# Religiosity is negatively associated with later-life intelligence, but not with age-related cognitive decline ☆

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## ARTICLE INFO

## ABSTRACT

A well-replicated finding in the psychological literature is the negative correlation between religiosity and intelligence. However, several studies also conclude that one form of religiosity, church attendance, is protective against later-life cognitive decline. No effects of religious belief *per se* on cognitive decline have been found, potentially due to the restricted measures of belief used in previous studies. Here, we examined the associations between religiosity, intelligence, and cognitive change in a cohort of individuals (initial $n = 550$) with high-quality measures of religious belief taken at age 83 and multiple cognitive measures taken in childhood and at four waves between age 79 and 90. We found that religious belief, but not attendance, was negatively related to intelligence. The effect size was smaller than in previous studies of younger participants. Longitudinal analyses showed no effect of either religious belief or attendance on cognitive change either from childhood to old age, or across the ninth decade of life. We discuss differences between our cohort and those in previous studies – including in age and location – that may have led to our non-replication of the association between religious attendance and cognitive decline.

## 1. Introduction

Religiosity, measured by how often individuals attend religious ceremonies or by questionnaires assessing religious

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belief, has been consistently negatively associated with cognitive ability (Zuckerman, Silberman, & Hall, 2013). That is, individuals who are more religious tend to have lower intelligence, albeit by only a small degree. However, some studies indicate that, in later life, religiosity is protective against age-related cognitive decline (e.g. Van Ness & Kasl, 2003). In the present study, we investigate this apparent paradox in a sample of older individuals who completed detailed measures of religiosity at age 83 years, and for whom cognitive ability data were available from childhood and from multiple tests between ages 79 and 90.

Evidence for the negative relation of religiosity to cognitive ability comes from a variety of studies, recently meta-analyzed by Zuckerman et al. (2013). Over 85% of the 63 studies included in the analysis showed a negative correlation between the two measures, and the overall random-effects meta-analytic correlation between religiosity and intelligence was $r = -.24$. Zuckerman et al. (2013) discussed a number of possible explanations for this correlation, ranging from the lower

propensity of high-IQ individuals to conform to religious dogma, to the possibility that religion acts to support attributes that higher intelligence may itself confer on other individuals, such as self-enhancement and self-control. Importantly for the present study, the majority (73%) of the studies in the meta-analysis examined religiosity and intelligence in university students or even younger samples, and only two studies – Blanchard-Fields, Hertzog, Stein, and Pak (2001), who studied a sample ranging from 23 to 86 years, and McCullough, Enders, Brion, and Jain (2005), who used longitudinal data following a sample aged 24–40 in 1940 across over 50 years – included some individuals who were in later life. To date, no studies have examined the correlation between religion and intelligence in individuals over 80 years of age. Since late life is a time at which individuals may engage in greater reflection on the past, with concomitant increases in religiosity (Hunsberger, 1985), it is of particular interest to test whether the association between intelligence and religiosity tends to be of a different size (or direction) in later life compared to earlier ages.

A smaller literature exists testing the relation of religion to later-life cognitive change. In one sample of 2812 older individuals aged 65 years and above (Van Ness & Kasl, 2003), higher religious attendance, but not stronger religious identity, was associated with lower rates of cognitive impairment 3 years later (but not by 6 years later) as measured on the Short Portable Mental Status Questionnaire (SPMSQ; Pfeiffer, 1975). A subsequent study (Hill, Burdette, Angel, & Angel, 2006) found a similar result in 3050 Mexican–Americans: those who attended church more regularly had shallower declines in cognitive function as measured by the Mini-Mental State Examination (MMSE; Folstein, Folstein, & McHugh, 1975) than those who were less frequent or non-attendees (see also Reyes-Ortiz et al., 2008, for a further analysis of the same dataset including an extra wave of cognitive testing, extending the study to 11 years, with the same conclusions). Yeager et al. (2006), in a sample of 4440 Taiwanese individuals, found effects of religious attendance (but, again, not belief) on cognitive decline measured by three cognitive tests, such that individuals with more regular attendance had better cognition after 4 years of follow-up. Finally, Corsentino, Collins, Sachs-Ericsson, and Blazer (2009) analyzed a sample of 2938 American women aged 65 and over across a three-year follow-up period, finding that religious attendance was associated with less cognitive decline, also measured using the SPMSQ.

The effect of religious attendance, but not belief, found in these studies is usually interpreted as indicating that social engagement, regardless of its type, is beneficial in cognitive aging (see e.g. Zunzunegui, Alvarado, Del Ser, & Otero, 2003); the beliefs *per se*, therefore, might be unimportant. For instance, Yeager et al. (2006) saw the relation of attendance to cognitive decline disappear in the presence of controls for social engagement. However, some studies have found effects of religious attendance even after controlling for social support (e.g. Corsentino et al., 2009), suggesting that specific aspects of religious activity are protective against cognitive decline. It is perhaps difficult, then, to reconcile these findings with the research that shows a relatively unambiguous negative correlation of religiosity with cognitive ability, discussed above, unless the intelligence–religion relationship is substantially different in old age.

The previous research on cognitive decline and religiosity has some limitations that may explain this apparent contradiction. First, all the studies, aside from that of Yeager et al. (2006), use cognitive function measures such as the MMSE and the SPMSQ that are designed to detect cognitive pathology. Such measures are useful for screening older individuals for dementia, but do not necessarily provide an accurate estimate of their general intelligence. In addition, these tests have reasonably pronounced ceiling effects, and thus tend to have poor sensitivity to milder cognitive decline, or cognitive decline in healthier or more highly educated samples (e.g. Pendlebury, Cuthbertson, Welch, Mehta, & Rothwell, 2010). Second, the studies that were able to assess religious belief in addition to attendance tend to have done so using very short, simple measures that may not have been sensitive enough to detect associations with change in cognition. It is still an open question, then, whether and how a more detailed measure of religious belief – tapping more dimensions of belief, and obtaining a better spread of scores than a one-item measure – would be associated with cognitive decline. Third, the follow-up periods of all the studies except Reyes-Ortiz et al. (2008) are less than 10 years. Fourth, all samples included a wide age range.

Here, we sought to overcome these limitations by analyzing a narrow-age cohort with multiple, detailed measures of religious belief and multiple, sensitive cognitive tests taken four times across an eleven-year period that covered the entire ninth decade of life. The cohort is also situated in the United Kingdom, a country with generally low religiosity (Norris & Inglehart, 2004), where no previous studies of religiosity and cognitive decline have been reported. It was therefore of interest to test whether the findings from previous studies held in a society in which relatively less importance is attached to religious attendance, and where older individuals may receive social support from other, non-religious social groups.

### 1.1. The present study

In line with the previous literature, we hypothesized that religiosity, measured in this study by religious belief and church attendance, would be significantly negatively correlated with intelligence. We then tested three hypotheses regarding religiosity's association with cognitive change. A rare aspect of our sample – the participants' completion of a test of cognitive ability in childhood as well as in old age – allowed us to test the hypothesis that religiosity would be associated with cognitive change across the life course (from age 11 to age 79). To our knowledge, no previous papers have tested this hypothesis. We also tested the hypothesis that longitudinal cognitive change would be associated with change in religiosity (in this sample, measured by religious attendance only). Finally, we tested the hypothesis that religiosity would be associated with cognitive change within the ninth decade of life. Based on the literature discussed above, the prediction was made that only religious attendance, and not religious belief, would associate with the slope of later-life cognitive change such that more regular attendance would be associated with shallower decline.