Religion and Mortality Among the Community-Dwelling Elderly

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ABSTRACT

Objectives. This study analyzed the prospective association between attending religious services and all-cause mortality to determine whether the association is explainable by 6 confounding factors: demographics, health status, physical functioning, health habits, social functioning and support, and psychological state.

Methods. The association between self-reported religious attendance and subsequent mortality over 5 years for 1931 older residents of Marin County, California, was examined by proportional hazards regression. Interaction terms of religion with social support were used to explore whether other forms of social support could substitute for religion and diminish its protective effect.

Results. Persons who attended religious services had lower mortality than those who did not (age- and sex-adjusted relative hazard [RH] = 0.64; 95% confidence interval [CI] = 0.52, 0.78). Multivariate adjustment reduced this relationship only slightly (RH = 0.76; 95% CI = 0.62, 0.94), primarily by including physical functioning and social support. Contrary to hypothesis, religious attendance tended to be slightly more protective for those with high social support.

Conclusions. Lower mortality rates for those who attend religious services are only partly explained by the 6 possible confounders listed above. Psychodynamic and other explanations need further investigation. (*Am J Public Health.* 1998;88: 1469–1475)

> Every society is a product of both barbarism and spectacular cultural achievement, and it is the intellectual's job to tease out the best of each culture while also recognizing its blindnesses.
>
> — *Cornel West*[1]

A growing body of empirical evidence suggests that religious involvement has salutary effects on health and mortality.[2–5] Early investigations such as Durkheim's 1897 studies of suicide rates among Catholics, Protestants, and Jews measured religious involvement solely by religious group membership.[6] More recently, death and many disease rates for certain behaviorally strict religious groups such as Mormons and Seventh-Day Adventists have been found to be lower than rates for the general population.[7–9] These groups prescribe health practices that may include not smoking cigarettes, drinking alcohol, or eating meat.[10] Other investigations have associated higher frequencies of attendance at religious services across many denominations with lower blood pressure,[11] lower cause-specific mortality for atherosclerotic cardiovascular disease,[12] lower incidence of physical disability,[13] lower all-cause mortality,[3,14] and lower depressive symptomatology.[15]

Better health practices among some religious individuals may be explained by strict denominational teachings. But more broadly, the emphasis placed upon respect for one's body[10,16] by many religions implies that adherents may be more likely to adopt favorable health practices. Social and psychological factors may also be important. Participation in religious services or other religious group activities facilitates social support, a well-established salutary factor.[17] And while many authors have assumed that psychosocial effects upon health from religious involvement are equivalent to and "equally substitutable" for psychosocial effects from other forms of social support, other authors point out that theoretical bases for health effects *specific* to religion go back at least to Durkheim's later writings.[18]

Recently published empirical studies support the possibility of specific effects from religion that may have an impact on health through psychodynamic pathways.[19,20] Detailed catalogues of potential causal pathways by which religious involvement may affect physical health are offered by Levin,[2] Jarvis and Northcott,[21] and Koenig.[4] While reviews have concluded that the accumulated evidence demonstrates a positive association between religion and health,[3,5,14,21] the relative importance of the various possible causal pathways remains comparatively unexplored. Many earlier studies had serious methodological flaws, which included employing cross-sectional designs and omitting potential confounders. Some health end points, such as physical disability, physical symptom reports, depression, anxiety, and subjective well-being, may also be susceptible to reporting biases.

An attractive outcome for evaluating the impact of religion on health, subject to minimal reporting bias, is all-cause mortality. The present study addressed previous methodological difficulties by examining the prospective association between religious attendance and all-cause mortality in a large, community-dwelling sample of older adults while adjusting for likely confounders. The possibility that other forms of social support might be equally substitutable for religious attendance suggests that the effects on health of religious involvement could be attenuated among individuals already benefiting from

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higher levels of other forms of social support. Therefore, we checked for such effect modifications.

Methods

Study Population

The study population was a cohort of 2025 community-dwelling residents of Marin County, California, first examined in 1990 and 1991. Marin is one of the most affluent counties in the state. All respondents were age 55 or older at baseline; 95% were non-Hispanic Whites, and 76% of the men and 51% of the women had yearly incomes over $15 000.[22,23] Residents over age 75 were oversampled, yielding approximately 500 respondents in each of the 4 age groups 55 to 64, 65 to 74, 75 to 84, and 85 and over. Major characteristics of this population have been described previously.[22]

Exposure

Religious attendance was measured by a single question, "How often do you usually attend religious services?" with 5 possible responses: 3 times or more per week, 1 or 2 times per week, 1 to 3 times per month, less than once per month, and never. Because of the small numbers, these were collapsed to "weekly" (at least once per week), "occasional" (less than weekly and more than never), and never. Sometimes attendance was dichotomized as "high" (weekly) vs "low" (occasional or never) or as "attenders" (weekly or occasional) vs "nonattenders."

Outcome

Mortality was determined by screening local newspapers for obituary notices, or by attempted contact for reinterview at the time of the second examination. Identifying information obtained from baseline interviews was periodically submitted to the National Death Index for all members of the cohort, and all reported deaths were confirmed by obtaining death certificates. We examined the incidence of mortality from the first interview through November 13, 1995, the closing date of the second major examination of the cohort. Follow-up times averaged 4.9 years and ranged from 3.2 to 5.6 years.

Covariables

Most variables were measured by using a questionnaire administered at baseline that contained standardized instruments for assessing depression and memory as well as numerous requests for self-reports of demographic, social, health, and functioning variables. A physical performance examination measured respondents' capacities for tasks such as walking, maintaining balance in a tandem stand, and chairstands (defined as repeatedly rising from a chair and sitting down). We grouped the covariables into 6 categories corresponding roughly to different types of possible causal influence, all measured by self-report unless specified otherwise.

1. *Demographics.* Demographic variables were sex, age, marital status, income, years of education, employment status (working or nonworking), job type (degree of physicality), years of residence in county, and ethnic group (White vs non-White). Annual income was available for 74% of the respondents.

2. *Health status.* Specific chronic diseases as diagnosed by a doctor (and reported by respondent) included stroke, hypertension, diabetes, myocardial infarction, other heart problems, cancer, and the total number of such conditions (coded 0, 1, or 2+). Arthritis, shortness of breath, tiring easily, having had a recent hospitalization, ever having had surgery, self-perceived overall health, and being worried about health were also study variables.

3. *Physical functioning.* Observed variables were completion of a 100-foot walk, completion of 5 chairstands in 1 minute, and balancing ability (Rossiter-Fornoff scale[24]; ability to do tandem stand). Self-reported variables were ability to do housework (none, light, or heavy), leg problems, difficulty seeing steps, cataracts, vision difficulty, limitations of balance, a recent fall, problems from falls, hearing problems, wearing of a hearing aid, trouble sitting for long periods, and urinary incontinence.

4. *Health habits.* Exercise (activities lasting 20 minutes and sometimes involving perspiration; 0, 1–12, or 12+ times per month); eating habits (regularity of meals); sleeping habits (number of hours); taking central nervous system medications; alcohol consumption (drinks per week); smoking; body mass index (BMI) calculated from reported height and weight; possession of health insurance; and availability of medical care.

5. *Social functioning and support.* Living alone; participating in social activities (scored 0–8, one point for attending each of the following in past 6 months: concert, play, or sporting event; movie; museum or art gallery; dance; cards or bingo; meeting of club or organization; auction or yard sale; other); social isolation[25]; participating in religious group activities (apart from regular services); having a confidante; satisfaction with marriage; doing volunteer work (0, 1, or 2+ organizations); giving social support to others (helping with household tasks or transportation; offering advice; lending money; enhancing self-esteem); having a religious or charitable group do grocery shopping or housekeeping for respondent; driving status; lack of access to public transportation; health of spouse; days out of house per week (including time spent in yard); and nights out of house per week. A general organized group activity variable was available but was considered problematic because religious involvement was not specifically excluded.

6. *Psychological.* Depression (Center for Epidemiologic Studies Depression Scale [CES-D] continuous score of 16 or higher); CES-D subscales[26,27]; fearfulness (single CES-D item no. 10); and the East Boston Memory Test.[28]

Statistical Analyses.

To screen potential explanatory variables, we used the high (weekly) vs low dichotomous form of religious attendance. Associations of each candidate variable with both religion and mortality were assessed through age- and sex-adjusted and sex-specific age-adjusted logistic models. Variables associated ($P < .10$) with both exposure (religion) and outcome (mortality) were retained for further analyses, as were 2 other variables that had been found by others to be important. A series of 7 multivariate proportional hazards models were constructed as follows: Model 1 analyzed mortality as a function of age, sex, and religious attendance (high vs low). Model 2 was constructed by introducing other retained demographic variables and dropping any nonsignificant new variables one by one until a model was obtained in which all newly introduced variables were significant ($P < .10$). Models 3 through 7 were constructed analogously by progressively introducing and selectively retaining variables of significance in the following categories (in order): health conditions, physical functioning, health habits, social support, and psychological state. The optimal form of variables with plausible alternative coding schemes was determined at the time they were introduced into the multivariate model.

To explore the possibility that other forms of social support might substitute for religious attendance, dichotomous forms of 7 social support variables were constructed (living with others, 3 or more social activities, out of house 7 days per week, socially nonisolated, any organized group activities, doing

any volunteer work, and monthly religious group activities). The significance of the interaction terms of each of these dichotomous variables with religious attendance was determined in the first and final proportional hazards models. On the basis of these interaction terms, separate relative hazards (RHs) and confidence intervals (CIs) were computed for the effect of religious attendance at high and low levels of each dichotomous social support variable. Stratification by sex was explored similarly within all 7 models. Two problematic variables (income and general organized group activity) and all individual chronic diseases were inserted into the final model to examine sensitivity of results to these variables. Finally, all models were rerun with religious attendance coded as an ordinal variable (never, occasional, or weekly) to check for possible dose–response relationships.

Results

Of the 2025 respondents in the overall study, 2023 (99.9%) reported their frequency of religious attendance. As Table 1 shows, 24.5% (495) of these respondents attended religious services weekly or more often. The percentage of weekly attenders was lower for the youngest (20.3%) and oldest (23.0%) age groups and was slightly higher for women (26.2%) than for men (22.2%).

Deaths during the follow-up period were recorded for 206 (24.2%) of the men and 248 (21.2%) of the women. Table 2 presents age-adjusted mortality rates for respondents according to frequency of attendance at religious services. For each sex, weekly attenders had the lowest mortality and nonattenders had the highest mortality (tests for the trend were significant at $P < .01$). Male mortality rates were equally low among weekly and occasional attenders but were higher for nonattenders. Female mortality exhibited a near-linear trend. The extra protection conferred on women who attended weekly over those who attended occasionally was not statistically significant, however, in either age-adjusted or multivariate proportional hazards regressions. Further analyses therefore emphasized an attender/nonattender coding for religion.

Age-specific mortality rates by frequency of attendance (attender/nonattender) and sex are displayed in Figure 1. As suggested in the figure by the approximately constant attender/nonattender mortality rate ratios, there was no significant interaction between religious attendance and age in either combined or sex-stratified proportional hazards models. Interaction terms between religion and age were all nonsignificant (analyses not shown).

TABLE 1—Numbers of Study Subjects and Percentages of High (Weekly) Attendants at Religious Services, by Age and Sex

	Men		Women		Combined	
Age Group	n	% High Attendants	n	% High Attendants	n	% High Attendants
55–64	208	18.2	231	22.1	439	20.3
65–74	250	23.6	304	30.9	554	27.6
75–84	231	25.5	290	26.6	521	26.1
85+	164	20.1	345	24.4	509	23.0
All ages	853	22.2	1170	26.2	2023	24.5

Possible Explanatory Variables

Screening resulted in retention of variables in all 6 categories, as follows: (1) Demographics—sex, age, marital status, and income; (2) health status—myocardial infarction (women only); (3) physical functioning—observed: chairstands and balance (Rossiter-Fornoff, tandem stand); self-reported: does housework and has limitations from imbalance (men only); (4) health habits—exercise, alcohol, smoking, and BMI; (5) social functioning and support—social activities, days out of house, religious group activities, volunteer work, gives social support (transport), and organized group activity; (6) psychological—depression, positive affect, and poor memory. Education and number of chronic diseases were related only to mortality but were retained because of their importance in other studies.

Table 3 shows that, compared with low attenders, weekly attenders were more frequently married (applies to men only), had less lower-body disability, had better balance in tandem stands (men only), exercised more, smoked less, drank less alcohol, were more overweight, did much more volunteer work, left the house more days, and were less depressed (men only).

Multivariate Adjusted Associations

Possible explanatory variables retained from bivariate and trivariate screening were entered sequentially into multivariate models as described in the statistical methods section. Ninety-five percent (n = 1931) of subjects had nonmissing values on relevant variables and were available for the final model. Table 4 shows the final model when religious attendance is coded as a 3-level ordinal variable with nonattenders as the reference group. After adjusting for all classes of variables, occasional and weekly attendance gave protective relative hazards of 0.80 ($P = .09$) and 0.72 ($P = .01$), respectively, revealing a nonsignificant trend toward greater protection from more frequent attendance. When religious attendance was coded as attenders vs nonattenders, the protective relative hazard for model 1 (age- and sex-adjusted) was 0.64 (95% CI = 0.52, 0.78); the final model reduced this to 0.76 (95% CI = 0.62, 0.94), primarily from the effects of social support and physical functioning.

Other

Religious attendance (attender vs nonattender) did not interact with any of the 7 dichotomized social support variables in the final model. It did interact ($P = .04$) with social activities in the first (age- and sex-adjusted) model, but in the direction opposite from what was hypothesized. Five of the 7 interactions in the final model were also in a direction opposite to what had been hypothesized (although not significant at $P < .05$).

The interaction terms between religious attendance and sex were never significant in any model, although men received slightly more protection in each of the 7 models. Insertion of all individual chronic diseases into the final model did not appreciably affect the results, nor did inclusion of income (with a separate level coded for missing values) or general organized group activity.

Additional Analyses

Two further analyses (not shown) explored whether other social support might substitute for religion. First we examined whether, among religious attenders, weekly rather than occasional attendance might give more protection to respondents with lower levels of other social support. Indeed, high attendance gave additional protection to those who sometimes remained in the house all day (RH = 0.60; 95% CI = 0.36, 1.00) but not to those who left the house every day (RH = 1.09; 95% CI = 0.76, 1.55). The test of interaction was significant ($P = .04$) in the full model after controlling for attendance vs nonattendance. However, contrary to hypothesis, weekly attendance also gave additional protection beyond occasional attendance to those who did volunteer work (RH = 0.44; 95% CI = 0.24, 0.83) but not to nonvolunteers (RH = 1.11; 95% CI = 0.79, 1.55; test of interaction significant at

TABLE 2—Age-Adjusted Mortality Rates[a] per 1000 Person-Years (PY) of Follow-Up, by Sex and Frequency of Attendance at Religious Services

Frequency of Religious Attendance	Men		Women		Combined	
	No. At Risk	Deaths/1000 PY	No. At Risk	Deaths/1000 PY	No. At Risk	Deaths/1000 PY
Weekly	189	24.2	306	19.1	495	21.0
Occasional	235	24.3	305	25.8	540	25.3
Never	429	35.1*	559	28.8*	988	32.1
Total, all subjects	853	29.9	1170	25.7	2023	27.8

[a]Age-adjusted to 1990 US Census.
*Tests for trend significant ($P < .01$) in Cox proportional hazards models.

$P < .01$). No other interactions between high vs occasional attendance and dichotomous social support variables were significant.

Second, each of the 8 items that constituted the social activities measure were inserted one by one into the first and final proportional hazards models in place of religious attendance. A similar item regarding attending church (but not synagogue) was also individually entered. All 9 items pertained to whether the respondent had done the activity in the past 6 months. Six of the activities were significantly protective (all P's $< .01$) in the first (age- and sex-adjusted) model. In the final model, only attending church was significantly associated with mortality (RH = 0.81; 95% CI = 0.66, 1.00), although attending museums or art galleries was marginally protective (RH = 0.81; 95% CI = 0.63, 1.04).

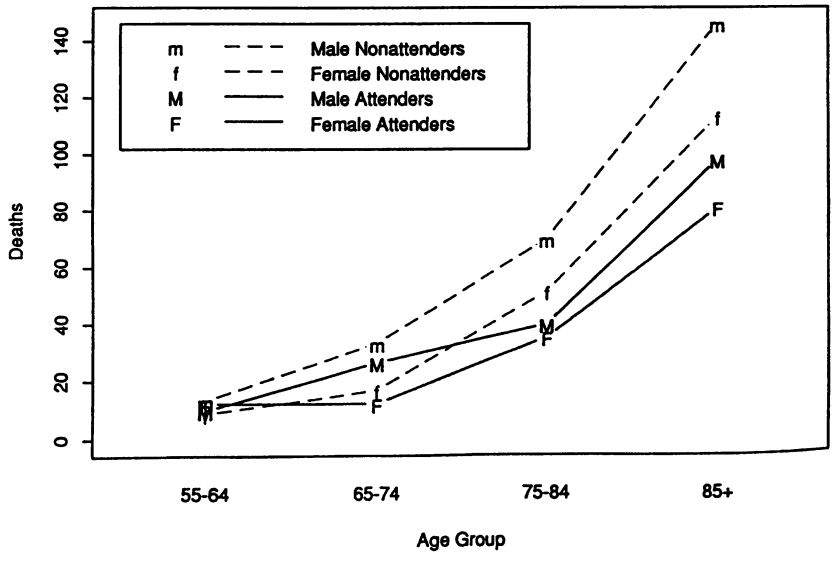

FIGURE 1—Death rates per 1000 person-years by age, sex, and religious attendance.

Discussion

This study demonstrated that religious attendance provided a persistent protective effect against mortality in an elderly population. The protective effects from religious attendance found in this study in a highly affluent White population, even after controlling for most potential confounders, are consistent with earlier results in other populations.

There was little support for the hypothesis that the protective effect from religious attendance would be attenuated among respondents with higher levels of other social support. For 5 of 7 social support variables, religious attendance was slightly *more* protective for respondents with high levels of other social support. Thus, rather than a substitution effect, there was a slight tendency toward what we might label a "complementary" effect, whereby religion attains its maximum protective power in conjunction with other practices. Such complementary effects were further suggested by the significantly increased protection associated with weekly attendance among respondents who did volunteer work. The possibility of substitution and complementary effects should be investigated in other cohorts. The fact that religious (church) attendance was the *only* activity independently protective against mortality further validates an "epidemiology of religion"[14] aimed at understanding the distinctive etiologic and salutogenic[2,29] significance of specifically religious activities.

While several studies have evaluated the relationship between religious attendance and all-cause mortality, apparently only 5 community-dwelling cohorts have been studied while the researchers adjusted for more than 2 variables.[3] Comstock and Tonascia,[30] House et al.,[31] and Strawbridge et al.[32] all studied large populations with average ages in their 40s. All 3 found significant unexplained protective effects for religious attendance after controlling for available explanatory variables. Each study controlled for demographic factors and health habits. House et al. and Strawbridge et al. controlled for physical health conditions and social support, while Strawbridge and colleagues alone controlled for a psychological factor (depression).

Whether analogous unexplained effects exist among the elderly has been less clear. The elderly in America today are slightly more religious than the young,[4] but they have health problems and mobility difficulties that make it imperative to control for confounding effects from physical functioning and health status. Only 2 cohorts of community-dwelling elderly have previously been investigated for effects of religious attendance on all-cause mortality in studies that controlled for more than 2 variables. Idler and Kasl found that a significant protective effect disappeared after they controlled for demographics and health status in an ethnically mixed older population.[18] Goldman and colleagues controlled for demographics, health conditions, physical functioning, and other social support, but not health habits, and they were unable to explain a significant protective effect in a

TABLE 3—Age-Adjusted[a] Percentages and/or Means of Study Subjects Reporting Selected Characteristics at High (Weekly) vs Low (Occasional or Never) Attendance of Religious Services, by Sex

Characteristic	Religious Attendance by—					
	Men		Women		Combined	
	High (n = 189)	Low (n = 664)	High (n = 306)	Low (n = 864)	High (n = 495)	Low (n = 1528)
Unmarried, %	17.3	23.0**	53.7	51.4	38.3	38.0
Any chronic disease,[b] %	64.8	59.5	60.6	61.8	62.2	60.8
Physical functioning, %						
Lower-body disability	7.0	8.4	11.3	14.0	9.3	11.4*
Balance difficulties	12.2	17.7***	27.7	26.8	21.1	22.5
Health characteristics, %						
Exercises (any)	77.8	76.0	59.9	54.9	66.8	64.2*
Currently smokes	10.6	15.4*	9.5	14.2*	9.9	14.6***
Alcohol						
None	17.3	14.7	25.5	20.1	22.1	17.5
>8 Drinks/week[c]	31.5	40.5	15.9	18.6	22.4	28.7*
BMI[d]						
Underweight	18.4	17.1	11.5	18.6	14.3	18.6
Overweight[c]	26.7	23.2*	28.0	20.6***	27.5	21.8****
Social functioning and support						
Did any volunteer work, %	48.0	26.8****	54.2	32.5****	51.8	29.8****
Days not out of house/week,[e] mean	0.26	0.26	0.60	0.69***	0.46	0.49**
Depression (≥16 CES-D[f]), %	4.7	6.7**	11.4	8.3	8.8	7.5

[a]Age-adjusted to 1990 US Census.
[b]Includes diagnoses of stroke, hypertension, myocardial infarction, diabetes, cancer, and other heart disease.
[c]Used ordinal logistic regression.
[d]High and low sex-specific quintiles.
[e]Used linear regression.
[f]The CES-D positive affect subscale had uniformly more significant associations with religion, but its use did not affect substantive conclusions from multivariate analyses.
*$P < .10$; **$P < .05$; ***$P < .01$; ****$P < .0001$ for association between covariate and high attendance in age-adjusted logistic regression models with row-variable as outcome.

nationally representative older cohort.[33] In an African American subsample of the same national cohort, Bryant and Rakowski found significant unexplained protection while additionally controlling for BMI.[34]

The present study found no significant sex differences in the protective effect associated with religious attendance. This result contrasts with the findings of House et al.,[31] Strawbridge et al.,[32] and Kark et al.[19] that among younger cohorts women received significantly more protection, but it is consistent with the findings of Goldman et al.[33] and Bryant and Rakowski[34] that among older adults, men received slightly but nonsignificantly stronger protection.

Several studies suggest protective influences from psychological factors that may be specific to religion. Oxman and colleagues[20] found that receiving "strength and comfort" from religion was associated, independently of social support, with survival after cardiac surgery. Lower mortality rates among religious as compared with secular Israeli kibbutzim, even though the 2 groups constituted "almost identical cohesive communal settlements,"[19(p345)] were found by Kark et al.[19] to be inexplicable in terms of sociodemographic variables or measured health habits. The authors concluded that a likely explanation was that the social environment of the religious kibbutzim induced less stress and enhanced host resistance and overall well-being. Strawbridge and colleagues[32] found that frequent religious attendance was associated with more stable marriages, implying that psychological aspects of religion may also serve to stabilize social ties and lower the "probability of deficiency . . . as ties are broken with the passage of time."[35(p589)]

Data to assess a variety of hypotheses about religion's possible impact on health were unavailable to the present study:

1. *Nutrition.* Improved diets have been found to contribute to lower mortality rates in certain religious denominations.[9] Many religions teach respect for the body,[16] which could benefit the dietary and related serum parameters of religious adherents by encouraging better individual eating habits and greater access to organized nutritional programs.[36(pS292)]

2. *Psychological states.* As Levin points out,[2] religiously motivated expressions such as hope,[37] forgiveness,[38] altruism,[39] and love[40] have been proposed as psychological factors that may strengthen host resistance, "getting into the body" through psychoneuroimmunologic, psychoneuroendocrinologic, or psychophysiologic pathways.[2] Such motivations may also stabilize and improve the quality of social relationships. These motivations would be expected to be more prevalent among religious individuals who have more fully internalized the corresponding religious values and are thus "intrinsically" rather than "extrinsically" religious.[41,42] Including the National Institute on Aging–sponsored[43] or other[44,45] measures of intrinsic religiousness could assist in determining the etiologic significance of psychological pathways.

3. *Immunity.* Serum immune and endocrine parameter levels could assist in evaluation of psychological pathways.[46]

4. *Coping.* Religious attenders may have a greater ability to use religious coping methods[47–49] or a stronger sense of coherence, facilitating selection of the most appropriate coping strategy.[29(p138)]

5. *Stress reduction.* Ellison[10] and Kark et al.[19] each point out that the physiological effects of meditative prayer may directly affect health. Ellison also details numerous

TABLE 4—Relative Hazards (RH) and 95% Confidence Interval (CI) Relating Attendance at Religious Services and Selected Variables to Mortality (in Final Multivariate Model)

Predictor Variable	RH	95% CI	P
Religious attendance			.01[a]
Weekly vs never	0.72	0.55, 0.93	.013
Occasional vs never	0.80	0.62, 1.03	.086
Demographics			
Age (decades)	2.05	1.79, 2.36	.0001
Sex (female)	0.42	0.34, 0.53	.0001
Unmarried	1.40	1.10, 1.79	.006
No. of chronic diseases	1.39	1.22, 1.58	.0001
Physical functioning			
Lower body disability	1.24	0.97, 1.58	.08
Balance difficulties	1.31	1.02, 1.68	.03
Health characteristics			
Exercise	0.84	0.73, 0.97	.02
Currently smokes	2.08	1.55, 2.79	.0001
Currently drinks alcohol (any)	0.81	0.65, 1.01	.06
Underweight	1.19	0.95, 1.49	.11
Social functioning and support			
Days not out of house per week	1.06	1.01, 1.12	.02
No. volunteer groups	0.82	0.68, 0.98	.03
Depression (high CES-D)	1.42	1.07, 1.89	.02

Note. All estimates and CIs in table are from fitting model with 3-level religious attendance.
[a]When religious attendance was recoded binary (attenders vs nonattenders) and the same model was refit, religion was significant ($P = .01$), with RH of 0.76 and 95% CI of 0.62, 0.94.

psychosocial pathways by which religion may reduce or buffer stress.

6. *Personality.* Personality traits[50] have been controlled as confounders in health studies[51] and could predispose toward both religiousness and health.

7. *Multiwave data.* Measurements over time may be important for determining underlying causal relationships. Potential confounding variables may also be intervening variables that lie on the causal pathway between attendance and mortality. In a 4-wave, 28-year study in which health habits and social connections were entered as time-dependent covariates, Strawbridge and colleagues concluded that support existed for both confounding and intervening models but that there was "somewhat stronger evidence for the intervening model."[32(p960)]

8. *Interactions.* Benson and Stark give theoretical bases for protective interactions between meditative prayer and other religious practices.[52(p155)] The complementarities[11] observed in the present study also suggest that religious "life styles"[53] may be more than the sum of their parts.[54]

Finally, inaccurate measurement of covariables and hitherto unidentified confounders cannot be ruled out as sources of the association found in the present study.

Our analyses lend further support to the existence of a protective effect of religious attendance on health that acts by multiple pathways. Each pathway deemed causal[5] bears implications for public health and should receive further study. A broad implication is that religious and health organizations can develop closer collaborations[55] on health prevention campaigns; the American Public Health Association has an initiative to form new partnerships with religious communities to better coordinate such activities.[56] The 10-fold increase in the past 3 years in the number of medical schools offering instruction in religious and spiritual issues indicates a growing medical interest.[57]

Beyond this, to paraphrase pragmatist-philosopher Cornel West,[58] future research and activities should aim to "tease out" how religion can most benefit the public health. Idler and Kasl point out that religion "is not a scarce resource . . . and it is all the more important because it appears to make other resources available."[13(pS315)] Krause suggests that if religion is causally beneficial "then the goal of research in this field should ultimately be to inform intervention design," and that while the challenges confronting such efforts are "formidable . . . the benefits of further work should far outweigh the costs."[36(pp S292–293)] Koenig speculates that becoming religious *solely* to gain positive health effects[49,59] "will probably not work very well,"[4(p126)] arguing that psychological pathways are not activated when religion is used "as a means to an end." Maugans[60] offers practical discussions of why, when, and how physicians might include inquiries regarding patients' religious and spiritual well-being[61–64] into routine practice.

In conclusion, we found that attendance at religious services predicted lower mortality in an affluent elderly White population, suggesting that patterns of protective effects previously found in other populations may extend to affluent elderly Whites. Even after controlling for 6 classes of potential confounding and intervening variables, we were unable to explain the protection against mortality offered by religious attendance. Evidence regarding the possibility that other forms of social support can substitute for religious attendance was mostly negative but deserves further study, as does the possibility that certain behaviors (e.g., volunteerism) may be complementary to religious attendance in preventing mortality. □

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