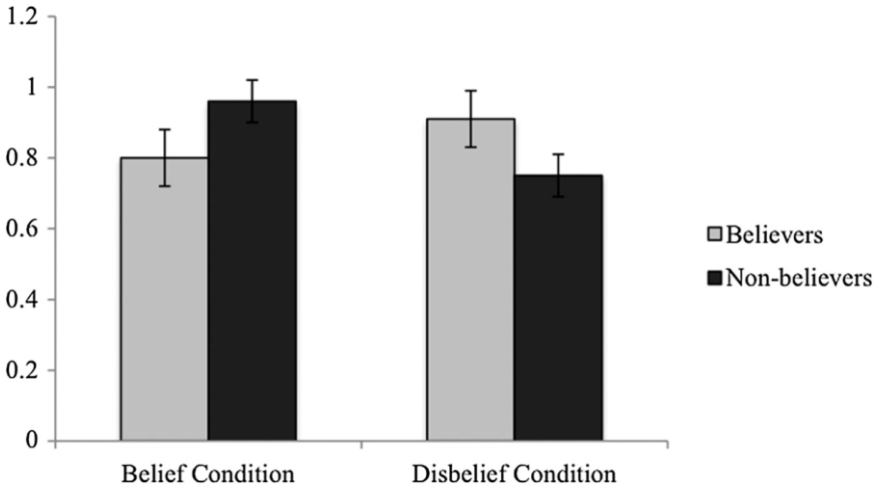

Figure 2. Explicit death anxiety by condition and religion.

These results validated the difficulty of our ease-of-retrieval task, and also found a TMT-consistent effect of religiosity on death anxiety. The majority of participants could not list the expected number of reasons for (or against) God's existence. As such, participants appear to have adjusted their self-reported death anxiety based on whether their worldview was affirmed or threatened: non-religious participants reported significantly more death anxiety when they had difficulty listing reasons against God's existence, while religious participants reported non-significantly more death anxiety when they had trouble listing reasons for God's existence. Furthermore, this effect did not vary based on the number of reasons that participants listed, suggesting that the mere difficulty of listing 12 reasons – rather than the failure to list so many reasons – drove participants' attitude change.

Study 2

As in previous research on religiosity and death anxiety (Jong et al., 2012, study 1), Study 1 revealed a relationship between religiosity and death anxiety that depended critically on participants' own religious belief. This effect is congruent with a TMT account of religion's motivational function (e.g., Landau et al., 2004), but does not align with religiosity's unique ability to offer literal immortality, which we have found manifested via implicit cognition. Therefore, to test whether religiosity can act as a buffer against *implicit* death anxiety for both believers and non-believers, we conducted a follow-up study. The procedure of our follow-up was identical to that used in Study 1, except that death anxiety was measured implicitly via an ST-IAT (Bluemke & Friese, 2008), a version of the implicit association test adapted to measure the association between a single target and two attributes – in this case, between "death" and "fear."

Method

Participants

Fifty-four female and 41 male native English speakers between the ages of 18 and 61 years (M_{age} = 24.4, *SD* = 6.9) completed the study in conjunction with another, unrelated procedure. All participants were first- or second-year undergraduate psychology students of the University of Otago who received course credit in return for their participation. An additional two participants' data were lost due to technical problems. An additional 12 non-native English speakers were run in the study, but their data were not analysed.

Materials and procedure

The procedure was similar to that of Study 1, with the exception that death anxiety was measured via the ST-IAT, which measures the automatic association between the concepts of death and anxiety, relative to death and calmness. This task, programmed and presented on SuperLab development software for Macintosh (Haxby, Parasuraman, Lalonde, & Abboud, 1993), consists of three blocks, always presented in the same order. The first block consisted of 36 practice trials, in which participants simply classified words as synonyms of either calm (restful, calm, tranquil, serene, peaceful, and relaxed) or anxious (restless, nervous, anxious, worried, upset, and distressed), by pressing the "z" and "/" keys, respectively (pairing of attribute words with response keys was kept constant across blocks). In block 2, participants classified words as synonyms of either calm, or of anxious or death (perished, entombed, buried, deceased, dead, dying). Finally, in block 3, the target–attribute pairing was reversed: participants classified words as synonyms of either calm or death, or of anxious. On each trial a target word was presented in the centre of the screen in 72 point "Calibri" font, preceded by a 500 ms fixation cross ("+"), and removed only when the participant made the correct response. There were 72 trials in each of the critical blocks (blocks 2 and 3), during which participants classified 18 different words four times each, in individually randomized order.

Results and discussion

Based on participants' SBS scores, the sample consisted of 32% religious and 66% non-religious participants (2% recorded SBS scores of exactly at the midpoint and were not included in the following analyses). Figure 3 shows the full distribution of participant religiosity.

Arguments

Overall, participants listed an average of 7.93 arguments (SD = 3.73), with the majority (67%) listing fewer than 12. The numbers of arguments were analyzed in a 2 (experimental condition: belief versus disbelief) × 2 (participant religiosity: religious vs. non-religious) between-subjects ANOVA, which revealed only an interaction, $F(1,91) = 6.61$, $p = 0.01$, $\eta_p^2 = 0.07$. As in the pretest, non-religious participants provided more arguments for God's non-existence than for God's existence (Ms = 9.00 versus 6.00, SEs = 0.65 versus 0.61), $t(1,57) = 3.38$, $p = 0.001$, but religious participants offered the equivalent numbers of arguments for both propositions (Ms = 8.25 versus 9.18, SEs = 1.04 versus 0.77).

Death anxiety

One participant's ST-IAT data were lost due to computer error. ST-IAT scores were calculated using a variant of Greenwald's D3 algorithm (Greenwald, Nosek, & Banaji, 2003). Responses slower than 10,000 ms were excluded and the remaining correct responses were standardized within participant. Implicit death anxiety was defined as the difference between participants' standardized mean reaction time on death-calm trials, and their standardized mean reaction time on death-anxiety trials, such that higher values reflected greater death anxiety. This index was entered into a 2 (condition) × 2 (religiosity) ANCOVA, controlling for number of arguments listed, which revealed only a main effect of condition: participants in the belief condition more closely associated death with calmness than with anxiety, compared to participants in the disbelief condition (Ms = 0.22 versus 0.36, SEs = 0.05), $F(1,90) = 4.30$, $p = 0.04$, $\eta_p^2 = 0.05$. Neither the main effect of religiosity nor the interaction was significant (ps = 0.51 and 0.84, respectively). Means, converted back to millisecond differences for ease of interpretation, appear in Figure 4.

In summary, Study 2 replicated the effects associated with our ease-of-retrieval task, wherein the majority of participants were unable to list 12 reasons for or against God's existence. Furthermore, using a novel measure of implicit death anxiety – the ST-IAT – we found that an ease-of-retrieval paradigm produced shifts in death anxiety that diverged from Study 1. Participants in this study reported lower implicit religiosity in the belief condition, an effect that was neither moderated by participants' own self-reported belief, nor by the number of reasons that participants were able to list.

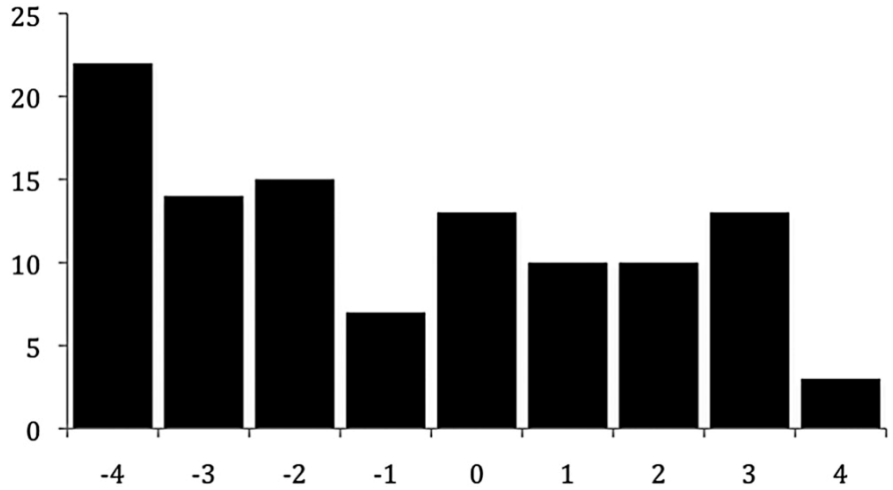

Figure 3. Distribution of participants' religious belief.

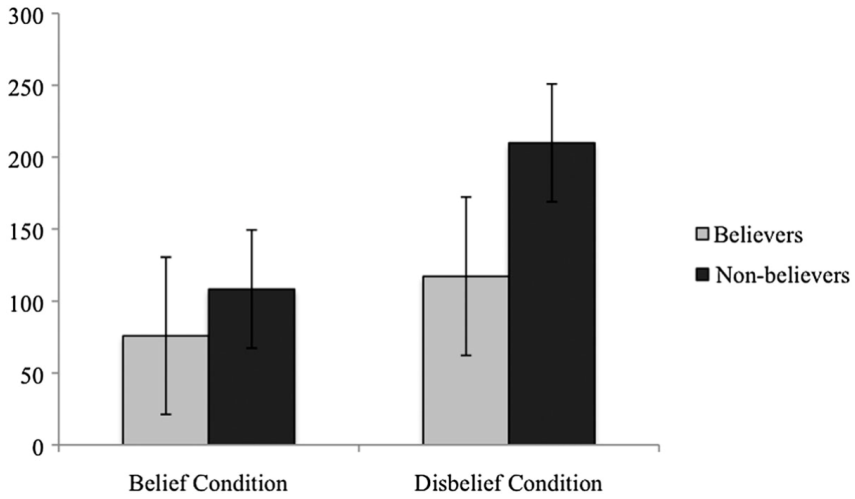

Figure 4. Implicit death anxiety by condition and religion.

General discussion

Many researchers and scholars, including but not limited to terror management theorists, have argued for a causal role of religious belief in managing death anxiety (Freud, 1925; Jonas & Fischer, 2006; Norenzayan & Hansen, 2006; Soenke, Landau, & Greenberg, 2013; Vail et al., 2010). While there is now good evidence that people, even "non-religious" people, gravitate toward supernatural religious beliefs when death is salient (Jong et al., 2012), there is little or no evidence that such movement is warranted in terms of mitigating death anxiety.

The current studies provide the first experimental test of this hypothesis, and in the process, address a number of challenges faced by past research: rather than challenge religious belief directly, a strategy likely to meet with resistance if not ironic strengthening of the challenged beliefs (Batson, 1975), we relied on the subjective experience of participants' *own* arguments: effectively, participants convinced *themselves* of the validity of their beliefs through the ease with which they were able to substantiate them. We also considered both implicit and explicit death anxiety, in recognition of participants' possible inability or unwillingness to report on their emotional reactions (e.g., Nisbett & Wilson, 1977; Winkielman & Berridge, 2004), and the fact that religious belief itself varies when assessed directly versus indirectly (Jong et al., 2012). Finally, to gauge participants' religious beliefs in a more direct fashion than through their religious identity, we assessed such beliefs directly in each of our studies through the SBS.

The results reveal interesting effects of religiosity on both measures of death anxiety, effects that in some ways mimic those found by Jong et al. (2012) when studying the effects of death anxiety on religious belief. Non-religious participants reported less conscious fear of death when their perspective was strengthened than when it was weakened, but the opposite was true (albeit non-significantly) for believers. This result, at a minimum, clearly falsifies the claim that religious belief is soothing in all cases, but is consistent with TMT's worldview defence hypothesis, in which identification with and participation in enduring social institutions provide *symbolic* immortality that is as much or more important than any particular ideology (Landau et al., 2004). In this account, irreligiosity is itself a worldview that, when eroded (in this case, via participants' difficulty in justifying it), has negative consequences for non-believers' mortality concerns.

However, when death anxiety was measured implicitly in Study 2, the results were very different: participants whose confidence in God's existence was bolstered showed less death anxiety than those whose confidence was weakened, regardless of their pre-existing religious beliefs. This effect is more consistent with the hypothesis that supernatural entities offer emotional benefits to all individuals, presumably via their unique potential to address mortality concerns literally, and not just symbolically.

Recent research has offered some support for humans' tendency to endorse supernatural religious concepts, what Norenzayan and Hansen (2006) term a "distinct cognitive inclination" toward religious belief, even while explicitly denying it. A small but remarkable literature on "implicit theism" (see Uhlmann et al., 2008, for one review), illustrates how individuals' behaviours sometimes belie their explicit religious denials. For example, atheists worry about the behaviour of the God they don't believe in: Lindeman, Heywood, Riekki, and Makkonen (2014) found that they were just as physiologically aroused as religious participants when asked to challenge God to do terrible things (e.g., "I dare God to rape my friend"). Atheists are also unwilling to part with the soul they don't think they have: Haidt, Bjorklund, and Murphy (2000) reported that most participants (including atheists) were unwilling to sell their soul to the experimenter, even when assured that the "contract" had no validity of any kind.

Furthermore, Norenzayan and Hansen (2006) found that people affirm the gods they don't believe in when confronted with thoughts of death: participants primed with death endorsed the existence of not only their own (Christian) god, but also culturally unfamiliar supernatural agents (e.g., shamanic spirits), suggesting that participants at least *assumed* such endorsement would help assuage anxiety prompted by the prime. Heflick and Goldenberg (2012) reported indirect evidence that this assumption could be warranted. American participants – both religious and non-religious – read an account by a "Harvard Law School professor" either supporting or dismissing the religious implications of near-death experiences. Those who read the supportive paragraph showed less secular worldview defence (disagreement with an anti-American essay) than those who read the dismissive paragraph, regardless of whether they themselves were religious. The researchers deduced that even non-religious participants had been using religious belief in some way to buffer death anxiety, as evidenced by their need for a substitute worldview-defensive strategy when the professor challenged those beliefs, although no measures of religious belief or death anxiety (or, for that matter, nationalism) were provided.

Although we have interpreted our data in terms of two distinct pathways, one potentially unconscious, from religious belief to death anxiety, we consider the current research only suggestive, with further research clearly necessary. The idiosyncratic association between "death" and "fear" is only one way that death anxiety can be assessed implicitly, and future research should supplement it with emotional, physiological, and behavioural markers of anxiety (Becker, 1973). Likewise, there are other, complementary ways that religiosity can be operationalized and manipulated. "Belief" is a core component of religiosity, but it does not represent the totality, or even the majority, of "religiosity" as a vast and complex human endeavour (Atran & Norenzayan, 2004; McKay & Whitehouse, 2014). Religious values, behaviours, and rituals, for example, may be prompted and influenced by death anxiety in different and unexpected ways.

These caveats notwithstanding, the current research represents a novel demonstration of the complex motivational functions of religious belief. A subtle, self-generated change in confidence regarding God's existence produced changes in both self-reported death anxiety, and in the association between "death" and "anxiety." However, responses to the manipulation depended on prior belief and how anxiety was assessed, such that relative non-believers reported less anxiety when their disbelief was bolstered than when it was eroded, yet showed *more* anxiety in the form of implicit cognitive associations to "death." We tentatively interpret the results in terms of dual and complementary terror management techniques, with the potential to reconcile the sometimes-competing literal and symbolic functions of religious belief, and to provide a broad framework for understanding religions endurance in a secularized world.

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