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RELIGIOUS INVOLVEMENT AND MORTALITY

Answers and More Questions

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The scientific study of the relationship between religion and mortality reaches back further than many might imagine. Indeed, scientists have been interested in the influence of religion on mortality and longevity for nearly 130 years. In 1872, Francis Galton (1822–1911), who was already well known for his groundbreaking research on scientific genius, reported the results of a study that sought to examine scientifically whether prayer had any objective influence on human mortality.

Galton began by assuming that certain groups of people—namely, ministers and missionaries—prayed more than did others. He reasoned that if prayer were efficacious, then “prayerful” people such as ministers and missionaries would most likely live longer than less prayerful people. So, when Galton (1872) found that ministers did not live substantially longer than did attorneys or physicians, he felt confident that he had adduced definitive evidence that prayer was not efficacious.

Galton also reasoned that the members of royal families were frequently the subject of people’s prayers (e.g., “God save the queen!”) and reckoned that if prayer were efficacious in deterring death, then sovereigns would typically live longer lives than other people as a result of the many prayers said on their behalf. Using actuarial tables, Galton demonstrated

that members of royal houses actually had lower life expectancies than did people from other affluent sectors of English society (including lawyers, gentry, and military officers). Based on the unremarkable longevity of clergy and sovereigns, Galton (1872) concluded that no statistical evidence existed for the efficacy of prayer in promoting or preserving physical health.

Humble beginnings indeed to the scientific study of religion and mortality.

Another important figure in the history of social science who was interested in the links between religion and mortality was Émile Durkheim (1858–1917), the father of French sociology. Durkheim's lifelong intellectual project was to demonstrate how human phenomena can be explained at the sociological level, and in his book *Suicide*, Durkheim (1897/1951) argued that suicide was largely a sociological phenomenon rather than a psychological one. From this basic premise he reasoned that religions that encourage strong social ties and adherence to social norms should deter suicide, leading to low suicide rates among their practitioners, whereas religions that do not encourage strong social cohesion would be unable to generate the normative force necessary to deter suicide. To support this hypothesis, Durkheim adduced evidence that largely Roman Catholic European countries (e.g., Spain, Portugal, and Italy), which were presumed to foster stronger social ties and lifestyle prescriptions, had lower suicide rates than did largely Protestant European countries (e.g., Prussia, Saxony, and Denmark).

Galton's and Durkheim's thinking about possible links between religion and mortality has been influential. In the century after their initial work, scores of researchers have examined the links between religion and mortality (for reviews see Koenig, McCullough, & Larson, 2000; McCullough, Hoyt, Larson, Koenig, & Thoresen, 2000; McCullough, Larson, Koenig, & Lerner, 1999). In this chapter I review one dimension of the relationship between religion and mortality: the role of ordinal and interval levels of religious involvement (such as frequency of church attendance, belief in God, or frequency of prayer) as predictors of mortality.

ORGANIZATION OF THIS CHAPTER

This chapter is divided into three major sections. First, I briefly review the major findings from studies in which researchers have examined the associations between religious involvement and mortality. Second, I describe the results of a meta-analysis in which my colleagues and I summarized quantitatively the results from this area of research. Third, I outline what I believe to be the major questions still to be addressed in understanding the links between religious involvement and mortality.

IS RELIGIOUS INVOLVEMENT LINKED TO LONGER LIFE?

The studies that address the link between religious involvement and mortality can be divided roughly into two groups: (1) studies that have examined samples of basically healthy, community-dwelling adults; and (2) studies that have examined samples of medically ill adults.

Religious Involvement and Mortality in Community Samples

One of the first investigations of religious involvement and mortality in community-dwelling adults was conducted by Comstock and colleagues (Comstock & Partridge, 1972; Comstock & Tonascia, 1977) using data from an 8-year longitudinal study of residents of Washington County, Maryland. The primary measure of religiousness was a single-item measure of frequency of church attendance. Across the 8-year follow-up period, Comstock and colleagues found that frequent church attenders were significantly less likely to die than were infrequent church attenders, even after controlling for race, sex, age, marital status, education, the presence of a complete bathroom in the house, and cigarette smoking (Comstock & Tonascia, 1977). Earlier analyses had suggested that the religious involvement was related to reduced mortality resulting particularly from heart disease, emphysema, cirrhosis of the liver, and suicide (Comstock & Partridge, 1972).

Researchers (including Comstock and his colleagues) have criticized Comstock's results for failure to control for baseline health status. However, the study and its findings captured the interest of other researchers. After Comstock and Tonascia's (1977) groundbreaking study, a variety of researchers (e.g., Berkman & Syme, 1979; House, Robbins, & Metzner, 1982; Zuckerman, Kasl, & Ostfield, 1984) also conducted early investigations of the religiousness–mortality link.

Similar studies followed throughout the 1990s, with researchers from the United States (e.g., Hummer, Rogers, Nam, & Ellison, 1999; Koenig et al., 1999; Strawbridge, Cohen, Shema, & Kaplan, 1997) and Israel (e.g., Goldbourt, Yaari, & Medalie, 1993; Kark et al., 1996) conducting intensive examinations of the association of religious involvement and length of life in samples of community-dwelling adults.

Goldbourt, Yaari, and Medalie (1993), for instance, followed a sample of 10,059 male Israeli government workers for 23 years to examine the predictors of mortality. They assessed religious orthodoxy using a three-item measure consisting of (1) whether the respondent received a religious or secular education; (2) whether the respondent defined himself as "orthodox,"

“traditional,” or “secular”; and (3) frequency of attending synagogue. Unadjusted data indicated that each standard unit increase in orthodoxy was associated with a 16% increase in odds of survival through the 23-year follow-up period (these data were adjusted for age but were not adjusted for other demographic, biomedical, and psychosocial variables).

More recently, Strawbridge et al. (1997) used 28-year data from the Alameda County study to examine the relationship between religious attendance and all-cause mortality. They found an association of mortality and religious attendance across the 28-year follow-up. Although adjustments for baseline health status accounted for some of the variance in the religious attendance–mortality relationship, the adjusted relationship was still significant, with a relative hazard = .67 (i.e., the probability of dying for highly religious people in any given year, given the number of respondents alive during the previous year, was only 67% as large as was the probability of dying during any given year for people who were less religious). Strawbridge et al. (1997) also found that people who frequently attended church at the beginning of the study were less likely to smoke or drink heavily than were people who attended church less frequently. They also had more social connections than did infrequent church attenders.

As important, Strawbridge et al. (1997) found that frequent church attenders were more likely to change their health behaviors for the better during the 28 years of the study. Even after adjusting for initial differences in health behaviors, frequent attenders were more likely to (1) quit smoking, (2) reduce their drinking, (3) increase the frequency with which they exercised, (4) stay married to the same person, and (5) increase their number of social contacts than were infrequent attenders. Thus initial differences in the health practices of frequent and infrequent church attenders did not tell the whole story: Religious attendance was related to *positive changes* in the study population's health behaviors, which might have been, in part, responsible for the relationship of religious attendance and mortality. Interestingly, religious people were significantly *more* likely to become obese during the 28 years of the study.

Hummer, Rogers, Nam, and Ellison (1999) reported the same basic finding. Using a nationally representative sample of more than 21,000 adults followed from 1987 to 1995, they examined the association of religious service attendance with survival. In 1987, respondents completed a single-item measure of frequency of attendance at religious services, along with a variety of other measures to assess demographics, socioeconomic status, health, social ties, and health behaviors. Hummer et al. (1999) found that frequency of religious attendance was positively related to length of life. For example, people of both sexes who attended religious services more than once per week were estimated to live for 62.9 years beyond age 20. For those who attended once per week, life expectancy beyond age 20 was 61.9 years. For

those who attended less than once per week, life expectancy beyond age 20 was 59.7 years. Finally, for those who reported never attending religious services, the life expectancy beyond age 20 was 55.3 years. This represents a 7.6-year survival differential between the frequent attenders and the non-attenders.

After controlling for a variety of potential confounds and mediators that could explain the association of religious involvement and longevity (including age, gender, health, social status, social support, cigarette smoking, alcohol use, and body mass index), people who frequently attended religious services survived considerably longer than did people with lower levels of public religious activity. Indeed, people who reported never attending religious services had an 87% higher risk of dying during the follow-up period than did people who attended religious services more than once per week. People at intermediate levels of religious service attendance also experienced lower risks of death than did nonattenders.

Because of the large number of observations, Hummer and colleagues (1999) were able to examine the association of religious involvement and mortality from specific causes (including circulatory diseases, cancer, respiratory diseases, diabetes, infectious diseases, external causes, and all other causes). Religious attendance was associated with lower hazard of death from most causes, including circulatory diseases, respiratory diseases, diabetes, infectious diseases, and external causes. There was little evidence that religious involvement was related to reduced mortality from cancer. When demographics, health, socioeconomic status, social ties, and health behaviors were controlled, most of these survival differences became statistically nonsignificant, although the direction of the associations still indicated that frequent attenders were living slightly longer lives than were nonattenders. The fact that religious involvement was related to reduced mortality from so many causes led Hummer and colleagues (1999) to propose that religious involvement might actually be one of the “fundamental causes” of longevity (i.e., it works through such a multitude of pathways and mechanisms that controlling any single mechanism or cause of death does not cause the association to disappear).

Religious Involvement and Mortality in Clinical Samples

Along with the evidence derived from examinations of community-dwelling samples, researchers have also examined whether religious people have greater survival in the face of serious illness or medical procedures (e.g., Kune, Kune, & Watson, 1992; Oxman, Freeman, & Manheimer, 1995; Ringdal, 1996). Oxman et al. (1995), for instance, examined the 6-month survival of 232 older adults who had undergone elective open heart surgery.

Prior to surgery, patients were assessed on a variety of demographic, biomedical, and psychosocial variables, including depression, presence of mental disorder, social support, and impairment in basic activities of daily living. Oxman et al. (1995) found that people who reported not receiving strength and comfort from religion were considerably more likely to die during the 6 months following surgery than were people who reported receiving a great deal of strength and comfort from religion. This association persisted even after controlling for other biomedical and psychosocial variables (odds ratio [OR] = 3.25, $p < .05$). When four indicators of religious involvement (attendance at religious services, amount of strength and comfort derived from religion, number of people known in one's congregation, and self-rated religiousness) were combined into a single measure of religiousness, the relationship between religious involvement and odds of 6-month mortality fell to nonsignificance (OR = 0.82, $p < .05$), suggesting that perhaps some aspects of religiousness, but not others, are associated with mortality.

Of course, not all investigations of the association of religious involvement and mortality have revealed favorable associations (e.g., Idler & Kasl, 1992; Janoff-Bulman & Marshall, 1982; LoPrinzi et al., 1994; Reynolds & Nelson, 1981). For example, Koenig et al. (1998) examined whether the use of religion as a source of coping was a predictor of all-cause mortality in a sample of 1,010 older adult males who were hospitalized for medical illness. These 1,010 patients were followed for an average of 9 years. At the beginning of their involvement in the study, patients completed a three-item measure of the extent to which they used their religion to cope with stress. In both bivariate analyses and analyses that adjusted for demographic, social, and medical differences among the patients, those who relied heavily on religion for coping did not live any longer than did patients who did not rely heavily on religion for coping. Idler and Kasl (1992) reported similar results from analyses of a sample of basically healthy, community-dwelling adults.

Sifting the Evidence: A Meta-Analytic Review of the Research

As can be seen from this brief review, some studies on religious involvement and mortality have revealed positive associations, whereas others have not. Given this apparent inconsistency, the literature on religious involvement and mortality has the potential to generate a substantial amount of scientific controversy. To address this potential for controversy empirically, my colleagues and I (McCullough et al., 2000) conducted a meta-analytic review. Meta-analysis is a family of analytic tools for aggregating and making sense of the results of many different empirical studies (see Cooper & Hedges, 1994). After conducting an extensive search (using electronic data bases, searches through the reference sections of relevant studies, and leads from

other investigators) for published and unpublished studies relevant to the topic, we retrieved 42 independent estimates of the association, or *effect sizes*, for religious involvement and mortality. These 42 estimates, or effect sizes, incorporated data from 125,826 people.

We coded these 42 effect sizes on a variety of variables, including (1) how religious involvement was measured; (2) percentage of males and females in the sample; (3) number of statistical adjustments made to the association; and (4) whether the sample was composed of basically healthy community-dwellers or medical patients. We also made a series of codings to represent whether each of 15 potential confounds and mediators of the religious involvement–mortality association were controlled (race, income, education, employment status, functional health, global health appraisals, clinical or biomedical measures of physical health, social support, social activities, marital status, smoking, alcohol use, obesity/body mass index, mental health or affective distress, exercise).

Using all 42 effect sizes (which were adjusted for a variety of covariates of religion and mortality in the studies from which we derived them), we found an association of religious involvement and mortality of OR = 1.29, indicating that religious people had, on average, 29% higher odds of survival during any follow-up period than did less religious people. Another way of saying the same thing is that religious people had, on average, only 1/1.29 (77.5%) odds of dying during any specified follow-up period compared with less religious people, adjusting for at least some covariates.

How robust is this finding? We calculated a fail-safe N for the omnibus analysis ($k = 42$ effects), which is a function of the z values associated with each of the effect sizes included in the meta-analysis. This revealed that 1,418 effect sizes with a mean OR of 1.0 (i.e., literally no relationship of religious involvement and mortality) would be needed to overturn the significant overall association of religious involvement and mortality (i.e., to render the resulting mean effect size non-significant, $p < .05$, one-tailed) that we found in our omnibus analyses. The large number of nonsignificant results that would be needed to overturn these findings makes it extremely unlikely that the association of religiousness and mortality that our meta-analysis revealed was due exclusively to having found an uncharacteristically favorable set of studies for inclusion.

These 42 effect sizes were not homogeneous, however. There was a considerable amount of variability among them, suggesting that the effect sizes might better be considered as estimates of more than one single population parameter. Because they were more variable than we could expect would be due to sampling error alone, we assumed that characteristics of the samples or the procedures used to collect and analyze the data could help to explain the inconsistency. Through a series of regression analyses, we found several variables that helped to explain these variations in effect size.

First, studies that used measures of public religious involvement (e.g., frequency of attendance at religious services, membership in religious social groups, membership in religious kibbutzim vs. secular kibbutzim) yielded consistently larger effect sizes than did studies that used private measures (e.g., frequency of private prayer, use of religious coping, etc.), measures that combined indicators of public and private religious involvement, and measures that could not be identified due to insufficient information in the study reports. Indeed, studies that used measures of public religious involvement yielded an omnibus effect size of $OR = 1.43$ (i.e., after controlling for covariates, people high in public religious involvement had 43% higher odds of being alive at follow-up). In contrast, the association of religious involvement and mortality for effect sizes that used nonpublic measures of religious involvement was nearly zero ($OR = 1.04$). This finding suggests that mortality is linked to involvement in public religious activity to a much greater extent than to measures of other dimensions of religiousness.

Another important predictor of effect size was the percentage of males in the study sample. The relationship between religious involvement and mortality was considerably stronger for women than for men. Indeed, we estimated that a sample with 100% males would yield an effect size of $OR = 1.33$, whereas a sample of 100% females would yield an effect size of $OR = 1.59$.

Finally, the degree of statistical control exerted over the religion-mortality association was negatively related to effect size. Better controlled studies (i.e., those including more covariates) yielded smaller associations. This result is quite intuitive: Adjusted effect sizes (after controlling for mediators or confounds) *should* be smaller than unadjusted effect sizes.

In a final set of analyses, we estimated how strong the relationship between public religious involvement and mortality would be if researchers were to conduct a study that controlled for all 15 of the potential covariates, mediators, and confounds that we identified. In such a study, one would expect an OR of 1.23, which indicates that people highly involved in public religious activities would be expected to have 23% higher odds of survival than would people who are less involved in religious activities, *even after controlling for a large array of potential covariates, mediators, and confounds*. In this final set of analyses, the OR of 1.23 was not statistically significant. The nonsignificance of this estimate was due to the fact that we were, in a sense, abusing the tools of multiple regression by estimating parameters for a relatively large number of highly correlated predictor variables with a relatively small number of effect sizes (24 in all). Indeed, the 15 predictor variables were so highly intercorrelated (a condition called multicollinearity) that it was mathematically impossible to arrive at a solution without throwing 3 of them out of the prediction equation altogether! The effects of such abuses of multiple regression on the certainty of one's param-

eter estimates are well known (e.g., Cohen, 1990), and so it is important to focus on the size and direction of the OR and not on whether it is *significantly different* from 1.0.

Magnitude of the Adjusted Association of Religiousness and Mortality

Our meta-analysis revealed that, on average, people who are highly religious have 29% higher odds of being alive at a given follow-up than do people who are less religious (after adjusting for some covariates). An OR of 1.29 corresponds to a tetrachoric correlation coefficient of $r_{tet} = .10$ (Davidoff & Goheen, 1953)—a “small” effect by Cohen’s (1988) rules of thumb. The adjusted association is small, but does that mean that it is unimportant? One helpful way to portray the association of religious involvement and mortality is with Rosenthal’s (1990) binomial effect size display (BESD; Rosenthal, 1990, 1991), which can be used to portray effect sizes in terms of the difference between two groups (100 people high in religiousness, 100 people low in religiousness) in the odds of dying, when the base mortality rate is 50%. If the OR of 1.29 derived from our meta-analysis is portrayed using Rosenthal’s BESD, one sees that approximately 47 of the 100 people in the “highly religious” group would be dead at follow-up (53:47 odds in favor of surviving), whereas approximately 53 of the 100 people in the “less religious” group would be dead at follow-up (47:53 odds against surviving). Thus, among a group of 100 “religious” people and a group of 100 “less religious” people, we would expect six more of the religious people to be alive at the point in time when 50% of the sample had died.

The BESD obtained for the association of religious involvement and mortality can be compared with the BESDs obtained from examining how other psychosocial variables or medical interventions are related to all-cause mortality. Table 3.1 shows what the BESDs would look like for several other variables whose relations to all-cause mortality have been examined in recent meta-analyses. The BESD for participation in an exercise-based rehabilitation program following coronary heart disease (Jolliffe et al., 2000) is similar (see Table 3.1) to the BESD obtained for the association of religious involvement and mortality. Based on Jolliffe et al.’s (2000) effect size estimates, 54 people receiving only conventional cardiac care would be dead, whereas 54 people in an exercise-based rehabilitation program would still be living.

The BESDs obtained for the association of “hazardous” alcohol use (two to four drinks per day for women, four to six drinks per day for men) and mortality (Holman, English, Milne, & Winter, 1996) and for “harmful” alcohol use (more than four drinks per day for women, more than six drinks per day for men) and mortality (Holman et al., 1996) are of similar magni-

TABLE 3.1. Binomial Effect Size Displays for Several Variables Related to All-Cause Mortality

Vital status at follow-up	Religious involvement		Total
	Highly religious	Less religious	
Dead	47	53	100
Alive	53	47	100
Total	100	100	200

Vital status at follow-up	Exercise-based rehabilitation following coronary heart disease (Jolliffe et al., 2000)		Total
	Exercise rehabilitation	Conventional cardiac care	
Dead	46	54	100
Alive	54	46	100
Total	100	100	200

Vital status at follow-up	Hazardous levels of alcohol use (Holman, English, Milne, & Winter, 1996)		Total
	Abstainers	"Hazardous drinkers"	
Dead	45	55	100
Alive	55	45	100
Total	100	100	200

Vital status at follow-up	Harmful levels of alcohol use (Holman, English, Milne, & Winter, 1996)		Total
	Abstainers	"Harmful drinkers"	
Dead	42	58	100
Alive	58	42	100
Total	100	100	200

Vital status at follow-up	Cholesterol-lowering drugs among high-risk patients (Smith, Song, & Sheldon, 1993)		Total
	Treated	Untreated	
Dead	46	54	100
Alive	54	46	100
Total	100	100	200

tude. Cholesterol-lowering drugs also have an effect on all-cause mortality among high-risk patients (Smith, Song, & Sheldon, 1993) that is of similar magnitude (54 treated patients still alive; 54 untreated patients dead). These comparisons suggest that religious involvement has a small but nontrivial association with all-cause mortality that is only slightly smaller than the associations of other behavioral, psychosocial, and medical variables (e.g., exercise-based cardiac rehabilitation, abstention from alcohol use, and cholesterol-lowering drugs) with all-cause mortality. Once again, it should be noted that our mean effect size estimate represents the *net association* of religious involvement and mortality after primary-study authors controlled for a variety of demographic, psychosocial, and physical health variables at the highest level of stringency that they saw fit.

The point of presenting these binomial effect size display data is not to argue that the association of religious involvement and mortality is important only to the extent that it is "large" or even "moderate" by conventional (arbitrary) rules of thumb. I do not even present these data to argue that the association between religious involvement and mortality is "as important as" any other predictor of mortality. Rather, I present these estimates for two reasons: first, to put the size of the association into perspective, and second, to show that even a "small" association can be important, regardless of size, if the association involves criterion variables that are important to individuals or society. Is the association of religious involvement and mortality an important one? Ultimately, I suppose one's answer depends on whether one is among the three additional persons in the "highly religious" group who would have survived to follow-up or the three additional persons in the "less religious" group who would have died as of follow-up!

ANSWERS AND MORE QUESTIONS

The association between religious involvement and mortality appears to be quite robust. Even the best studies reveal a favorable association between religious involvement and mortality, and this association cannot be explained away by appealing to the argument that the association is due to confounding. Moreover, an improbably large number of additional studies showing no relationship between religious involvement and mortality would be necessary to overturn the basic conclusion that religiousness is related to lower mortality. Given the robustness of this association, it is probably accurate to say that the religious involvement-mortality association is one of the most well-established findings in the religion and health literature. Additional studies are unlikely to overturn this basic conclusion, although they would certainly be welcome. Given this robustness, researchers investigating religious involvement and mortality in the future should probably focus less

on "proving" or "disproving" whether such a link exists and instead should focus on addressing several ancillary questions.

Why Public Religious Involvement But Not Private?

Our meta-analytic review demonstrated that the means by which religious involvement was measured played a big role in the magnitude of the religious involvement-mortality association. The favorable association of religious involvement and mortality was most marked in studies that used public religious activity to assess religious involvement. This finding is consistent with speculations that the health-related effects of religious involvement are due partially to the psychosocial resources derived from frequent attendance at religious services, membership in religious groups, or involvement with other (religious) people (Goldbourt et al., 1993; Idler & Kasl, 1997). These psychosocial resources might include: (1) positive emotional states that are engendered by public religious worship and activities; (2) the pleasurable social interactions that people experience during religious activities; and (3) the formation of beneficial personal relationships. If it is true that public religious involvement exerts a causal influence on longevity but that subjective religiousness, prayer, meditation, and particular religious beliefs do not, then this finding has great theoretical significance. However, given the typically high correlation between public and private indicators of religious involvement, it will take some effort to determine why some measures of religious involvement (i.e., public measures) but not others (i.e., private measures) appear to be related to mortality.

The results of Krause's (1998) study may shed some light regarding this point. Krause examined the association of religious involvement and mortality in a sample of 819 older adults who were followed for 4 years. Krause measured three dimensions of religiousness: (1) organizational religiousness (a three-item scale assessing attendance at religious services or activities); (2) nonorganizational religiousness (a two-item scale assessing reading of religious texts and tuning in to religious broadcasting), and (3) use of religion for coping with stress (a three-item scale assessing reliance on religious support and guidance for dealing with difficulties and important decisions).

When controlling for age, sex, education, marital status, self-rated health, functional disability, and stress, Krause found that the three measures of religiousness had different relationships with the probability of dying during the 4-year follow-up period. Every standard unit change in organizational religiosity was associated with a 12% reduction in the odds of dying during the follow-up period. Every standard unit change in nonorganizational religiousness was associated with a nonsignificant 1% reduction in the odds of dying during the follow-up period. Every standard unit change in religious coping was associated with a 15% increase in the

odds of dying during the follow-up period. Therefore, it appeared that the favorable association of religious involvement and mortality was confined only to organizational religious involvement, whereas nonorganizational religiousness had no appreciable association with mortality and using one's religion to cope with stress was related to *greater* probability of mortality. Future research conducted similar to Krause's (1998) study could help considerably to untangle the important dimensions and causal dynamics of religious involvement and mortality.

Why Is the Link Stronger for Women?

As noted previously, our meta-analysis revealed that the association of religious involvement and mortality is stronger for women than for men. Indeed, several studies that examined the associations of religious involvement and mortality for men and women separately (e.g., Clark, Friedman, & Martin, 1999; House, Robbins, & Metzner, 1982; Kark et al., 1996; Koenig et al., 1999; Strawbridge et al., 1997) revealed stronger associations for women than for men.

Why do women appear to receive more "protection" against early death by religious involvement than do men? Is it because religion replaces some health-promotive resource (i.e., social support) for women that men typically receive through other routes? Is it because religion provides unique health-promotive resources that men typically do not receive at all from religious involvement? Kirkpatrick, Shillito, and Kellas's (1999) study illustrates this possibility. Kirkpatrick et al. surveyed 123 female and 61 male students to examine the associations between perceptions of having a relationship with God and loneliness. Even after controlling for standard measures of perceived social support, women who reported a close relationship with God were less lonely than were those who did not report having a close relationship with God. For men, on the other hand, beliefs about having a strong relationship with God were either unassociated or *positively* associated with loneliness. Similarly, Idler and Kasl (1992) found that religious involvement has a stronger negative relationship to depression and disability among women than among men. In any case, because women live longer and are more religious than men in most cultures (Levin & Chatters, 1998; Levin & Taylor, 1997), researchers in the future would be wise to control statistically for gender or to estimate models separately for men and women to prevent confounding with gender.

Does Personality Play a Role?

Could the association of religious involvement and mortality be an artifact of the overlap of religious involvement with personality traits that are

related to increased longevity? For example, Friedman and colleagues (1995) have shown that conscientious people live considerably longer than do less conscientious people. Conscientious people may obtain their survival advantage by virtue of less engagement in risky behaviors such as fast driving, dietary excesses, and physical inactivity, or of a tendency to respond early to bodily signs of physical health problems.

Interestingly, conscientiousness is one of the most robust correlates of religiousness. Researchers have employed measures of the constructs in the Big Five or Five Factor Model (John & Srivastava, 1999; McCrae & Costa, 1999)—a taxonomy of personality traits that accounts for major higher order dimensions of personality—to examine the association of religiousness and personality. Both Kosek (1999) and Taylor and MacDonald (1999) found that measures of Agreeableness and Conscientiousness were positively associated with religious involvement and religious orientation. Indirect evidence for the link between religiousness and conscientiousness also comes from research using Eysenck's (Eysenck & Eysenck, 1985) Big Three taxonomy of personality traits. Cross-sectional studies using measures of the Eysenckian Big Three indicate that religiousness (as measured by a variety of indicators including frequency of attendance at worship services, frequency of private prayer, and positive attitudes toward religion) is related inversely to Eysenckian Psychoticism (e.g., Francis, 1997; Francis & Bolger, 1997). Eysenckian Psychoticism appears to be a conflation of Big Five Conscientiousness and Agreeableness (Costa & McCrae, 1995). I have data also showing that conscientiousness but *not* agreeableness in childhood and adolescence predicts public religious involvement and subjective religiousness in adulthood (McCullough, 2000). Given the robust links of conscientiousness with longevity, conscientiousness with religiousness, and religiousness with longevity, more work is needed to explore whether the health-promotive effects of religiousness are attributable to the correlation of religious involvement with conscientiousness or other personality traits. The relationships among religiousness, hostility, and mortality also should be explored, as some research suggests that religious people are less hostile (for review see Koenig, McCullough, & Larson, 2000) and that hostile people live shorter lives (Miller, Smith, Turner, Guijarro, & Hallet, 1996).

How Can We Model the Dynamics of Religious Involvement and Mortality?

Most of the studies conducted on religious involvement and mortality to date have used one general analytic framework for testing hypotheses: A variety of potential predictors of mortality—including religious involvement—have been included in a logistic or Cox regression model to predict vital status at a discrete follow-up point or to predict differences in continuous survival functions. Such methods have helped to instill confidence that

people who are more religious at baseline do live longer and that these effects cannot be attributed entirely to the overlap of religiousness with factors such as gender, age, socioeconomic status, health, social support, and health behaviors. Moreover, by examining the reductions in the religious involvement–mortality relationship with the successive addition of variables such as social support, smoking, and alcohol use, researchers have been able to infer that religious involvement might exert its effects on mortality partially via such variables as social support, smoking, and alcohol use.

As useful as such studies have been, they are not maximally helpful for testing dynamic hypotheses. Assuming that the association of religious involvement and mortality is a causal one, it is important to identify the health-promotive mechanisms that religious involvement might stimulate to influence mortality risk. For example, it would be enlightening to investigate whether the association of religious involvement and mortality is mediated by improvements in social support or changes in health behaviors that occur in the years between the assessment of religious involvement and the ascertainment of mortality. If researchers are interested in whether religious involvement truly is involved in a causal chain that eventuates in longer life, then the next step in research might be to conduct studies that allow us to observe the health-promotive or life-extending mechanisms that religious involvement might put into place.

In addition to finding that people frequently involved in public religious activities live longer lives, Strawbridge and his colleagues (1997) demonstrated that frequent church attenders were more likely to (1) quit smoking, (2) reduce their alcohol intake, (3) increase the frequency with which they exercised, (4) stay married to the same person, and (5) increase their number of social contacts over a 28-year period. The next step will be to integrate hypothesis tests regarding such health-promotive changes and hypothesis tests regarding religious involvement and mortality into a single statistical model. Of course, testing such dynamic models will call for multiple waves of panel data.

How Are Religious Cognitions, Emotions, and Actions Involved?

In a related vein, it would be fruitful to include a level of psychological theorizing that is too often absent from empirical examinations of the religious involvement–mortality phenomenon. Many if not most researchers have assumed that religious involvement influences mortality by building a tendency for cognitions, emotions, or actions that lead to healthy lifestyles or increased competence for coping with stress (Ellison & Levin, 1998; Hummer et al., 1999; Idler & Kasl, 1992; Kark et al., 1996; Koenig et al., 1999; Krause, 1998; Oman & Reed, 1998; Strawbridge et al., 1997). Most theorists seem to agree, for instance, that religious involvement can lead people

to acquire (1) personal *norms* regarding food, alcohol, tobacco, and sexual behavior; (2) a *coherent world view* that helps to provide meaning in times of stress and suffering; and (3) social support.

But most researchers have lacked data for examining how religion might promote such life-extending psychological resources. Rather, they have focused on demonstrating that after nearly every conceivable risk factor for mortality is controlled, religious involvement still predicts mortality. These early research questions have been perfectly appropriate, but now we need studies of how static indicators of religious involvement get translated into religious cognitions, emotions, and actions that promote longer life.

Without including such a level of analysis, this line of research—no matter how statistically sophisticated the studies are—will be theoretically unsatisfying in the long run. Presumably, all researchers concur that simply getting out of bed on Wednesday, Friday, Saturday, or Sunday morning to get to a church, synagogue, or mosque probably does not make people live longer. However, if researchers do not begin to propose and test more interesting substantive mechanisms for the association of religious involvement and mortality, then I doubt that this line of research will be interesting enough to attract future researchers. To add more theoretical depth to these investigations, researchers might endeavor to make connections between the low-level behavior of religious attendance and mortality through more meaningful psychological constructs. If religion *qua* religion is exerting an influence on mortality, there must be something special going on inside of churches, synagogues, and mosques or in the heads of religious people that leads to reduced mortality. What health-relevant positive affects are stimulated by public religious involvement? What health-related beliefs does religious attendance engender? What sorts of health-relevant choices does religious involvement lead people to make? What cognitions, affects, behaviors, or social interactions does religion stimulate that help people to cope better with the longevity-compromising effects of stress?

Perhaps an analogy will help. It is well established that religious adolescents are less likely to use drugs, tobacco, and alcohol than are their less religious counterparts (e.g., see Willis, Wallston, & Johnson, Chapter 9, this volume). D'Onofrio and colleagues (1999) attempted to account for these associations with two constructs: (1) the number of religious peers each respondent had and (2) respondents' beliefs about drug use being a sin. D'Onofrio et al. (1999) demonstrated that the association of religious involvement and drug use could be accounted for completely by numbers of respondents' religious peers and the strength of their beliefs about drug use being a sin. In other words, these data suggested that religious adolescents refrain from drug use because they interact with a high number of religious peers and because they believe that drug use is sinful. Similar models could be tested to account for the associations of religious involvement and mortality. Researchers should consider adding measures of religious cognitions,

emotions, and actions that would allow them to examine whether (1) religious involvement leads to (2) psychologically meaningful but nonetheless religious processes that (3) eventuate in health behaviors or mental states that (4) promote long life. Of course, in addressing such an agenda, researchers will need data bases that include measures for assessing such religious cognitions, emotions, and actions. An added methodological twist comes from the fact that religious involvement might begin to create these psychological structures (e.g., beliefs, norms, and coherent world views) in childhood or adolescence for most people. Therefore, religious involvement might have caused people to obtain these psychological resources long before they might be included, as adults, in a longitudinal study of religion and mortality. To tackle these thorny issues, researchers may need to adopt explicitly developmental theorizing about the nature of the relationships between religious involvement and mortality.

Life Worth Living?

Another question raised by the existing research on religion and mortality relates to quality of life. Evidently, religious people are living slightly longer lives, but what is the quality of those additional years of life? Are they characterized by fulfillment, peace, and love, or are they characterized by disability, pain, and isolation?

Researchers have developed methods for "quality-adjusting" the increments in lifespan that can be attributed to psychosocial factors or medical interventions. The Quality-Adjusted Life-Years (QALY) metric integrates longevity with quality of life in a single expression (Kaplan, 2000; Shen, Pulkstenis, & Hoseyni, 1999). Experts are beginning to view such measures as fairer appraisals of the benefits associated with a particular health factor because they account for the trade-off between length of life and quality of life. Researchers in religion and mortality could implement these methods profitably in future research.

What about the Mortality Burden of Religion?

A final question that is raised by the religion and mortality literature relates to the negative effects of religious involvement on length of life. The association of public religious involvement and mortality, at least among adults, is on balance a positive one. However, some conservative religious groups eschew standard medical care, and refusal of such care apparently can lead to untimely and unnecessary death. For example, in a recent study, Asser and Swan (1998) reviewed the medical records of 172 cases of children who died as a result of religion-motivated medical neglect. The parents of these 172 children typically belonged to isolated Christian sects that objected to the use of modern medical care. Asser and Swan found that 140 (80%) of

the 172 children died of ailments that would have had more than a 90% likelihood of being cured if proper medical care had been received. Another 18% of the children had ailments with a greater than 50% likelihood of being cured. Only 3 of the 172 children died of conditions that would not have responded positively to medical care. These findings correspond to other studies documenting excess child and adult mortality among members of religious groups that forgo standard medical care (e.g., Kaunitz, Spence, Danielson, Rochat, & Grimes, 1984; Simpson, 1989; Wilson, 1965).

In all research areas, researchers typically go for the "Big Story" first. The study of religion and mortality has been no different: Researchers have been concerned primarily with the net association of religious involvement and mortality across the entire population. As a result of such studies, we now can say with some confidence that, on average, people who are actively involved in public expressions of religion live longer than people who are not. However, such "average" associations might be masking other trends, such as a trend toward higher child and perinatal mortality among members of religious groups that eschew standard medical care. It would be scientifically productive and socially valuable to pour more effort into examining the role that religious faith might play in interfering with adequate self-care and the receipt of proper medical care. By addressing such issues, researchers interested in religion can use their skills in greater service of the common good. They might also add more intrigue and complexity to a plot that otherwise could quickly become rather predictable.

CONCLUSION

People do not pursue religion in order to lengthen their lives. Indeed, for many people from many faiths, "keeping the faith" caused them to die early deaths. Also, much of the violence of world history has been religiously motivated. Moreover, some religions persuade people to eschew modern medical care. As a result of all these factors, it would be naïve not to acknowledge that some manifestations of religion can exact a toll in terms of longevity. Nonetheless, in the population, the net association of religious involvement and longevity appears to be a positive one. Religiously involved people—particularly those who are involved in public expressions of religion—gain a substantial survival advantage over people who are not involved in a religion. These associations are considerably larger for women than for men. We cannot conclude that these associations are causal, but they do persist even when researchers exert reasonable care in ruling out potential sources of spuriousness.

Although these findings answer many questions, they raise new ones: What specifically about public religious involvement causes it to be such a robust predictor of longevity, whereas the link is much less remarkable for

private religiousness? Why would the religion-longevity link be so much stronger for women than for men? How do standard personality factors—particularly those that are robust correlates of religious involvement and mortality—play a role? How can we gain a better understanding of whether religious involvement actually puts health-promotive psychosocial resources into place? What happens at a psychological level that would cause religious people to embrace health-promotive behaviors or mental states? Are the extra years of life afforded to religious people worth the wait? Finally, how can we better integrate the robust association of religious involvement and mortality with the fact that religion also can cut life short for some people? Addressing these questions would help to enrich our understanding of the diverse connections between religious involvement and length of life. By doing so, the state of the science will improve, as will its potential contribution to prevention and health promotion.

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RELIGIOUS INVOLVEMENT AND HEALTH OUTCOMES IN LATE ADULTHOOD

*Findings from a Longitudinal Study
of Women and Men*

PAUL WINK
MICHELE DILLON

In recent decades social scientists have learned a lot about the relation between religiosity and health outcomes. Several studies document either a direct or an indirect effect of religious participation on various indicators of physical and mental health. As noted by the authors of one recent review of research on the religion-health connection, notwithstanding variations across studies, there tends to be statistically significant salutary effects of religious involvement on health (Ellison & Levin, 1998). Although some readers may chafe at the incorporation of what might appear to be a nonscientific variable into analyses of medical processes, it should be remembered that social scientists treat religious beliefs and practices as external social facts (Durkheim, 1912/1976). In this view, religion is a sociocultural phenomenon subject to empirical investigation in the same way as are other everyday cultural processes. Social scientists are not interested in establishing the rational validity of beliefs; rather, they seek to understand the contexts in which discrete beliefs and practices develop and their social and psychosocial implications.