The religious correlates of death anxiety:
A systematic review and meta-analysis

Jonathan Jong
Coventry University
University of Oxford

Robert Ross
Royal Holloway, University of London
Macquarie University

Tristan Philip
The University of Melbourne

Si-Hua Chang
Gordon College

Naomi Simons
University of Oxford

Jamin Halberstadt
University of Otago

Abstract

Various theories of religion hypothesize a connection between death anxiety and religiosity. In particular, Terror Management Theory's worldview defense hypothesis predicts that death anxiety is lowest among very religious and irreligious individuals, and highest among uncertain individuals. Likewise, the supposition that death anxiety motivates religious belief, which in turn mitigates death anxiety predicts that religiosity increases with death anxiety among nonbelievers, and that death anxiety decreases as religiosity increases among believers. In both cases, a curvilinear relationship—specifically, an inverted-U curve—is predicted. We extracted 202 effect sizes from 100 studies for an "omnibus" religiosity meta-analysis, and six meta-analyses that examine particular dimensions of religiosity. We found high heterogeneity and a weak negative association between death anxiety and religiosity. A closer examination revealed that 10 of the 11 studies that directly tested for curvilinearity provided some support for an inverted-U pattern. The curvilinearity hypothesis cannot be ruled out, but more evidence—particularly on nonreligious individuals, and in nonwestern, nonAbrahamic contexts—is needed.

A brief history of thanatocentric theories of religion

The notion that religious belief is motivated by fear has a long and venerable history. Even from classical times, philosophers have made this link, as Petronius's oft-quoted line—*primus in orbe deos fecit timor*—indicates: it was fear that first made gods in the world. In perhaps the earliest systematic naturalistic account of religion, Lucretius Carus (c. 99 BCE–c. 55 BCE) proposed that the uncertainties and perils of mortal life lead us to believe that gods control the natural world; he did not, however, suppose that the belief in gods was comforting. To the contrary, Lucretius argued that ideas about divine wrath and postmortem judgement increase fear, including the fear of death. Much later, the British anthropologist Alfred Radcliffe-Brown (1939) would revisit this line of argument, specifically in the context of religious and magical rituals. Prescriptions about ritual performance, he argued, generate fear based on the potential for failure to perform the rite appropriately. However, for most of Western intellectual history, the proposed relationship between religion and fear—and the fear of death in particular—has been characterized by two causal claims: first, that fear motivates religious belief, and second, that religious belief mitigates fear.

The fear of death has repeatedly featured in theorizing about the evolutionary and psychological origins of religion in precisely these terms. David Hume (1757/2008, p. 140), for example, hypothesized that it is "the

ordinary affections of human life; the anxious concern for happiness, the dread of future misery, *the terror of death*, the thirst of revenge, the appetite for food and other necessaries" (emphasis added) that led our ancestors to see "the first obscure traces of divinity". Similarly, Ludwig Feuerbach (1851/1967) proposed that religion arises out of our feelings of finitude, the chief source of which is the knowledge of our mortality, so much so that, "If man did not die, if he lived forever, if there were no such thing as death, there would be no religion" (p. 33). This focus on death sharpens further in the 20th century, particularly in the work of the anthropologists Bronislaw Malinowski and Ernest Becker, and more recently in social psychological research on Terror Management Theory.

For both Malinowski and Becker, the fear of death is a given, a psychobiological endowment from our evolutionary past: the fear of death is the affective complement to the desire for self-preservation. Having asserted that the fear of death is the "result of some deep-seated instincts common to man and animals" (Malinowski, 1948, p. 50), theorists have also maintained that human beings' existential anxieties are unique to the extent that we are self-aware, and therefore also aware that death may be the end of our selves. Consequently, it is specifically the fear of *annihilation*—that is, of the cessation of life, conscious experiences, and personhood—that occupies Malinowski (e.g., 1948, p. 50), Becker (e.g., 1973, p. 66), and their intellectual descendants, rather than fears that we might share with nonhuman animals, such as

aversions to pain. This fear of annihilation is, for Malinowski (1948, p. 47),

religion's most powerful driver: thus, "Of all sources of religion", he writes,

"the supreme and final crisis of life—death—is of the greatest importance".

Becker (1973, p. 27) takes it further still, extending the theory to cover all of

human cultural achievements, such that everything human beings do in our

"symbolic world is an attempt to deny and overcome [our] grotesque fate".

This is not to deny that Becker prioritizes religion; indeed, religion is, to

Becker, "the 'best' illusion under which to live" (1973, p. 202), and all other

cultural "immortality projects" (e.g., nationalism, ethnocentrism, artistic and

scientific endeavor) are functional facsimiles of belief systems that offer literal

immortality.

Terror Management Theory

Terror Management Theory (TMT; Greenberg, Pyszczynski, & Solomon, 1986)

adopts Becker's theory of culture more generally, and of religion in particular,

extracting its core insights from their original psychoanalytic context and

reinterpreting them in terms of evolutionary and social psychological

theories. Like Becker, TMT also begins with the observation that human

beings are, perhaps uniquely, aware of their mortality. This self-awareness

elicits crippling existential anxiety, which in turn motivates us to seek

immortality, whether literal or symbolic. Literal immortality is pursued

through afterlife concepts (e.g., immortal souls, heaven, reincarnation,

nirvana), whereas symbolic immortality is pursued through lasting culturally valued identifications and achievements, and the increased self-esteem they engender (Dechesne et al. 2003). Religious worldviews, at least those with comforting afterlife beliefs, offer both literal (via afterlife concepts) *and* symbolic immortality (via membership in durable religious organizations, notions of chosenness and cosmic significance, etc.), and are therefore the culturally dominant means of relieving existential anxiety: as Vail et al. (2010, p. 65) claim, "there may be no antidote to the human fear of death quite like religion".

This distinction between literal and symbolic immortality raises the possibility of a tension within Terror Management Theory. According to the standard *worldview defense* account of terror management, it is the bolstering of our worldviews—regardless of content—that mitigates death anxiety; we are therefore motivated to defend our worldviews against the worldviews of others. There is an impressive amount of evidence for this account, as recently reported in a meta-analysis by Burke, Martens, and Faucher's (2010), reminders of death consistently lead individuals to enhance their self-esteem, defend their cultural values, favour their ingroups (including minimal ingroups; Harmon-Jones, Greenberg, Solomon, & Simon, 1996), and denigrate outgroups. Note that on this view, even *atheism* might serve the same terror management function as religion more traditionally construed, insofar as atheism represents a worldview to be defended; furthermore, there seems to

be no reason to doubt this, given that even worldview defense effects can occur in minimal group contexts (Heflick & Goldenberg, 2012; but see Laundau, Greenberg, & Solomon, 2004). Nevertheless, some recent research suggests that the motivation to pursue literal immortality may take priority over the desire to defend our preexisting and culturally dominant beliefs. For example, Norenzayan and Hansen (2006) found that Christians were more willing to endorse belief in culturally unfamiliar gods when they were reminded of death (but see Vail, Arndt, & Abdollahi, 2012). And recent evidence suggests that even atheists benefit from afterlife beliefs (Heflick & Goldenberg, 2012).

Predictions from thanatocentric theories

As we have discussed, thanatocentric theories of religion tend to comprise two causal claims about the relationship between religiosity and the fear of death. First, there is the claim that death anxiety motivates religious belief. This might lead us to expect that more death anxious individuals are also more attracted to religion than their stoical peers: a *positive* correlation between death anxiety and religious belief. Second, there is the claim that religious belief mitigates death anxiety. These claims might lead one to predict that more religious individuals enjoy reduced levels of anxiety than their secular peers: a *negative* correlation between death anxiety and religious belief. We seem to have a contradiction on our hands. The contradiction is

resolved, however, when we see the two hypotheses as occupying different halves of an inverted U-shaped curve (see Figure 1). That is, among religious nonbelievers, those who are more afraid of death are more tempted toward religion, whereas among believers, those who are more certain in their conviction enjoy the fruits of their faith, which is the dissipation of their existential fears. Thus, the two thanatocentric hypotheses combine to predict a *curvilinear* (viz., negative quadratic) relationship between death anxiety and religious belief.

[Figure 1]

Figure 1. Predicted inverted U-shaped curve.

A curvilinear relationship is also consistent with Terror Management Theory's worldview defense account. Recall that on this view both religious and atheistic worldviews may serve to mitigate death anxiety. We might therefore expect—all things being equal—that people with neither religious nor antireligious commitments will experience high levels of death anxiety compared to those who either hold a strongly religious or strongly atheistic worldview. This is clearly a different causal account to the one described above; nevertheless, both accounts make the same prediction about the relationship between death anxiety and religiosity: an inverted-U curve. Correlational studies therefore cannot resolve this dispute between different

thanatocentric accounts; conversely, a failure to find the hypothesized curvilinear relationship would provide a serious challenge to both.

Previous reviews: fear(s) of death and religiosity

There is, as we shall see, a plethora of empirical studies designed to show how death anxiety and religiosity are related. Two previous attempts to survey this literature are particularly instructive.

First, Donovan's (1994) survey of 137 studies found that 78 provided evidence for a negative relationship between death anxiety and religiosity, whereas 13 provided evidence for a positive relationship, and the remaining 46 presented contradictory, null, or otherwise inconclusive findings. Among these 46, there were also six studies that supported the curvilinearity hypothesis, suggesting that the relationship between death anxiety and religiosity forms an inverted-U pattern. Donovan argues that his survey provides tentative support for the curvilinearity hypothesis despite the paucity of direct evidence to the effect. To explain the apparent contradiction between studies that found positive and negative correlations, he conjectured that an important factor is differences in the religiosity of the samples: highly religious samples are likely to produce negative correlations, whereas highly nonreligious samples are likely to produce positive correlations. Similarly, to explain the null effects, he argued that this is consistent with an *untested* negative quadratic relationship: in a mixed sample, positive and negative

linear relationships among nonreligious and religious participants respectively could cancel each other out. These conjectures enjoy a *prima facie* plausibility, but Donovan (1994) made little attempt to test them.

The second, more recent survey, by Ellis and Wahab (2013) did quantify the effects of various sampling and methodological factors, but its scope was somewhat narrower. They reviewed 84 papers, from which they extracted 108 effects. Of these, 40 showed a negative correlation between death anxiety and religiosity, 27 showed a positive correlation, and 32 showed no significant correlation in either direction, and nine provided support for the curvilinearity hypothesis. In addition, they examined whether other sample characteristics— such as age, gender, and religiosity— could help to explain the diverse results. While most of these analyses found null effects, there was some evidence that the negative correlations were driven by samples that skewed religious: 42% of the studies that found a negative correlation included only individuals who were moderately and strongly religious. Thus, like Donovan (1994), Ellis and Wahab (2013) concluded that "when nonreligious individuals are sampled alongside those who are both moderately and extremely religious, the overall relationship shifts to being curvilinear, and possibly even positive" (p. 149).

These two reviews provide the starting point for the present attempt to systematically survey existing evidence for thanatocentric hypotheses. Nevertheless, we believe that both reviews assumed too broad a definition of

"death anxiety", including different kinds of death-related attitudes (e.g.,

positive vs. negative attitudes) and emotions (e.g., depression). Furthermore,

Donovan (1994) also conflated different measures of religiosity under the

questionable assumption that they measure the same underlying constructs.

Both reviews reported significant heterogeneity in findings, which they

attribute largely to sampling biases, but another possibility is that conflating

different kinds of measures exacerbated the problem. Consequently, one of

our key goals was to take a more targeted approach; we define dimensions of

religiosity more precisely, both for theoretical reasons, and in an effort to

reduce the heterogeneity encountered in previous reviews.

"Death anxiety" and "religious belief"

As we alluded to above, thanatocentric theories of religion are primarily

concerned with the fear of one's own death. This may be distinguished from

the fear of the dying process (e.g., the pain involved), and the fear of others'

death and dying (Collett & Lester, 1969; Lester, 1990; Wittkowski, 2001). More

specifically, following our reading of Malinowski (1948) and Becker (1973),

our specific construct of concern is *existential* death anxiety, the fear of the

"complete cessation" of life (e.g., Malinowski, 1948, p. 50) and of the

"annihilation" of the self (or the "ego"; e.g., Becker, 1973, p. 288). This may be

distinguished from other aspects of our own death that are potentially anxiety

inducing, such as fears concerning loved ones left behind, or about the fate of

our bodies and belongings.

These distinctions are important given the diversity of ways in which fears and anxieties about death have been measured. By far the most common measure of death anxiety is Templer's (1970) Death Anxiety Scale (DAS; see also revisions of the DAS, Templer et al., 2006; Thorson & Powell, 1992), which conflates various aspects of fear of death and dying, containing both general items about being "afraid to die" and also specific items about "a painful death" and even heart attacks, cancer, World War III, and corpses. The DAS is usually treated as a unidimensional measure of general death anxiety, but multiple factor analyses have shown that its underlying structure is multidimensional (e.g., Durlak, 1982; Gilliland & Templer, 1985; Levin, 1990; Lonetto, Fleming, & Mercer, 1979; Martin, 1982; Royal & Elahi, 2011; Tomás-Sábado & Gómez-Benito, 2002).

More recently, however, there has been increasing recognition of the multidimensionality of death anxiety. Consequently, there are now various multidimensional scales, the most widely using being the Collett-Lester Fear of Death Scale (FOD; Lester, 1990), Hoelter's Multidimensional Fear of Death Scale (MFODS; Hoelter, 1979), and Florian and Kravetz's (1983) Fear of Personal Death Scale (FPODS). Each of these scales consists of multiple subscales that are intended to capture particular dimensions of death anxiety. The Collett-Lester FOD distinguishes the fear of death from the fear of dying, and fears concerning oneself from fears concerning others. MFODS comprises

eight subscales—the fear of the dying process, of the dead, of being destroyed, for significant others, of the unknown, of conscious death, for the body after death, and of premature death—none of which appear to capture the fear of annihilation as described above. The fear of the unknown comes closest, but may be confounded with religiosity, as it contains items about afterlife and God beliefs. FOPDS comprises six subscales—the fear of the loss of self-fulfilment, of the loss of social identity, of consequences to family and friends, of transcendental consequences, of punishment in the hereafter, and of self-annihilation—the last of which enjoys face validity as a measure of our construct of interest.

Measures of death anxiety are diverse: different scales and subscales measure different aspects of death anxiety, not all of which are theoretically relevant for our purposes. There is an analogous problem in the measurement of religiosity. Following most thanatocentric theorists of religion, our primary interest is in religious *belief*: the belief in supernatural agents, particularly those relevant to the afterlife. However, many studies employ "hodgepodge" measures of religiosity that conflate various kinds of religious attitudes and behaviours (Gorsuch, 1984, p. 234). Furthermore, among the most common religiosity measures are measures of religious *orientation*, of the manner in which an individual approaches religion. Measures of religious orientation are not very useful for evaluating thanatocentric theories of religion, as such theories do not generate hypotheses about religious orientation. Nevertheless,

some measures of religious orientation may plausibly be used as proxies for an individual's commitment to her religious worldview.

Given the diversity in the measurement of death- and religiosity-related constructs, it is perhaps unsurprising that previous reviews have found such heterogeneous associations. In an attempt to reduce this heterogeneity, we restricted our systematic review and meta-analysis to a narrower range of measures, and, following Ellis and Wahab (2013), made distinctions between categories of measures where possible (see Method below). Like Ellis and Wahab (2013), we conducted a systematic review of the literature, but we also supplemented this with estimates of aggregate effect sizes for each category of religiosity measures.

Method

Search and Selection

To ensure as exhaustive a collection as possible, we searched for potentially relevant research articles in multiple databases, using the following Boolean search phrase: "("death anxiety" OR "fear of death" OR "fear of dying" OR "death fear" OR "attitudes towards death" OR "attitudes to death") AND ("religiosity" OR "religion" OR "faith" OR "spirituality" OR "spiritual" OR "afterlife")". This search was first conducted in Google Scholar, EBSCOhost, and ProQuest, and then also in two specific journals—*Omega: Journal of Death and Dying*, and *Death Studies* (where many relevant articles were found, based

on our database search).

Our searches produced 464 initial hits. We rejected 322 of these from further consideration because their abstracts suggested that they did not measure either religiosity or death anxiety. For the remaining 142 articles, the methods and results sections were consulted to ascertain whether the measures used were relevant, and whether the relevant statistics were reported. Articles were retained if they met all four of the following criteria: (1) they measured the fear of one's own death or dying (as opposed to the fear of others' death; or other death-related constructs, such as obsession and depression; Abdel-Khalek, 1998; Templer, Lavoie, Chalgujian, & Thomas-Dobson, 1990); (2) they measured aspects of religiosity, including religious beliefs, behaviour, identity, and/or orientation; (3) they examined the relationship between death anxiety and religiosity; and (4) they reported effects from which correlation coefficients can be estimated.

Based on these criteria, 100 articles were included in our quantitative analyses. Twenty-five further articles fulfilled all but the final criterion (i.e., adequate information for effect size estimation)[1]. Of the 100 articles, 92 tested linear relationships, or otherwise made categorical comparisons between more and less religious groups. Very few studies sampled sufficient numbers of nonreligious participants to enable the curvilinearity hypothesis to be

---

[1] Further information about all 125 articles are included in Supplementary Materials.

tested[2]. Recall that the curvilinearity hypothesis encompasses both religious and nonreligious individuals: a positive correlation between death anxiety and religiosity is expected among nonreligious individuals, whereas a negative correlation is expected among religious individuals. Thanatocentric theories differ on their causal account of this pattern, but agree on the shape of the pattern itself. However, insofar as very few existing studies sample sufficient numbers of nonreligious individuals, they are unable to test the curvilinearity hypothesis at all. In this case, thanatocentric theories would simply predict a negative linear effect, consistent with the notion that religiosity mitigates death anxiety among religious individuals. Thus, we estimated linear effects in our meta-analyses; in addition, we paid special attention to those studies that tested for curvilinearity. Finally, as Ellis and Wahab (2013) have also observed, the likelihood of finding a negative quadratic pattern should increase as the proportion of nonreligious participants in a sample increases; as nonreligious participants outnumber religious participants, we might even expect a shift toward a positive correlation. We therefore also estimated whether the percent of participants who were nonreligious predicted effect sizes.

---

[2] Of the 100 studies, only 72 reported enough information to ascertain the proportion of nonreligious participants. 24.5% of these had no nonreligious participants at all; 56.9% had samples that consisted of 10% or fewer nonreligious participants. The mean proportion of nonreligious participants per sample was 12.87% ($SD = 16.61$).

Effect size selection and conversion

From the 100 studies, it was possible to extract 272 effect sizes, as many studies used multiple measures of death anxiety and religiosity. We reduced the number of effect sizes to 202 by selecting only the most relevant measure of death anxiety for each sample, and the most relevant measure of religiosity for each religiosity category for each sample. In keeping with our theoretical concerns and our reading of thanatocentric theories, our primary construct of interest was the fear of one's own death, as distinct from the fear of dying, and the fear of others' death and dying (Collett & Lester, 1969). In particular, we were most interested in the fear of the cessation of life or the extinction of the self, as distinct from other aspects of death. Thus, in selecting death anxiety measures, we prioritized measures of the fear of personal annihilation or extinction (e.g., FPODS "fear of personal annihilation" subscale; MFODS "fear of the unknown" subscale), followed by more general measures of the fear of one's own death (e.g., Collett-Lester "fear of death"). Finally, we also retained general measures of death anxiety, such as Templer's DAS, if neither of the previous two kinds of measures were used. Although such measures do not specifically target our construct, we assume that they serve as adequate proxies. Supporting our assumption, previous research has shown Templer's DAS scores to be highly correlated with the Collett-Lester "fear of death of self" subscale, relative to its other subscales (Abdel-Khalek, 2002; Lester, 1990). Other general measures, many of which derived from DAS,

were retained when a more specific measure was not available (e.g., Conte, Weiner, & Plutchik, 1982; Templer et al., 2006; Thorson & Powell, 1992).

There was much less redundancy among religiosity measures, especially after they were categorized into four groups: general/composite measures of religiosity, measures of religious belief, measures of religious behaviour, measures of religious orientation. As we were most interested in religious belief, whenever multiple measures of each type were used in a sample, we retained the measure that we felt was most indicative of religious belief (e.g., private religious behaviours were preferred over public ones)[3].

Most studies reported the association between death anxiety and religiosity as a Person correlation coefficient (r). When other measures of the association were reported (e.g., mean differences, t-test, odds ratio, χ^2, etc.) we transformed them to r (see Card, 2011; Rosenthal, Rosnow, & Rubin, 2000). If only the significance level of an r, t, or F statistic was reported, we estimated the effect size by assigning the minimum r that would provide that level of significance given the sample size; if the effect size was reported as not significant or $p > .05$, r was estimated as 0 (Card, 2011).

[Figure 2]

Figure 2. PRISMA flow diagram.

---

[3] The effects that were dropped are reported in Supplementary Materials.

Summary of Meta-analysis

We first performed an "omnibus analysis" in which all religiosity effect sizes were pooled together across religiosity categories; this analysis provides the broadest overview of the available research findings. In addition, because different dimensions of religiosity might show different associations with death anxiety, we also performed a series of meta-analyses that examined the four categories independently: general/composite measures of religiosity, measures of religious belief, measures of religious behaviour, and measures of religious orientation.

For each meta-analysis, we converted *r* scores into Fisher's z-scores to estimate uncertainty in effect sizes, and back-transformed Fisher's z-scores to *r* scores for interpretation (Hedges & Olkin, 1985). The meta-analyses were conducted using the *R* package *Metafor* using a random-effects model with the restricted maximum-likelihood estimator of heterogeneity and the Knapp and Hartung adjustment (Team, 2013; Viechtbauer, 2010). To index heterogeneity we used Q statistics (Cochran, 1954) and I^2 indices (Higgins, Thompson, Deeks, & Altman, 2003). To examine potential moderators of effect sizes (percent non-religious, percent female, and mean age), we used random-effects meta-regression. We used funnel plots to examine the evidence for publication bias.

Results and Discussion

Preliminary Overview and Omnibus Meta-analysis

An initial view of the 202 results presents a chaotic picture. By far the most common result—accounting for more than half the effects ($n = 106$)—is a null finding: that is, no significant linear effect in either direction. The next most common finding ($n = 60$) was a negative correlation between religiosity and death anxiety; the remaining 36 effects were positive correlations. Thus, as did Donovan (1994) and Ellis and Wahab (2013), we see that existing findings are very heterogeneous.

Before conducting an omnibus meta-analysis, we eliminated nonindependent observations by calculating an average effect size whenever multiple effect sizes were reported for any sample (i.e., multiple measures of religiosity). The omnibus meta-analysis of all 113 effect sizes showed high heterogeneity, $Q(112) = 801.12$, $p < .01$; $I^2 = 83.66\%$. The average association between death anxiety and omnibus religiosity was $r = -.06$ (95% CI [$-.09$, $-.02$], $p < .01$), providing evidence for a small negative association (see Supplementary Materials for forest plots of all meta-analyses). The proportion of nonreligious participants (% nonreligious) was available for 80 effect sizes. Across these 80 effect sizes, associations between death anxiety and religiosity were not found to be moderated by % nonreligious, $F(1, 78) = 2.17$, $p = .15$. The high heterogeneity compromises the meaningfulness of this estimate, so the precise magnitude of the overall effect size should be interpreted with considerable caution. In fact, given the diversity of measures of religiosity in

this omnibus meta-analysis this high level of heterogeneity is not unexpected.

In the remainder of this section of the paper, we report the results of meta-analyses performed separately for different categories of religious measures. A summary of the findings may be found in Table 1 below.

General measures of religiosity

There were 42 general measures of religiosity effect sizes. Of these, 26 showed no statistically significant linear relationship between death anxiety and religiosity; 11 showed a negative relationship; and 5 showed a positive relationship. As before, the meta-analysis of 42 general religiosity effect sizes showed high heterogeneity, $Q(41) = 352.90$, $p < .01$; $I^2 = 85.50\%$. The average association between death anxiety and general religiosity was $r = -.05$ (95% CI [$-.10$, .00], $p = .07$), providing no evidence for an association. Across the 30 effect sizes that included % non-religious, associations were not found to be moderated by % nonreligious, $F(1, 28) = .15$, $p = .70$.

As discussed earlier, such "hodgepodge" measures of religiosity either conflate multiple aspects of religiosity together, or attempt to approximate "general religiosity" via single broad items. Such attempts problematically assume a monolithic view of religiosity, rather than fractionating this complex phenomenon into distinct variables of interest. Our primary variable of interest is religious belief—the belief in supernatural entities, including those that enable literal immortality—and these general/composite measures were

intended to serve as proxies for religious belief. Fortunately, many of the studies we found included more direct measures of religious belief.

Measures of religious belief

There were 73 religious belief effect sizes. Of these, 43 showed no statistically significant relationship with death anxiety; 23 showed a negative relationship; and 7 showed a positive relationship.

Some studies reported correlations for multiple distinct measures of religious belief (e.g., belief in God, belief in afterlife). For these studies, we computed mean religious belief scores before running a meta-analysis. This meta-analysis of 59 religious belief effect sizes showed high heterogeneity, $Q(58) = 474.44$, $p < .01$; $I^2 = 82.19\%$. The average association between death anxiety and religious belief was $r = -.07$ (95% CI [$-.11$, $-.03$], $p < .01$), providing evidence for a small negative association. Across the 38 effect sizes that included % non-religious, associations were moderated by % nonreligious, $F(1, 36) = 4.82$, $p = .03$. However, this association must be interpreted with some caution due to the existence of an outlier.[4]

Next, we ran a meta-analysis that focused exclusively on afterlife beliefs. In this case, whenever multiple religious belief measures were used in the same sample, instead of averaging effect sizes, we retained only the

---

[4] The association is not statistically significant when the two data points from the study that included this influential case are removed, $F(1, 34) = .43$, $p = .52$.

afterlife belief measures. This meta-analysis of 35 afterlife belief effect sizes

showed high heterogeneity, $Q(33) = 248.54$, p < .01; $I^2 = 79.44\%$. The average

association between death anxiety and afterlife beliefs was $r = -.06$ (95% CI

[−.11, −.01], $p = .03$), providing evidence for a small negative association.

Across the 24 effect sizes that included % non-religious, associations were not

found to be moderated by % nonreligious, $F(1, 2) = .02$, $p = .89$.

Measures of religious behaviour

As religious belief is often highly correlated with religious behaviour, we also

looked at the correlation between religious behaviour and death anxiety

separately, to see if the results are consistent with those on religious belief.

There were 30 effects on measures of religious behaviour. Of these, 12 showed

no statistically significant relationship between death anxiety and religiosity;

11 showed a negative relationship[5]; and 7 showed a positive relationship.

This meta-analysis of 30 religious behaviour effect sizes showed high

heterogeneity, $Q(29) = 414.37$, $p < .01$; $I^2 = 91.72\%$. The average association

between death anxiety and religious behaviour was $r = -.08$ (95% CI [−.15,

−.01], $p = .03$), providing evidence for a small negative association. Across the

22 effect sizes that included % non-religious, these associations were not

---

[5] Two effects were reported as significant in the original papers, but were marginally- and nonsignificant once linear contrasts were calculated and transformed into *r* scores. We categorized these effects based on our transformation: the marginal effect was retained as negative, while the nonsignificant effect was treated as null.

found to be moderated by % nonreligious, $F(1, 20) = 2.36$, $p = .14$.

Measures of religious orientation

Finally, we turn to religious orientation. There were 57 religious orientation

effect sizes. Of these, 25 showed no statistically significant relationship; while

16 showed a negative relationship, and 16 a positive relationship. As 50 of the

57 effect sizes involved either measures of intrinsic motivation or extrinsic

motivation, we focused on these two constructs in our meta-analyses[6].

Researchers have tended to emphasize the positive effects of intrinsic

religiosity and the negative effects of extrinsic religiosity: indeed, as

Kirkpatrick and Hood (1990) have observed, intrinsic and extrinsic religiosity

has typically be treated as "good" and "bad" forms of religiosity respectively.

Even Gordon Allport (e.g., 1950) himself, to whom the distinction is

attributed, referred to them as mature and immature religiosity. According to

Allport and Ross (1967, p. 434), the extrinsically religious individual "*uses* his

religion", whereas the intrinsically religious individual "*lives* [it]". That is, the

extrinsic orientation is a disposition to "use religion for [one's] own ends";

religious beliefs are thus "lightly held or else selectively shaped" in an

"instrumental and utilitarian" fashion. In contrast, the intrinsic orientation is

---

[6] The remaining seven effects, reported across five studies, measured quest ($n = 2$)
and fundamentalist ($n = 5$) religiosity. One study found a positive correlation
between quest and death anxiety, whereas the other found no association. One study
found three positive effects across three samples between fundamentalism and death
anxiety; another two studies found no association.

a disposition to treat one's religion as ultimate, with all other concerns deprioritized; religious belief is embraced, and the individual "endeavours to internalize it and follow it fully". Thus, intrinsic religiosity has also been construed as "true belief", whereas extrinsic religiosity has been thought of as disingenuous participation on religion (e.g., Carroll, 2010; Cicirelli, 2002; Sedikides & Gebauer, 2010). Consistent with this "good-religion-versus-bad-religion" view (Kirkpatrick & Hood, 1990, p. 442), intrinsic religiosity has also previously been empirically associated with psychological well-being (Ventis, 1995), meaning in life (e.g., Donahue, 1985), and even recovery from illness (Koenig, George, & Peterson, 1998), whereas such benefits are generally found to be unrelated to extrinsic religiosity, which instead predicts negative outcomes such as poorer mental health (Ryan, Rigby, & King, 1993) and racial prejudice (Hall, Matz, & Wood, 2010). Given the values attached to intrinsic and extrinsic religiosity in previous research, we might be led to expect that intrinsic religiosity is negatively correlated with death anxiety, while extrinsic religiosity is positively correlated with death anxiety. Our findings find some support for this hypothesis. Of the 30 effect sizes reported on intrinsic religiosity, 15 were negative, while the remaining 15 were nonsignificant. Similarly, of the 20 effect sizes reported on extrinsic religiosity, 13 were positive, while the remaining 7 were nonsignificant.

The meta-analysis of 30 intrinsic religiosity effect sizes showed high heterogeneity, $Q(29) = 206.92$, p <.01; $I^2 = 85.15\%$. The average association

between death anxiety and intrinsic religiosity was $r = -.21$ (95% CI [−.29, −.13]), $p < .01$), providing evidence for a small to medium negative association. Across the 26 effect sizes that included % nonreligious, this effect was not found to be moderated by % nonreligious, $F(1, 24) = .59$, $p = .45$.

The meta-analysis of 20 extrinsic religiosity effect sizes showed high heterogeneity, $Q(19) = 107.28$, $p < .01$; $I^2 = 82.02\%$. The average association between death anxiety and extrinsic religiosity was $r = .27$ (95% CI [.18, .35], $p < .01$), providing evidence for a small to medium positive association. Across the 18 effect sizes that included % nonreligious, this effect was not found to be moderated by % nonreligious, $F(1, 16) = 1.20$, $p = .29$.

For both intrinsic and extrinsic religiosity, the aggregated associations were, on average, larger than for the other measures of religiosity. This is not only consistent with the "good-religion-versus-bad-religion" view mentioned earlier, but also with a curvilinear effect of religious belief on death anxiety, on the assumption that intrinsic religiosity represents a stronger or more authentic form of religious commitment (e.g., Carroll, 2010; Sedikides & Gebauer, 2010; see also Wink & Scott, 2005), at least for religious participants about whom it makes sense to talk about religious orientation at all.

Table 1

Summary of meta-analysis results

Category	n.s.	negative	positive	r	95% CI	I²
General measures	26	11	5	−.05	−.10, .00	85.50%
Religious belief	43	23	7	−.07	−.11, −.03	82.19%
Afterlife belief*	23	10	2	−.06	−.11, −.01	79.44%
Religious behaviour	12	11	7	−.08	−.15, −.01	91.72%
Intrinsic religiosity	15	15	0	−.21	−.29, −.13	85.15%
Extrinsic religiosity	7	0	13	0.27	.18, .35	82.02%

*Afterlife belief measures form a proper subset of measures of religious belief

Publication bias

The funnel plot for the omnibus analysis appears to be relatively symmetric (see Supplementary Materials) and Egger's regression test for funnel plot asymmetry was not statistically significant (t = -1.3, p = .20), which suggests that publication bias has had little influence on the meta-analysis. Although we have not found evidence for publication bias, absence of evidence should be interpreted with some caution. First, even when publication bias is present it can be difficult to identify (Sterne et al., 2011; Terrin, Schmid, & Lau, 2005). Second, given that different research groups makes different predictions about associations (i.e. negative, positive, or curvilinear) it is possible that results that did not support hypotheses were not reported, and these suppressed results "average out", resulting in a relatively symmetrical funnel plot.

A curvilinear relationship?

Prima facie, the general picture seems like bad news for thanatocentric accounts of religion, including the worldview defense account of terror management. Recall that these theories predict a curvilinear relationship between death anxiety and religiosity, which should manifest as a negative linear correlation in samples that are predominantly religious. Our review and meta-analyses thus far has provided little evidence for this. First, although estimated aggregated effect sizes are generally negative, which is consistent with the curvilinearity hypothesis (because most studies were run on predominantly religious samples), these effects were also very small. Second, there seems to be little consistency across studies: for most religiosity constructs, there were studies that found positive, negative, and null associations. This observation of heterogeneity is further supported by Q and I^2 statistics. Third, more than half of the effect sizes reported indicated no linear association between religiosity and death anxiety; even in the case of our religiosity construct of primary interest, 62.67% of the effects showed no association. Finally, concerning the curvilinearity hypothesis more specifically, there was little evidence that the proportion of nonreligious participants in the sample affected the associations. The only exception to this was in the relationship between death anxiety and religious belief. However, this result was driven by Jong, Bluemke, and Halberstadt's (2013) study that had the highly unusual property of sampling equal numbers of religious and

nonreligious participants, and reported effect sizes for them separately as separate groups. Indeed, in having a 100% nonreligious sample, Jong et al.'s (2013) study was the only one to report a sample with % nonreligious figures above 50%. This is not to suggest that the association between % nonreligious and death anxiety is a statistical artifact. Rather, there is insufficient evidence draw firm conclusions. This result highlights the importance of reporting raw data in psychology research. Had earlier studies reported raw data then we could have split groups ourselves into religious and nonreligious subgroups to test the curvilinear hypothesis with greater rigour.

It is possible that the preponderance of null findings conceals an underlying nonlinear relationship, such as a negative quadratic one in which nonreligious individuals fear death more as their religious beliefs (such as they are) increase, while religious individuals show the opposite pattern. Unfortunately, as noted above, only eight of the 100 studies we included in our meta-analysis tested for nonlinear effects. A further three were found in the larger initial set of 125. Of these 11, 10 provided some evidence for a curvilinear relationship, and only one found no such association.

Nelson (1974) provides perhaps the earliest direct evidence of a curvilinear relationship. The sample, though, impressively large ($N = 1,279$) was, unfortunately, only of men who self-identified as Christian. The study found that death anxiety was lowest among individuals who attended church least ("never") or scored lowest on measures of private religious devotion,

experience, and belief, as well as those who attended church most ("at least weekly") or scored highest on other dimensions of religiosity; conversely, death anxiety was highest among those who only went to church "occasionally, but less often than monthly" or had low-to-moderate scores on other religiosity dimensions (e.g., private religious devotion). Individuals who were moderately religious (e.g., attending church monthly or more) were more similar to those who were devoutly religious than those who were moderately irreligious. Nelson reported regression analyses that provided evidence both for a linear *positive* correlation between death anxiety and these different aspects of religiosity (driven, it appears, by the steep increase between the very irreligious and the slightly religious), as well as the predicted inverted-U quadratic pattern.

Similarly, Leming (1980; $N = 372$) measured different aspects of religiosity—religious belief, religious ritual participation, and religious experience—to examine relationships with death anxiety, which he measured using his own Leming Death Fear scale. This he treated as a unidimensional measure, even though it contains items pertaining to various aspects of death anxiety. In contrast to Nelson's (1974) study, Leming (1980) found a *negative* relationship between death anxiety and religiosity, for all three aspects of religiosity he studied. However, a close inspection of Leming's data suggests that death anxiety initially rises with religiosity when religiosity levels are low. For the moderately to strongly religious individuals, however, death

anxiety declines. Leming's (1980) own interpretation of this finding is that

religion both causes and alleviates the fear of death; it causes anxiety by

introducing ideas about post-mortem judgment and the possibility of divine

punishment, and only alleviates it when believers are sufficiently committed,

aware of their commitment, and concomitantly confident of their salvation.

McMordie (1981; $N = 320$) had participants self-classify their degree of

religiosity, as "extremely religious", "very religious", "somewhat religious",

"slightly religious", "not at all religious", or "anti-religious". As might be

expected, only a handful of individuals considered themselves either

extremely religious ($n = 9$) or anti-religious ($n = 14$), whereas most people

either identified as somewhat ($n = 123$) or slightly ($n = 86$) religious. Using a

modified version of Templer's Death Anxiety Scale, he found an inverted-U

curve: those who were "slightly" and "somewhat" religious reported the

highest levels of death anxiety, whereas the "extremely religious" and "anti-

religious" reported the lowest levels of death anxiety. This pattern of results is

slightly different from either Leming's (1980) or Nelson's (1974) in that there

is no evidence of a linear relationship, either positive or negative. McMordie's

interpretation of these findings also differs: he posits that it is the strength of

one's conviction—independent of the content of the belief system—that

reduces death anxiety. In other words, McMordie (1981) represents a

precursor to the worldview defense account of terror management.

Downey (1984) studied 237 middle-aged men, using Boyar's Fear of

Death Scale and her own composite measure of religiosity that included elements of religious belief, behaviour, experience, and the perceived effects of religiosity; six of the 13 items in the scale pertained to religious beliefs. She found no evidence of a linear relationship but, dividing her sample into low, moderate, and high religiosity groups—she found an inverted-U relationship between death anxiety and religiosity: as before, the moderate religiosity group reported higher levels of death anxiety than did the other two groups. She too concluded that "strength of religious commitment is the most significant variable in explaining the relationship between religion and fear of death" (p. 820).

Aday's (1985) study of 181 college students focused on afterlife belief, but also measured frequency of church attendance, and intensity or strength of religious belief. He reported a weak negative correlation between afterlife belief (Osarchuk & Tatz, 1973) and death anxiety (Templer, 1970), but did not attempt to test for nonlinear effects. He does, however, note that individuals who only went to church monthly reported higher levels of death anxiety than did individuals who went weekly or seldom. A similar pattern holds for the measure of participants' intensity of religious belief. Aday provided no substantive theoretical interpretation of these findings.

Wink and Scott (2005; $N = 155$) ran a study on older participants (in their 60s and 70s), and found no linear relationship between participants' religiosity (including both belief and behaviour components) and their fear of

death or fear of dying; however, they did find an inverted-U relationship between religiosity and fear of death (but not fear of dying). Wink and Scott (2005) also provided evidence for the view that *consistency* between belief and behaviour is important in reducing death anxiety: participants who held positive views of the afterlife but scored low on other measures of religiosity (e.g., behaviour, belief) reported the highest levels of death anxiety. Wink and Scott (2005) tie these findings directly to those were reviewed above about the divergence between intrinsic and extrinsic religiosity, arguing that extrinsic religiosity does not mitigate death anxiety because it involves an inconsistency between (true) belief and (superficial) participation.

A recent study complicates Wink and Scott's (2005) interpretation somewhat. Wen (2012; $N = 236$) used Hoge's Intrinsic Religious Motivation scale, and treated intrinsic and extrinsic religiosity as two ends of a continuum. In this study, as in many other studies included in our meta-analysis, extrinsic religiosity was positively correlated with death anxiety; however, there was also a curvilinear trend, such that both highly intrinsically and highly extrinsically motivated religious individuals reported lower levels of death anxiety than did individuals whose religious orientations were less clearly defined. This finding is inconsistent with Wink and Scott's (2005) idea that death anxiety should be correlated with intrinsic and extrinsic religiosity in opposite directions: in this case, lower death anxiety is associated with both high levels of intrinsic and extrinsic religiosity. Perhaps then, even extrinsic

religiosity has its benefits, at least for people who are solidly of that disposition. Insofar as this finding challenges the "good-religion-versus-bad-religion" view of religious orientation that Wink and Scott (2005) adopt, it also challenges the relevance of these constructs for our theoretical purposes. Fortunately, in addition to religious orientation, Wen's study also investigated frequency of religious attendance and strength of religious belief. In the former case, high religious attendance was associated with low death anxiety, but there was also a curvilinear relationship consistent with other studies just described. However, death anxiety and strength of religious belief—measured via a single question, "How strong is your religious belief?"—were conspicuously unassociated.

Wen's (2012) null findings with respect to strength of religious belief are in contrast with work by Jong et al. (2013; $N = 213$). In this study, a deliberate effort was made to obtain a sample with an approximately equally split between religious and nonreligious individuals. When collapsing across religious and nonreligious participants, no linear association between death anxiety and religious belief was found. However, splitting the sample into religious ($n = 66$) and nonreligious ($n = 81$) subsamples, revealed a clear difference: the correlation between death anxiety and religious belief was positive for individuals who identified as nonreligious (including atheists and agnostics), and negative for those who identified as religious.

Of the eleven studies that tested the curvilinearity hypotheses, these

eight provide consistent support for an inverted-U relationship between religiosity and death anxiety, across diverse measures of religiosity (e.g., belief, service attendance)[7]. Two others provide more qualified support. First, Power and Smith (2008), who analyzed self-reported religiosity ("not at all religious" to "very religious") found only "a potential curvilinear effect" on two subscales out of Hoelter's MOFDS's eight, namely "fear of the unknown" and "fear of conscious death". As alluded to earlier, it is "fear of the unknown" that is most relevant to our interests: so, even though the other subscales revealed no such pattern, Power and Smith (2008) seems to have found some, albeit weak, support for a curvilinear relationship on the most relevant construct.

The second study that provided only qualified support for the curvilinear hypothesis is by Ellis, Wahab, and Ratsaningan (2013). They collected data in Malaysia (n = 2396), the United States (n = 1291), and Turkey (n = 265), which allowed them to make both cross-cultural and interreligious comparisons. They found that individuals who self-identified as *non*religious reported the lowest levels of death anxiety, Muslims reported the highest, and Christians, Hindus, and Buddhists sat somewhere in between. In contrast to the aggregate effects we found in our meta-analyses, they also found positive linear relationships, between death anxiety and various other single-item

---

[7] Furthermore, consistent with our systematic review, the findings regarding linear effects were heterogeneous, and the most common result was no significant association (see Supplementary Material).

measures of religiosity, including measures of belief in God, belief in an afterlife, and religious observance. They also reported curve estimations for each of their single-item measures, separately for each country. Although they did find evidence of curvilinearity—on most measures in each country, negative quadratic functions fit the data—the linear effects were generally stronger than the quadratic ones, at least in Malaysia and Turkey. In the United States, however, the quadratic patterns were much more evident, and the curvilinear relationships were stronger than the linear ones. Thus, while Ellis et al.'s (2013) findings do not contradict the curvilinearity hypothesis, they do alert us to the potential cultural contingency of patterns. Indeed, even comparing Malaysia and Turkey, both of which are majority Muslim countries (approximately 60% in Malaysia, over 90% in Turkey), the patterns of correlations display some interesting differences; for example, the beliefs in God and immortality linearly predict death anxiety in Malaysia, but not in Turkey.

Indeed, among those testing nonlinear effects, the only study to *not* find an inverted-U pattern, is Feifel and Nagy (1981; $N = 616$). They found no curvilinear relationship between Collett-Lester's fear of death subscale and Hoge's intrinsic religiosity measure. However, it is not clear how generalizable these findings are: Feifel and Nagy's (1981) sample consisted of alcoholics ($n = 123$), drug addicts ($n = 115$), inmates ($n = 92$), deputy sheriffs ($n = 143$), and only 143 members of the general public. Furthermore, as Feifel

and Nagy (1981) did not to test for nonlinear effects using other measures of religiosity (e.g., belief, behaviour), their results do not provide strong disconfirmation of the hypothesis.

Although our meta-analyses did not provide direct evidence for the curvilinearity hypothesis, and only weak indirect evidence in the form of small negative correlations, a closer examination of the 11 studies that deliberately tested a curvilinear relationship is suggestive. Of these 11, eight provided firm support for the curvilinearity hypothesis; two studies provided some support, and one study provided disconfirmatory evidence. Furthermore, Ellis et al.'s (2013) three-nation analyses raise questions about the cultural contingency of the relationship between death anxiety and religiosity that future research should explore.

An important limitation of our meta-analysis was that statistics reported in papers tended to be reported in a manner that made it difficult to rigorously evaluate evidence for the curvilinearity hypothesis. In particular, in only one study (Jong et al., 2013) were participants divided into a nonreligious sample and a religious sample before analysis. Given that the curvilinearity hypothesis makes different predictions for these subgroups, the aggregate effect will tend to get swamped be the subgroup that dominates numerically. This is of particular concern because, as we have seen, the majority of the published studies included very few nonreligious participants in their sample. Future research could address this issue by taking an

individual participant approach to meta-analysis, which would involve requesting data from the authors of studies to divide analyses into religious and nonreligious subgroups. Such an analysis could play a crucial role in testing the curvilinear hypothesis more rigorously.

Conclusion

There is no shortage of empirical research examining relationships between trait levels of death anxiety and religiosity. There is, however, little consensus about the relationship; studies have reported negative, positive, and null linear effects, and our estimates confirmed these high levels of heterogeneity. Although our meta-analyses indicated weak negative correlations between most aspects of religiosity and death anxiety (extrinsic religious orientation being a notable exception), the aggregated effect sizes were very small. Given the sampling biases—most of the studies were on predominantly religious participants—these negative correlations could be taken as indirect evidence for the curvilinearity hypothesis: they represent the right-hand side of the inverted-U curve. Furthermore, only 11 studies reported testing for curvilinear relationships, and of these, 10 provided some support for an inverted-U relationship. It is possible that other studies could have found similar results had they tested for a negative quadratic relationship, but we have no direct evidence for this.

Thanatocentric theories of religion generally predict an inverted-U

relationship between death anxiety and religiosity, such that death anxiety is lowest among very nonreligious (e.g., atheists) and very religious individuals, and highest among their less certain counterparts. Our systematic review and meta-analyses provide some evidence for such a pattern, but our conclusions require some qualification. First, aggregate effect sizes were very small; if there is a curvilinear relationship between death anxiety and religiosity, it is a weak one. Furthermore, there was little evidence that the proportion of religious/nonreligious participants in the samples affected the outcome of the meta-analyses. Nor did examining different aspects of religiosity separately make much of a difference, though the distinction between intrinsic and extrinsic religious orientation once again proved important (see also Cohen et al., 2005). The cause of the high heterogeneity across effect sizes has yet to be identified, and this renders interpretation difficult. This should therefore be a priority in future research. Finally, although 10 out of 11 of the studies that deliberately tested the curvilinearity provided some support for it, there was also some evidence of cross-cultural and/or interreligious variation. More cross-cultural data are required before we can make general claims about the relationship between death anxiety and religion.

Although various thanatocentric theories of religion predict the same inverted-U pattern, they have different causal explanations. It is possible, for example, that religiosity increases with death anxiety until the individual in question believes, at which point her religiosity decreases her death anxiety

(Jong et al., 2013). It is also possible, however, as the worldview defense account of Terror Management Theory says, that baseline levels of death anxiety are high, but that strong religious or nonreligious commitments both decrease death anxiety (e.g., Landau, Greenberg, & Solomon, 2004). It is also possible that religiosity increases death anxiety—for example, by raising the possibility of divine wrath and postmortem punishment—at low levels, but decreases it at high levels, when individuals are more certain of their salvation (Homans, 1941). Correlational evidence cannot resolve these theoretical disputes, as there are disagreements about causal processes. Rather, what is needed next is an experimental approach to testing thanatocentric theories of religion.

Abdel-Khalek, A. M. (1998). The structure and measurement of death obsession. *Personality and Individual Differences, 24*, 159–165.

Abdel-Khalek, A. M. (2002). Death, anxiety, and depression: a comparison between Egyptian, Kuwaiti, and Lebanese undergraduates. *Omega, 45*, 277–287.

Aday, R. H. (1985). Belief in afterlife and death anxiety: correlates and comparisons. *Omega, 15*, 67–75

Allport, G. W. (1950). *The individual and his religion*. New York, NY: McMillan.

Allport, G. W., & Ross, J. M. (1967). Personal religious orientation and prejudice. *Journal of Personality and Social Psychology, 5*, 432–443.

Becker, E. (1973). *The denial of death*. New York, NY: Free Press.

Card, N. A. (2011). *Applied meta-analysis for social science research*. New York, NY: Guilford Press.

Carroll, M. P. (2010). Psychoanalytic theories of religion and the "Catholic problem". In B. Beit-Hallahmi (ed.), *Psychoanalysis and theism: critical reflections on the Grünbaum thesis* (pp. 81–98). Lanham, MD: Jason Aronson.

Cicirelli, V. G. (2002). Fear of death in older adults: Predictions from terror management theory. *Journal of Gerontology: Psychological Sciences, 57B*, P358–P366.

Cochran, W. (1954). The combination of estimates from different experiments. *Biometrics, 10*, 101–129.

Cohen, A. B., Pierce, J. D., Chambers, J., Meade, R., Gorvine, B. J., & Koenig,

H. G. (2005). Intrinsic and extrinsic religiosity, belief in the afterlife,

death anxiety, and life satisfaction in young Catholics and Protestants.

Journal of Research in Personality, 39, 307–324.

Collett, L. J., & Lester, D. (1969). The fear of death and the fear of dying.

Journal of Psychology, 72, 179–181.

Conte, H. R., Weiner. M. B., & Plutchik, R. (1982). Measuring death anxiety:

conceptual, psychometric, and factor–analytic aspects. *Journal of*

Personality and Social Psychology, 43, 775–785.

Dechesne, M., Pyszczynski, T., Arndt, J., Ransom, S., Sheldon, K. M, van

Knippenberg, A., & Janssen, J. (2003). Literal and symbolic immortality:

the effect of evidence of literal immortality on self–esteem striving in

response to mortality salience. *Journal of Personality and Social Psychology,*

84, 722–737.

Donahue, M. J. (1985). Intrinsic and extrinsic religiousness: The empirical

research. *Journal for the Scientific Study of Religion, 24*, 418–423.

Donovan, J. M. (1994). Defining religion: death and anxiety in an Afro–

Brazilian cult. *Unpublished doctoral dissertation.* New Orleans: Tulane

University.

Downey, A. M. (1984). Relationship of religiosity to death anxiety of middle–

aged males. *Psychological Reports, 54*, 811–822.

Durlak, J. A. (1982). Using the Templer scale to assess "death anxiety": a

cautionary note. *Psychological Reports, 50,* 1257–1258.

Ellis, L., & Wahab, E. A. (2013). Religiosity and fear of death: a theory–oriented review of the empirical literature. *Review of Religious Research, 55,* 149–189.

Ellis, L., Wahab, E. A., & Ratnasingan, M. (2013). Religiosity and fear of death: a three-nation comparison. *Mental Health, Religion & Culture, 16,* 179–199.

Feifel, H., & Nagy, V. T. (1981). Another look at fear of death. *Journal of Consulting and Clinical Psychology, 49,* 278–286.

Florian, V., & Kravetz, S. (1983). Fear of personal death: attribution, structure and relation to religious belief. *Journal of Personality and Social Psychology, 44,* 600–607.

Gilliland, J. C., & Templer, D. I. (1985). Relationship of death anxiety scale factors to subjective states. *Omega, 16,* 155–167.

Gorsuch, R. L. (1984). Measurement: the boon and bane of investigating religion. *American Psychologist*, 39, 228–236.

Greenberg, J., T. Pyszczynski and S. Solomon. (1986). The causes and consequences of a need for self–esteem: a terror management theory. In R. F. Baumeister (ed.) *Public self and private self* (pp. 189–212). New York, NY: Springer–Verlag.

Hall, D. L., Matz, D. C., & Wood, W. (2010). Why don't we practice what we preach? A meta–analytic review of religious racism. *Personality and Social Psychology Review, 14,* 126–139.

Harmon–Jones, E., Greenberg, J., Solomon, S., & Simon, L. (1996). The effects of mortality salience on intergroup bias between minimal groups. *European Journal of Social Psychology, 26,* 677–681.

Hedges, L. V., & Olkin, I. (1985). *Statistical methods for meta-analysis.* San Diego, CA: Academic Press.

Heflick, N. A., & Goldenberg, J. L. (2012). No atheists in foxholes: Arguments for (but not against) afterlife belief buffers mortality salience effects for atheists. *British Journal of Social Psychology, 51,* 385–392.

Higgins, J. P. T., Thompson, S. G., Deeks, J. J., & Altman, D. G. (2003). Measuring inconsistency in meta-analysis. *British Medical Journal, 327,* 557–560.

Hoelter, J. W. (1979). Multidimensional treatment of fear of death. *Journal of Consulting and Clinical Psychology, 47,* 996–999.

Homans, G. C. (1941). Anxiety and ritual: The theories of Malinowski and Radcliffe–Brown. *American Anthropologist, 43,* 164–172.

Hooper, T., & Spilka, B. (1970). Some meanings and correlates of future time and death among college students. *Omega, 1,* 49–56.

Huedo-Medina, T. B., Sanchez-Meca, J., Marin-Martinez, F., & Botella, J. (2006). Assessing heterogeneity in meta-analysis: Q statistic or I2 index? *Psychological Methods, 11,* 193–206.

Hume, D. (2008). *The natural history of religion.* J. C. A. Gaskin, (ed.), Oxford, UK: Oxford University Press. (Original work published 1757).

IntHout, J., Ioannidis, J., & Borm, G. F. (2014). The Hartung-Knapp-Sidik-

    Jonkman method for random effects meta-analysis is straightforward

    and considerably outperforms the standard DerSimonian-Laird method.

    BMC Medical Research Methodology, *14*, 1471-2288.

Jong, J., Bluemke, M., & Halberstadt, J. (2013). Fear of death and supernatural

    beliefs: developing a new Supernatural Belief Scale to test the

    relationship. *European Journal of Personality, 27*, 495–506.

Kirkpatrick, L. A., & Hood Jr, R. W. (1990). Intrinsic–extrinsic religious

    orientation: The boon or bane of contemporary psychology of religion?

    Journal for the Scientific Study of Religion, 29, 442–462.

Koenig, H. G., George, L. K., & Peterson, B. L. (1998). Religiosity and

    remission of depression in medically ill older patients. *American Journal

    of Psychiatry, 155*, 536–542.

Landau, M. J., Greenberg, J., Solomon, S. (2004). The motivational

    underpinnings of religion. *Behavioral and Brain Sciences, 27*, 743–744.

Leming, M. R. (1980). Religion and death: a test of Homans' thesis. *Omega, 10*,

    347–364.

Lester, D. (1990). The Collett–Lester Fear of Death Scale: The original version

    and a revision. *Death Studies, 14*, 451–468.

Levin, R. (1990). A re–examination of the dimensionality of death anxiety.

    Omega, 20, 314–349.

Lonetto, R., Fleming, S., & Mercer, G. W. (1979). The structure of death

anxiety: a factor analytic study. *Journal of Personality Assessment, 43*, 388–392.

Malinowski, B. (1948). *Magic, science and religion and other essays*. Westport, CT: Greenwood Press.

Martin, T. O. (1982). Death anxiety and social desirability among nurses. *Omega, 13*, 51–58.

McMordie, W. R. (1981). Religiosity and fear of death: Strength of belief system. *Psychological Reports, 49*, 921–922.

Nelson, L. D. (1974). Functions and dimensions of religion. *Sociological Analysis*, 263–272.

Norenzayan, A., & Hansen, I. G. (2006). Belief in supernatural agents in the face of death. *Personality and Social Psychology Bulletin, 32*, 174–187.

Osarchuk, M., & Tatz, S. J. (1973). Effect of induced fear of death on belief in afterlife. *Journal of Personality and Social Psychology, 27*, 256–260.

Radcliffe–Brown, A. R. (1939). *Taboo*. Cambridge, UK: Cambridge University Press.

Rosenthal, R., Rosnow, R. L., & Rubin, D. B. (2000). *Contrasts and effect sizes in behavioral research: A correlational approach*. Cambridge, UK: Cambridge University Press.

Royal, K. D., & Elahi, F. (2011). Psychometric properties of the death anxiety scale (DAS) among terminally ill cancer patients. *Journal of Psychosocial Oncology, 29*, 359–371.

Ryan, R. M., Rigby, S., & King, K. (1993). Two types of religious internalization and their relations to religious orientations and mental health. *Journal of Personality and Social Psychology, 65*, 586–596

Sedikides, C., & Gebauer, J. E. (2010). Religiosity as self-enhancement: a meta-analysis of the relation between socially desirable responding and religiosity. *Personality and Social Psychology Review, 14*, 17–36.

Sterne, J. A., Sutton, A. J., Ioannidis, J. P., Terrin, N., Jones, D. R., Lau, J., . . . Higgins, J. P. (2011). Recommendations for examining and interpreting funnel plot asymmetry in meta-analyses of randomised controlled trials. *British Medical Journal, 343*; d4002.

Team, R. C. (2013). *R: A language and environment for statistical computing*. R Foundation for Statistical Computing, Vienna, Austria. URL http://www.R-project.org/.

Templer, D. I., Awadalla, A., Al-Fayez, G., Frazee, J., Bassman, L., Connelly, H. J., Arikawa, H., Abdel–Khalek, A. M. (2006). Construction of a death anxiety scale–extended. *Omega, 53*, 209–226.

Templer, D. I., Lavoie, M., Chalgujian, H., & Thomas-Dobson, S. (1990). The measurement of death depression. *Journal of Clinical Psychology, 46*, 834–839.

Terrin, N., Schmid, C. H., & Lau, J. (2005). In an empirical evaluation of the funnel plot, researchers could not visually identify publication bias. *Journal of Clinical Epidemiology, 58*, 894–901.

Thorson, J. A., & Powell, F. C. (1992). A revised Death Anxiety Scale. *Death Studies, 16*, 507–521.

Tomás-Sábado, J., & Gómez-Benito, J. (2002). Psychometric properties of the Spanish form of Templer's death anxiety scale. *Psychological Reports, 91*, 1116–1120.

Vail III, K. E., Arndt, J., Abdollahi, A. (2012). Exploring the existential function of religion and supernatural agent beliefs among Christians, Muslims, atheists, and agnostics. *Personality and Social Psychology Bulletin, 38*, 1288–1300.

Vail III, K. E., Rothschild, Z. K., Weise, D. R., Solomon, S., Pyszczynski, T., & Greenberg, J. (2010). A terror management analysis of the psychological functions of religion. *Personality and Social Psychology Review, 14*, 84–94.

Ventis, W. L. (1995). The relationships between religion and mental health. *Journal of Social Issues, 51*, 33–48.

Viechtbauer, W. (2010). Conducting meta-analysis in R with the metafor package. *Journal of Statistical Software, 36*, 1–48.

Wallace, B. C., Dahabreh, I. J., Trikalinos, T. A., Lau, J., Trow, P., & Schmid, C. H. (2012). Closing the gap between methodologists and end-users: R as a computational back-end. *Journal of Statistical Software, 49*, 1–15.

Wen, Y. H. (2012). Religiosity and death anxiety of college students. *The Journal of Human Resource and Adult Learning, 8*, 98–106.

Wink, P., & Scott, J. (2005). Does religiousness buffer against the fear of death

and dying in late adulthood? Findings from a longitudinal study. *Journal of Gerontology 60B, 4*, 207–214.

Wittkowski, J. (2001). The construction of the multidimensional orientation toward dying and death inventory (MODDI–F). *Death Studies, 25*, 479–495.