Religion and Spirituality

Linkages to Physical Health

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Evidence is presented that bears on 9 hypotheses about the link between religion or spirituality and mortality, morbidity, disability, or recovery from illness. In healthy participants, there is a strong, consistent, prospective, and often graded reduction in risk of mortality in church/service attenders. This reduction is approximately 25% after adjustment for confounders. Religion or spirituality protects against cardiovascular disease, largely mediated by the healthy lifestyle it encourages. Evidence fails to support a link between depth of religiousness and physical health. In patients, there are consistent failures to support the hypotheses that religion or spirituality slows the progression of cancer or improves recovery from acute illness but some evidence that religion or spirituality impedes recovery from acute illness. The authors conclude that church/service attendance protects healthy people against death. More methodologically sound studies are needed.

Religion is a "very important" part of the lives of approximately 67% of the American public, of whom 96% believe in God and 42% attend religious services regularly (Gallup, 1995). Moreover, interest in spiritual growth is increasing, with 82% of Americans expressing such an interest in 1998 compared with only 58% expressing similar interests in 1994 (Myers, 2000). Although there is little dispute that religion and spirituality can provide psychological comfort to adherents, the proposition that they can reduce risk of death and disease is more controversial.

There have been reviews of the evidence that links religion or spirituality to physical health (Ellison & Levin, 1998; Koenig & Cohen, 2002; Larson, Swyers, & McCullough, 1998; Levin, 1996; Thoresen, 1999) and reviews of these reviews (Sloan & Bagiella, 2002; Sloan, Bagiella, & Powell, 1999). The reviews make strong claims for the broad health benefits of religion, and the reviews of the reviews raise concerns about selective attention to positive studies and disregard of methodological weaknesses. Whereas one reviewer concluded, "My review of the research reveals that . . . whenever religious faith is present remembered wellness is triggered and health can be improved" (Benson, 1996, p. 173), another concluded, "Suggestions that religious activity will promote health are unwarranted" (Sloan et al., 1999, p. 667).

Because such disparate conclusions make it difficult to know precisely the current status of hypotheses linking religion or spirituality and physical health, there is a need for a systematic, objective, and critical review. Of particular benefit would be a review that focuses on methodologically sound studies and holds them to the same standards as are used in epidemiology to evaluate any proposed causal link to physical health.

The aim of this article is to examine the scientific basis for some of the most popular hypotheses about the impact of religion or spirituality on physical health. This is a selective review that focuses on those studies that provide the strongest methodologies and thus have the lowest risk of bias and/or confounding. Hypotheses supported by strong and consistent evidence are highlighted, and gaps in the literature that provide opportunities for future research are identified.

Methods

Approach

This review features a levels-of-evidence approach in which hypotheses about the connection between religion or spirituality and physical health are evaluated using studies that meet minimally acceptable methodological standards (see Miller & Thoresen, 2003, in this issue). This approach was chosen over meta-analysis because it provides a focused critique of only those studies in which bias and confounding are minimized and is thus responsive to concerns about the quality of past reviews (Sloan et al., 1999). For those interested in a meta-analytic approach, one has already been conducted for the literature on religious involvement and mortality (McCullough, Hoyt, Larson, Koenig, & Thoresen, 2000).

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Identification of Studies

Studies were identified using computer searches of MEDLINE and PsycINFO, bibliographies of prior reviews, and consultations with experts in the field. Despite these efforts, it is possible that germane studies, particularly newer ones, may have been missed.

Studies of interest focused on the link between religion or spirituality and physical health only. Omitted were studies examining the link between religion or spirituality and potential mechanisms, such as blood pressure, and all psychosocial outcomes, such as suicide, alcoholism/substance abuse, and depression. There are extensive literatures that review each of these outcomes to which the interested reader is referred (Gartner, Larson, & Allen, 1991; Gorsuch, 1995; Kehoe & Gutheil, 1994; Larson et al., 1992; Levin & Vanderpool, 1989; Luskin, 2000; McCullough & Larson, 1999; Miller, 1995; Westgate, 1996).

Criteria for the Exclusion of Studies

Studies were categorized as C (inconclusive) and eliminated from further consideration if their designs made it impossible to rule out bias, confounding, or chance as alternative explanations for results. Specific exclusions were for any of the following criteria.

1. No attempt to control for any potential confounder. Studies that reported a univariate association with no attempt to control for such basic confounders as age, gender, or ethnicity were eliminated. Examples of this are studies that reported significant relationships between a specific religious denomination and physical health without any controls for factors that could explain these findings (see, e.g., Berkel & de Waard, 1983; Comstock & Partridge, 1972; Enstrom, 1980; Horowitz & Enterline, 1970; Jussawalla & Jain, 1977; Lemon & Walden, 1966; Locke & King, 1979; Lyon, Gardner, Klauber, & Smart, 1977; Phillips et al., 1980).

2. Cross-sectional design. Cross-sectional studies are unable to determine the temporal sequence of events. If religion or spirituality is related to physical health, it is as plausible that the religion or spirituality influenced subsequent health as that physical health influenced subsequent religion or spirituality. Because our interest in this review is in the hypothesis that religion or spirituality influences subsequent physical health and because cross-sectional studies cannot inform this hypothesis, they were eliminated. This does not, however, rule out the value of cross-sectional studies in helping to formulate hypotheses for subsequent longitudinal investigations. In cases where provocative cross-sectional data are available, we describe these studies in the text (see, e.g., Hypothesis 2 below, describing studies by Bernardi et al., 2001, and Gupta, Prakash, Gupta, & Gupta, 1997). A complete understanding of the temporal relationship between religion or spirituality and physical health would require the testing not only of models of the impact of religion or spirituality on subsequent health but also of models of the impact of health on subsequent religion or spirituality (see, e.g., the commentary for Hypothesis 3 below). Although an evaluation of this latter hypothesis is beyond the scope of this review, such study is largely missing in this literature but is needed to provide a fuller understanding of any links between religion or spirituality and physical health.

3. Inadequate measurement of religion or spirituality or of physical health. One example of this is inferring the level of religion or spirituality from a secondary source (e.g., living in a specific neighborhood) with no attempt to validate such an approach. This occurs, for example, when health status in individuals in homogeneously religious geographic areas is contrasted with that of individuals in nonreligious geographic areas. Another example is the assessment of physical health using a self-reported questionnaire where there is the potential for spurious associations due to method bias (e.g., a preexisting correlation between self-reports of psychosocial status and self-reports of health).

4. No statistical analyses. Studies that failed to conduct statistical analyses did not assess the role of chance in accounting for the observed association.

5. Earlier reports on the same cohort. Often, there is a series of reports on a specific religion or spirituality–health link that cover the same cohort but that differ in the length of follow-up of that cohort (see, e.g., the reports from Alameda County, California, by Oman, Kurata, Strawbridge, & Cohen, 2002; Seeman, Kaplan, Knudsen, Cohen, & Guralnik, 1987; Strawbridge, Cohen, Shema, & Kaplan, 1997; and Wingard, 1982). Because a central goal of our research was to examine the consistency of findings across different cohorts, we included only the report with the longest follow-up. If the findings for different lengths of follow-up differed, we make note of this in text (see, e.g., Hypothesis 5 below, noting Idler & Kasl, 1997b).

Criteria for the Evaluation of Included Studies

Each of the included studies was rated for its methodological strength in two ways. The first rating (*mediated model)* evaluated the impact of religion or spirituality on health, regardless of whether or not such a relationship was mediated by established risk/protective factors. That is, the strength of the evidence for a relationship was evaluated without control for any potential mediating factors that have already been established to influence physical health. These mediating factors include healthy lifestyle behaviors, social support, and depression. For this first rating, a study was evaluated using only the first four criteria below.

The second rating evaluated religion or spirituality as a new, independent protective factor (*independent model)*. That is, the strength of the evidence was evaluated using the same four criteria below but, in addition, after controlling for the risk/protective factors that have already been established as predictors of physical health—healthy lifestyle behaviors, social support, and depression. Thus, this evaluation was based on all five criteria below.

A comparison of the strength of the association between the mediated and independent models can help to determine the extent to which the religion or spirituality and physical health association can be accounted for by

known risk/protective factors. If, for example, the mediated model shows a strong association but the independent model shows no association, it can be interpreted that the religion or spirituality–physical health link can be completely accounted for by known risk/protective factors.

The clinical trial data that were evaluated in Hypothesis 9 below used the adequacy of the randomization to make judgments about the strength of the study. If the randomization produced equivalent groups, the study was deemed to have controlled for all potential confounders and established risk/protective factors. If there were imbalances after randomization, the study was deemed to have insufficient control on the factor(s) for which the groups were imbalanced.

The study was rated A (conclusive) if it did not have any of the flaws noted below or B (generally sound) if it had one or more of these flaws that clouded interpretation of the findings.

1. Adequacy of control for confounders. What is inferred to be a relationship between religion or spirituality and physical health could, in actuality, be an erroneous inference if a confounder is present. Any temporally antecedent variable that is related both to religion or spirituality and to physical health and that is not part of the proposed pathogenic process could serve as a confounder and should be controlled. The confounders of interest were age, ethnicity, gender, education, disability, and poor health. Age and ethnicity were confounders because older people and minorities are more likely to be religious (Chatters & Taylor, 1989; Ferraro & Koch, 1994; Levin, Taylor, & Chatters, 1994) and are at greater risk for mortality. Failure to adjust for them could result in an underestimation of the religion or spirituality–health relationship if, for example, the more religious minorities die sooner. Gender was a confounder because women are both more religious (Ferraro & Koch, 1994; Levin & Taylor, 1993; Levin et al., 1994) and live longer. Failure to adjust for gender could thus result in an overestimation of the effect of religion or spirituality on health if it is really female gender, not religion or spirituality, that protects against death. Disability, poor health, and education were confounders, but the direction of the bias may have been influenced by the specific measure of religion or spirituality used. Healthier and better educated people are more likely to attend services and live longer (Ainlay, Royce, & Swigert, 1992; Idler & Kasl, 1997a; Kaplan, 1996; Lantz et al., 1998). Failure to control for them could result in a relationship between church attendance and health that could actually be a relationship between ability to attend church and health. Sicker and less well-educated individuals are more likely to engage in private religious practices and to die sooner (Goode, 1966; Idler & Kasl, 1997a; Taylor & Chatters, 1991). Failure to control for them could result in an underestimation of the religion or spirituality–health relationship that would be suppressed if the privately religious people had preexisting illness.

2. Imprecise measurement of religion or spirituality or of covariates. An investigation was considered to have a flaw if it tested a religion or spirituality variable that was identified as "religiosity" or "religion" with no further description of what specifically was measured. An investigation was considered to have a flaw if any of the covariates in multivariate analyses were measured using nonstandard methods, despite the existence of standardized measures. Such imprecise measurement would result in misclassification bias and undercontrol of the covariate of interest. An example would be controlling for social support using only a single item despite the existence of numerous standardized social support scales.

3. Failure to control for multiple tests. Investigations that used multiple measures of religion or spirituality with poorly specified hypotheses to support them were, in effect, taking multiple looks at the same association. For example, if an investigator began with a religion scale but failed to find an association, then examined its subscales and still failed to find an association, and then examined individual items, he or she has made multiple attempts to find the expected association. The more statistical tests that are conducted, the greater the opportunity to observe a chance association. Type I error, conventionally set at 5% (e.g., in only 5 out of 100 times that a study is done will one erroneously conclude that an association exists), increases beyond 5% when taking multiple looks. Failure to control for multiple looks with some type of statistical adjustment, such as decreasing the alpha level for significance, was deemed to be a flaw.

4. Post hoc observation in a subgroup. If a hypothesis in the overall sample was not supported but the proposed relationship was observed on a post hoc basis in an important subgroup (e.g., women, minorities), statistical inference would have become clouded, and the subgroup finding may have been simply an artifact. Thus, the subgroup finding was deemed to be exploratory, and the study was deemed to have a flaw. This does not negate the value of these subgroup analyses in helping to formulate hypotheses about moderating effects for subsequent investigations. If the subgroup association was subsequently tested as an a priori hypothesis in a new investigation, the study was not judged to be flawed.

5. Adequacy of control for established protective factors. Religion or spirituality may be a protective factor because it encourages other protective factors, or discourages other risk factors, that have known causal pathways to physical health. That is, religion or spirituality may improve social supports that may, in turn, translate into improved survival. Alternatively, religion or spirituality may be a new protective factor that is independent of established risk/protective factors in its association to health. The protective factors of greatest interest are social support/integration, healthy lifestyle (e.g., avoidance of smoking, regular exercise, moderate alcohol consumption), and absence of depression. These factors are often characteristic of religious people (Idler & Kasl, 1997a; Kennedy, Kelman, Thomas, & Chen, 1996; Levin & Vanderpool, 1987; Strawbridge et al., 1997) and are protective against physical health problems (House, Landis, & Umberson, 1988; "Smoking-Attributable Mortality and Years of Potential Life Lost—United States, 1984," 1997;

Thun et al., 1997; Wulsin, Vaillant, & Wells, 1999). Ratings of the strength of the religion or spirituality–physical health association after adjusting for known risk/protective factors have been presented in tables in the column labeled "Independent model." A more in-depth discussion of how the religion or spirituality–physical health association may be mediated by established risk/protective factors can be found in George, Ellison, and Larson (2002).

Presentation of Effect Sizes

The strength of the association between religion or spirituality and health is portrayed, in most cases, using some measure of relative risk (RR), such as an odds ratio (OR) or relative hazard (RH), with an accompanying *p* value. The calculation of the RR is approximately equivalent to a rate ratio, that is, the rate of disease in the religious or spiritual group divided by the rate of disease in the nonreligious or nonspiritual group. Thus, RRs that are close to 1 suggest no relationship (i.e., the rate in the religious or spiritual group is the same as the rate in the nonreligious or nonspiritual group). RRs that are less than 1 suggest that religion or spirituality protects against disease (i.e., the rate in the religious or spiritual group is lower than that of the nonreligious or nonspiritual group). RRs that are greater than 1 suggest that religion or spirituality increases risk of disease (i.e., the rate in the religious or spiritual group is greater than the rate in the nonreligious or nonspiritual group). The farther the RR is from 1, the stronger the relationship. Thus, for example, a RR of 0.5 (equivalent to a 50% reduction from 1.0 [no relationship]) is stronger than a RR of 0.8 (a 20% reduction from 1.0 [no relationship]). If the RR presented in the original study did not follow the format in which a lower RR was associated with a protective benefit of religion or spirituality, it has been transformed. If RRs could not be calculated from the available data, the specific test statistic used (e.g., beta coefficient [β], log rank test, correlation coefficient [r_{xy}], or chi-square [χ^2]) and its accompanying *p* value are presented and labeled as such.

Identification of Hypotheses

We identified nine hypotheses that underlie most of the investigations that test for a link between religion or spirituality and physical health. To arrive at these nine hypotheses, we classified studies by their religion or spirituality conceptualization, most of which fell into one of five categories (church/service attendance, depth of religiousness, religious affiliation, religious coping, and spirituality), and by their physical health outcome, categorized into mortality (all-cause, cardiovascular, cancer, other), morbidity (cardiovascular, cancer, other), disability (limitations in activities of daily living), and physical recovery from physical illness. The major religion or spirituality conceptualizations were then linked to each of the major health outcomes to form highly specific hypotheses. For certain hypotheses, such as the relationship between church/service attendance and all-cause mortality, a large research base was available, and thus, the hypothesis was retained in this form. For most others, however, the research base was so small that the hypothesis was rewritten at a higher level of abstraction and the pertinent studies were combined. The final set of nine hypotheses is presented in Table 1.

Evaluation of the Strength of a Hypothesis

The strength of the evidence for any hypothesis was judged using the following scale. Evidence was considered to be *persuasive* (Level 1) if there were at least three supportive A studies or a mixture of five supportive A and B studies. Evidence was considered to be *reasonable* (Level 2) if there were two supportive A studies or a mixture of three or four supportive A and B studies. A hypothesis was judged to have *some* support (Level 3) if there was one

Table 1
Hypotheses Tested and Summary of Strength of Evidence for Them

	Strength of evidence	
Hypotheses	Mediated model[a]	Independent model[b]
1. Church/service attendance protects against death.	Persuasive	Persuasive
2. Religion or spirituality protects against cardiovascular disease.	Some	Some
3. Religion or spirituality protects against cancer mortality.	Inadequate	Inadequate
4. Deeply religious people are protected against death.	Consistent failures	Consistent failures
5. Religion or spirituality protects against disability.	Inadequate	Consistent failures
6. Religion or spirituality slows the progression of cancer.	Consistent failures	Consistent failures
7. People who use religion to cope with difficulties live longer.	Inadequate	Inadequate
8. Religion or spirituality improves recovery from acute illness.	Consistent failures	Consistent failures
Religion or spirituality impedes recovery from acute illness.	Some	Some
9. Being prayed for improves physical recovery from acute illness.	Some	Some

[a] Studies include adjustment for the demographic confounders of age, gender, ethnicity, education, poor health, and disability.
[b] Studies include adjustment both for the demographic confounders of age, gender, ethnicity, education, poor health, and disability and for established risk factors including aspects of a healthy lifestyle (e.g., smoking, alcohol, physical activity, diet), social support/integration, and depression.

supportive A study or at least two supportive B studies. In cases where repeated tests of a hypothesis resulted in repeated failures to support it, the evidence was described as *consistent failures*. If the research base was too small to fall into any of the above categories, the evidence was judged to be *inadequate*. Table 1 presents a summary of the strength of the evidence for each of the nine hypotheses evaluated in two ways: (a) regardless of whether or not religion or spirituality was mediated by established risk/protective factors and (b) when religion or spirituality was tested as a factor that is independent of established risk/protective factors.

If a hypothesis was judged to have persuasive evidence to support it, we further examined it using Hill's (1965) criteria for evaluating the causality of a risk/protective factor for health. Specifically, we examined (a) the strength of the relationship between religion or spirituality and physical health (using either the reported or a calculated reduction in risk metric); (b) its temporal sequence (whether the religion or spirituality preceded the health outcomes); (c) its dose–response relationship where the greater the "dose" of religion or spirituality (e.g., the more frequent the attendance at religious services), the greater the physical health response (e.g., the greater the reduction in risk of an event); (d) its consistency or the number of times different studies from different cohorts found the same effect; and (e) whether it had a biologically plausible mechanism.

Results

Hypothesis 1: Church/Service Attendance Protects Against Death

Eleven independent, longitudinal investigations of the relationship between church/service attendance and incidence of mortality were found (Table 2). Of these, all except two (Kutner, Lin, Fielding, Brogan, & Hall, 1994; Pargament, Koenig, Tarakeshwar, & Hahn, 2001) studied healthy populations. Of the nine studies of healthy participants, seven (78%) found a relationship after adjustment for demographic, socioeconomic, and health-related confounders, and six (66.6%) found a relationship after further adjustment for the established risk/protective factors of healthy lifestyle, social support, and depression. The strength of the relationship was, on average, approximately a 30% reduction in mortality after adjustment for demographic, socioeconomic, and health-related confounders and approximately a 25% reduction in mortality after adjustment for established risk factors. This evidence is strengthened by the fact that most of these studies were conducted on representative, population-based samples. Moreover, in two of these investigations (Hummer, Rogers, Nam, & Ellison, 1999; Musick, House, & Williams, in press), a dose–response relationship was found where increasing levels of churchgoing were associated with decreasing risk of mortality. It is worthwhile to note that in the Musick et al. (in press) study, this dose–response rela-

Table 2
Hypothesis 1: Church/Service Attendance Protects Against Death

			Mediated model		Independent model	
Study	Sample	Follow-up (years)	Relative risk	Rating	Relative risk	Rating
Musick, House, & Williams (in press)	3,617 adults[a]	7.5	0.71**	A	0.65**	B
Oman, Kurata, Strawbridge, & Cohen (2002)	6,545 adults[a]	31	0.72****	A	0.83***	B
Pargament, Koenig, Tarakeshwar, & Hahn (2001)	596 elderly patients	2	0.88*	A	—	—
Hummer, Rogers, Nam, & Ellison (1999)	21,204 adults[a]	8	0.72***	A	0.81**	B
Koenig et al. (1999)	3,968 elderly[a]	6.3	0.59**	A	0.72**	A
Oman & Reed (1998)	1,931 elderly	5	0.64**	A	0.76**	A
Krause (1998b)	819 elderly	4	0.88**	A	—	—
Goldman, Korenman, & Weinstein (1995)	7,478 elderly[a]	6	M: $\beta = 0.36$** W: $\beta = 0.35$**	A	—	—
Kutner, Lin, Fielding, Brogan, & Hall (1994)	287 elderly patients[a]	3	log rank (*ns*)	A	—	—
Idler & Kasl (1992)	2,812 elderly[a]	6 (max)	(*ns*)	A	(*ns*)	A
House, Robbins, & Metzner (1982)	2,754 adults[a]	9–12	—	—	M: $\beta = -0.02$ W: $\beta = -0.13$**	B

Note. Dashes indicate that the model was not tested (e.g., Krause [1998b] tested the mediated model but not the independent model). A = conclusive; B = generally sound; M = men; W = women; *ns* = nonsignificant.
[a] Cohort representative of population from which it was drawn.
* $p < .10$. ** $p < .05$. *** $p < .01$. **** $p < .0001$.

tionship occurred only when the suppressing effects of private religious practices were entered into the multivariate model. Because most studies do not control for the suppressing effects of private practices, it is possible that the relationship between attendance and mortality is currently being underestimated and that it is actually stronger than that observed thus far.

Gender was a moderator of this association where it was stronger for women than for men in three studies (House, Robbins, & Metzner, 1982; Koenig et al., 1999; Oman et al., 2002). Publication date was also a moderator where the association was more likely to exist in publications after 1995 than before. The association was equally as likely to be found in the elderly (Koenig et al., 1999; Krause, 1998b; Oman & Reed, 1998) as in younger adult populations (House et al., 1982; Hummer et al., 1999; Musick et al., in press; Oman et al., 2002). In one investigation that examined Gender × Age interactions, a significant interaction was observed where the strongest association was in women ≥ 70 years (RR = 0.72, $p < 0.05$), but the associations for the other three Gender × Age groups were nonsignificant (Oman et al., 2002). The bulk of this evidence was in healthy individuals. In the two studies of patients, church/service attendance had either no effect (Kutner et al., 1994) or an effect that was marginally significant (Pargament et al., 2001).

The mechanisms of this association were studied in an investigation by Strawbridge, Shema, Cohen, and Kaplan (2001). In this longitudinal, community-based study, the investigators tested the relationship between church/service attendance, reported in 1965, and improvement or deterioration in health behaviors, reported in 1994 (e.g., smoking, physical activity, medical checkups, depression, social interactions, and marital status). Weekly church/service attendance was associated with improvement, not deterioration, on most of the physical and mental health behaviors examined, with the results being stronger for women than for men. This suggests that weekly church/service attendance is a vehicle for maintaining and/or improving risk-factor status. However, because a 25% differential between attenders and nonattenders on mortality exists after adjustment for these established risk factors, this mechanism cannot account entirely for the protective benefits.

Hypothesis 2: Religion or Spirituality Protects Against Cardiovascular Disease

Cardiovascular disease includes diseases of the heart (myocardial infarction, angina pectoris), stroke, congenital cardiovascular defects, and congestive heart failure (American Heart Association, 2001). In contrast to the large number of studies of all-cause mortality, there were only four well-designed prospective studies that examined the impact of religion or spirituality on any of the cardiovascular diseases (Table 3). Two studied cardiovascular mortality (Hummer et al., 1999; Oman et al., 2002), one studied coronary heart disease mortality (Goldbourt, Yaari, & Medalie, 1993), and one studied stroke incidence (Colantonio, Kasl, & Ostfeld, 1992).

Oman et al. (2002) and Hummer et al. (1999) conducted similarly designed studies and came up with remarkably similar results. Large, representative samples of American adults were followed over long periods of time (31 years in the Oman et al. study; 8 years in the Hummer et al. study) to determine the relationship between weekly church/service attendance and incidence of cardiovascular mortality. With progressive adjustments for age, gender,

Table 3
Hypothesis 2: Religion or Spirituality Protects Against Cardiovascular Disease

Study	Sample	Follow-up (years)	Predictor	Mediated model		Independent model	
				Relative risk	Rating	Relative risk	Rating
Oman, Kurata, Strawbridge, & Cohen (2002)	6,545 adults[a]	31	Weekly attendance	0.73****	A	0.83**	B
Hummer, Rogers, Nam, & Ellison (1999)	21,204 adults[a]	8	Weekly attendance	0.74***	A	0.86	A
Goldbourt, Yaari, & Medalie (1993)	10,059 adults[a]	23	Religious orthodoxy (includes weekly attendance)	—	—	0.72**	B
Colantonio, Kasl, & Ostfeld (1992)	2,812 elderly[a]	7	Weekly attendance Depth of religiousness Strength & comfort from religion	— — —	—	$\chi^2 = 0.48$ $\chi^2 = 0.05$ $\chi^2 = 0.53$	A

Note. Dashes indicate that the analysis was not done in the particular study. Blank cells in the Rating columns occur because the study examined several different religion variables but the study was only rated once. The different religion variables had their own relative risks. A = conclusive; B = generally sound.
[a] Cohort representative of population from which it was drawn.
** $p < .05$. *** $p < .01$. **** $p < .001$.

education, ethnicity, health status, and social contacts, the RR progressively weakened, but only slightly and nonsignificantly. However, with the addition of healthy lifestyle behaviors, there was a large reduction in the strength of the association. In the Oman et al. study, the RR started at 0.64 ($p < 0.001$) after adjustment for demographic factors, dropped to 0.73 ($p < 0.001$) after adjustment for all other covariates, and then dropped to 0.83 ($p < 0.05$) after further adjustment for healthy lifestyle behaviors. In the Hummer et al. study, the RR started at 0.71 ($p < 0.001$) after adjustment for demographic factors, dropped to 0.74 ($p < 0.01$) after adjustment for all other covariates, and then dropped to 0.86 (*ns*) after further adjustment for healthy lifestyle behaviors. This suggests that the relationship between religion or spirituality and cardiovascular death is, to a large extent, explained by the encouragement that religion or spirituality provides for living a healthier lifestyle.

Goldbourt et al. (1993) studied the impact of religious orthodoxy on coronary heart disease mortality in 10,059 Israeli civil servants over a 23-year follow-up. They found an unadjusted association of 0.69 ($p < 0.05$). After adjustment for confounders and healthy behaviors, this association was weakened but not eliminated (RR = 0.72, $p < 0.05$). Their religious orthodoxy scale included weekly attendance at the synagogue as one of its items, making it difficult to disentangle the effects of attendance from the other religious variables in the index. Because there were no controls for social support or depression, it is not clear whether this observed association was mediated by known cardiovascular risk factors.

Colantonio et al. (1992) studied the impact of several measures of religiousness on incidence of stroke in a community-based study of New Haven, Connecticut, elderly. The only variable that predicted seven-year events in unadjusted analyses was weekly church/service attendance (RR = 0.86, $p < 0.05$). However, this association was relegated to nonsignificance when confounders and established protective factors were adjusted in multivariate models.

In general, these findings suggest that some aspect of religion or spirituality, most likely weekly attendance at church/services, protects against cardiovascular disease and that this benefit may in large part be mediated by the impact of religion or spirituality on the promotion of a healthy lifestyle. Such a lifestyle may translate into benefits on important cardiovascular risk factors such as C-reactive protein (D. E. King, Mainous, & Pearson, 2002). More longitudinal studies of cardiovascular diseases and, in particular, cardiovascular morbidity are needed.

Of particular interest would be an examination of the impact of daily private practices, such as prayer and meditation, on potential cardiovascular outcomes and mechanisms. Some notable cross-sectional examples are beginning to appear in the literature. In a population-based case-control study of prayer and yoga in three districts of rural India, of those who reported praying and practicing yoga regularly, men (OR = 0.28, $p = 0.04$) had a reduction in odds of being a coronary heart disease case, but not women (OR = 2.39, *ns*), both in the unadjusted and adjusted cases (Gupta et al., 1997). A study of rosary prayer and yoga mantras in an Italian population found that these practices caused powerful and synchronous increases in existing cardiovascular rhythms and baroreflex sensitivity (Bernardi et al., 2001). Because prayer and recitation of mantras have a quieting effect that is likely to trigger parasympathetic relaxation, a biologically plausible mechanism for such an association exists.

Hypothesis 3: Religion or Spirituality Protects Against Cancer Mortality

We found only two qualifying studies that examined the impact of some measure of religion or spirituality on cancer mortality (Table 4). Oman et al. (2002) studied a representative sample of 6,545 adults from Alameda County, California, who were followed for 31 years. Weekly church/service attendance was associated with a reduction in cancer mortality in analyses adjusted only for age and sex (RR = 0.78, $p < 0.05$), but this association was relegated to nonsignificance when adjustments were made for preexisting health conditions (RR = 0.83, *ns*) and further adjustments were made for independent risk factors (RR = 0.93, *ns*). Hummer et al. (1999) studied a national probability sample of 21,204 healthy adults and found a marginal

Table 4
Hypothesis 3: Religion or Spirituality Protects Against Cancer Mortality

				Mediated model		Independent model	
Study	Sample	Follow-up (years)	Predictor	Relative risk	Rating	Relative risk	Rating
Oman, Kurata, Strawbridge, & Cohen (2002)	6,545 adults[a]	31	Weekly attendance	0.83	A	0.93	B
Hummer, Rogers, Nam, & Ellison (1999)	21,204 adults[a]	8	Weekly attendance	0.93	A	0.90	B

Note. A = conclusive; B = generally sound.
[a] Cohort representative of population from which it was drawn.

association between weekly church/service attendance and cancer mortality after adjustment for age, sex, and race (RR = 0.88, $p < 0.10$) but no association after further adjustment for preexisting health status (RR = 0.93, *ns*) or after further adjustment for both preexisting health status and independent risk factors (RR = 0.90, *ns*).

In both studies, the researchers conducted a striking comparison of the relationship between weekly church/service attendance and a variety of different causes of death. Some evidence for an association was observed for every cause except cancer. These two studies suggest that any association between religion or spirituality and cancer mortality can be explained by the confounding effects of prior health status. This raises the possibility that the temporal relationship of religion or spirituality and health is reversed in people who are at risk for cancer mortality. That is, those who become sick are then more likely to become religious or spiritual.

Hypothesis 4: Deeply Religious People Are Protected Against Death

Depth of religiousness has been measured in several ways: (a) frequency with which one engages in private religious practices such as prayer or meditation, Bible study, reading religious books, and/or listening to religious programs; (b) a two-item measure assessing depth of religiousness and the extent to which one derives strength and comfort from religion; and (c) a global rating of religiousness assessed as a single item.

Eight studies tested the hypothesis that people who are deeply religious, by any of these definitions, live longer (Table 5). Of these studies, one found an association in the unadjusted case only (Musick et al., in press), two found an association in the mediated model (Janoff-Bulman & Marshall, 1982; Zuckerman, Kasl, & Ostfeld, 1984), and one found an association in the independent model after adjustment for both confounders and established protective factors (Zuckerman et al., 1984). The Zuckerman et al. (1984) study, however, measured depth of religiousness with three items, one of which was frequency of church/service attendance, making it difficult to disentangle the impact of depth of religiousness from that of attendance. Six well-designed studies that included healthy adults, healthy elderly, or elderly patients failed to support this hypothesis in multivariate analyses (Abramson, Gofin, & Peritz, 1982; Helm, Hays, Flint, Koenig, & Blazer, 2000; Idler & Kasl, 1992; Krause, 1998b; Kutner et al., 1994; Musick et al., in press). These findings did not vary by the specific operationalization of depth of religiousness because the measure of private religious practices was used in three of the nonsupportive studies (Helm et al., 2000; Krause, 1998b; Musick et al., in press) and the combined measure of depth of religiousness plus strength and comfort from religion was used in two of the nonsupportive studies (Idler & Kasl, 1992; Kutner et al., 1994). Thus, there is consistency in the failure to support this hypothesis.

Failure to support a global hypothesis encourages exploration of more specific hypotheses. Helm et al. (2000) failed to find an association between frequency of prayer, meditation, or Bible study and mortality in 3,851 elderly participants in the Duke Established Populations for Epidemiologic Studies of the Elderly (EPESE) but did observe an association in the 1,793 participants who were free of functional impairment, after adjustment for confounders and established protective factors (RH = 0.65, $p < 0.05$). This suggests that the effects of prayer and meditation may be more powerful in the prevention of mortality before the overwhelming force of functional impairment sets in.

Hypothesis 5: Religion or Spirituality Protects Against Disability

Table 6 presents three well-controlled, prospective studies of the elderly that tested the relationship between religion (measured as church/service attendance or depth of religiousness) and disability (measured as activities of daily living or institutionalization). Two of these studies were with healthy participants (Goldman, Korenman, & Weinstein, 1995; Idler & Kasl, 1997b), and one was with elderly post-stroke patients (Colantonio, Kasl, Ostfeld, & Berkman, 1993). None of these studies found any relationship between the religious variables and the development of disability.

One of these studies, however, deserves special mention. In the Idler and Kasl (1997b) study of elderly New Haven, Connecticut, residents, the predictive relationship between church attendance assessed in 1982 and lowered risk for disability assessed repeatedly at various annual follow-up exams was, after adjustment for confounders and risk factors, significant at the 3-, 5-, and 6-year follow-up exams but not at the 1-, 2-, 4-, or 12-year follow-up exams. All associations were stronger among the subgroup that was disabled at baseline where significant reductions in risk for further disability were observed repeatedly at the fourth through the seventh annual follow-up exams. A more recent cross-sectional study of 3,851 elderly participants from the Duke EPESE found that those who prayed, meditated, or read the Bible daily had greater physical disability than those who engaged in these practices weekly (Haley, Koenig, & Bruchett, 2001). Although the temporal relationships in this study could not be disentangled, when it is taken together with the Idler and Kasl (1997b) study, the possibility is raised that private religious activity is a response to increasing physical disability.

In summary, the only supportive evidence for the hypothesis that religion or spirituality protects against disability is from one study in which attendance predicted disability inconsistently from one follow-up exam to another. More consistency may be observed if the focus is on those elderly who have preexisting disability. Currently, there is inadequate support for the hypothesis that religion or spirituality protects against disability.

Hypothesis 6: Religion or Spirituality Slows the Progression of Cancer

Six studies examined the impact of religion or spirituality on progression of cancer (defined as survival time) in patients with a variety of types of advanced cancer, including breast, colorectal, and lung cancer (Table 7). In all of

Table 5
Hypothesis 4: Deeply Religious People Are Protected Against Death

Study	Sample	Follow-up (years)	Predictor	Mediated model		Independent model	
				Relative risk	Rating	Relative risk	Rating
Musick, House, & Williams (in press)	3,617 adults[a]	7.5	Read religious books, listen to religious programs	—	—	1.11	B
			Depth of religiousness + strength & comfort	—		1.07	
Helm, Hays, Flint, Koenig, & Blazev (2000)	3,851 elderly[a]	3	Spend time in prayer, meditation, Bible study	—	—	0.93	A
	1,793 unimpaired subgroup	3	Spend time in prayer, meditation, Bible study	—	—	0.65**	
Krause (1998b)	819 elderly	4	Read Bible, listen to religious programs	0.99	A	—	—
Kutner, Lin, Fielding, Brogan, & Hall (1994)	287 elderly patients[a]	3	Depth of religiousness + strength & comfort	—	—	Log rank (*ns*)	A
Idler & Kasl (1992)	2,182 elderly[a]	6 (max)	Depth of religiousness + strength & comfort	(*ns*)	A	—	—
Zuckerman, Kasl, & Ostfeld (1984)	398 poor elderly	2	Depth of religiousness + strength & comfort + church attendance	0.50**	A	$\chi^2 = 8.74$**	B
	129 poor health subgroup	2	Depth of religiousness + strength & comfort + church attendance	0.43***	A	—	
Abramson, Gofin, & Peritz (1982)	387 elderly	5	Religiosity	(*ns*)	B	—	—
Janoff-Bulman & Marshall (1982)	30 elderly patients	2.5	Extent of religious feeling	Wilks lambda = 0.39**	B	—	—

Note. Dashes indicate that the analysis was not done in the particular study. Blank cells in the Rating columns occur because the study examined several different religion variables but the study was only rated once. The different religion variables had their own relative risks. *ns* = nonsignificant; A = conclusive; B = generally sound.
[a] Cohort representative of population from which it was drawn.
** $p < .05$. *** $p < .01$.

these studies except one, no significant univariate associations were observed, and thus, multivariate tests were not conducted. In the sixth study, conducted on 1,957 breast cancer patients (Zollinger, Phillips, & Kuzma, 1984), a significant univariate association between being a Seventh-Day Adventist and survival over 1 to 10 years was observed in the unadjusted case (RR = 0.76, $p < 0.001$) but was relegated to nonsignificance after adjustment for confounders (RR = 1.09, *ns*).

In an excellent case-control study of the relationship between being a Mormon and having a diagnosis of primary cervical carcinoma in Utah women, Gardner, Sanborn, and Slattery (1995) reported a strong, significant, unadjusted association (OR = 0.39, $p < 0.05$), but after controlling for differences in sexual behaviors and smoking between the Mormons and non-Mormons, the association became nonsignificant (OR = 1.22). Further analyses aimed at strengthening this association by examining only the subgroup who attended church frequently did not alter it.

Thus, there is little evidence that religion or spirituality slows the progression of cancer in cancer patients. If an association has been observed, it has been completely accounted for by the salutary risk-factor profiles in those who are religious.

Hypothesis 7: People Who Use Religion to Cope With Difficulties Live Longer

This hypothesis suggests that in the face of difficulties, the use of God or religion to cope will lengthen life. The test of this hypothesis has been to examine the interaction between stress and religious coping in healthy samples. One study was found that bears on this hypothesis (Table 8). Using data from a nationwide survey, Krause (1998b) tested religious coping both as a main effect and as an interaction

Table 6
Hypothesis 5: Religion or Spirituality Protects Against Disability

Study	Sample	Follow-up	Predictor	Mediated model: Relative risk	Mediated model: Rating	Independent model: Relative risk	Independent model: Rating
Idler & Kasl (1997b)	830 elderly[a]	12 years	Attendance, number of people known in congregation	$\beta = -1.21$	A	$\beta = -0.81$	A
			Depth of religiousness, religion as source of comfort	$\beta = -0.84$		$\beta = -0.89$	
Goldman, Korenman, & Weinstein (1995)	2,847 elderly men[a]	6 years	Attendance in last 2 weeks	—	—	$\beta = 0.102$	B
	4,631 elderly women[a]				—	$\beta = 0.108$	
Colantonio, Kasl, Ostfeld, & Berkman (1993)	69 elderly patients who survived stroke	6 weeks	Attendance	—	—	(*ns*)	A
			Depth of religiousness	—		(*ns*)	
			Comfort from religion	—		(*ns*)	

Note. Dashes indicate that the analysis was not done in the particular study. Blank cells in the Rating columns occur because the study examined several different religion variables but the study was only rated once. The different religion variables had their own relative risks. *ns* = nonsignificant; A = conclusive; B = generally sound.
[a] Cohort representative of population from which it was drawn.

effect with life events stress on mortality four years later. He found, after adjustment for confounders, that religious coping was significantly associated with an increase in total mortality when it was examined as a main effect (RR = 1.15, $p < 0.05$) but with a reduction in risk when it was examined in interaction with the occurrence of stressful life events (RR = 0.90, $p < 0.05$). In the 266 participants with lower education, these effects were stronger (main effect: RR = 1.32, $p < 0.05$; interaction effect: RR = 0.75, $p < 0.001$).

Table 7
Hypothesis 6: Religion or Spirituality Slows the Progression of Cancer

Study	Sample	Follow-up (years)	Predictor	Mediated model: Relative risk	Mediated model: Rating	Independent model: Relative risk	Independent model: Rating
Ringdal, Gotestam, Kaasa, Kvinnsland, & Ringdal (1996)	253 patients, hospitalized	2	Religiosity scale	(*ns*)	B	(*ns*)	B
Loprinzi et al. (1994)	1,115 patients with advanced colorectal, lung cancer	2	Religious activity	(*ns*)	B	(*ns*)	B
Kune et al. (1992)	705 patients with colorectal adenocarcinoma	5	Jewish	(*ns*)	B	(*ns*)	B
Zollinger, Phillips, & Kuzma (1984)	1,957 patients with breast cancer	1–10	Seventh-Day Adventists	1.09	A	—	—
Spiegel, Bloom, & Gottheil (1983)	58 patients with metastatic breast cancer	1	Moral/religious orientation	(*ns*)	B	(*ns*)	B
Yates, Chalmer, St. James, Follansbee, & McKegney (1981)	71 patients[a] with advanced cancer	1	Attendance during last month	(*ns*)	B	(*ns*)	B
			Religious Beliefs Index	(*ns*)		(*ns*)	

Note. Dashes indicate that the analysis was not done in the particular study. Blank cells in the Rating columns occur because the study examined several different religion variables but the study was only rated once. The different religion variables had their own relative risks. *ns* = nonsignificant; A = conclusive; B = generally sound.
[a] Cohort representative of population from which it was drawn.

Table 8
Hypothesis 7: People Who Use Religion to Cope With Difficulties Live Longer

Study	Sample	Follow-up (years)	Predictor	Mediated model		Independent model	
				Relative risk	Rating	Relative risk	Rating
Krause (1998b)	819 elderly	4	Religious Coping Index	1.15**	B	—	—
			Religious Coping Index × Stress	0.90	B	—	—
	266 lower education subgroup	4	Religious Coping Index	1.32**	B	—	—
			Religious Coping Index × Stress	0.75****	B	—	—

Note. Dashes indicate that the analysis was not done in the particular study. B = generally sound.
** $p < .05$. **** $p < .001$.

It is worth mentioning that Krause (1998a) also conducted a retrospective study that tested the same interactive model on the same nationally representative sample. In this case, however, the stressor was neighborhood deterioration, and the physical health outcomes were past changes in global self-reported health and past changes in functional disability. He found the interaction between religious coping and stress to be significant for the more subjective outcome of self-reported health but nonsignificant for the more objective outcome of functional disability. This study is weakened by an inability to determine whether the religious coping affected health or health affected the religious coping and has not been considered further.

Thus, there are inadequate data currently to evaluate the hypothesis that the use of religion to cope with difficulties results in a longer life. A viable hypothesis for future studies is that any coping effect of religion or spirituality on physical health may be stronger in people, such as those of lower educational attainment, who have more limited access to coping resources.

Hypothesis 8: Religion or Spirituality Improves Recovery From Acute Illness

Table 9 presents five well-designed investigations that examined the role of some aspect of religion or spirituality on physical recovery from acute illness. In four of these studies, the hypothesized association between religious coping and more favorable physical outcomes in hospitalized patients is not supported (Fitchett, Rybarczyk, DeMarco, & Nicholas, 1999; M. King, Speck, & Thomas, 1999; Koenig et al., 1998; Pargament et al., 2001).

Only one of these five studies found religion or spirituality to be associated with a recovery advantage. Oxman, Freeman, and Manheimer (1995) studied six-month mortality in patients undergoing elective cardiac surgery. A significant association between the single item "strength and comfort from religion" and mortality was observed (OR = 0.31, $p = 0.04$) after adjustment for confounders and established risk factors. However, eight different ways to assess religion and spirituality were tested (five single items, a private religiousness scale, a public religiousness scale, and a total religiousness scale) with no preexisting hypotheses for these repeated attempts and no adjustments for multiple looks. If, for example, the Bonferroni transformation were used to adjust the significance level for the eight attempts to find the association, the cutpoint for significance would be 0.006, thus relegating the observed association of 0.04 to nonsignificance.

In three of the five studies presented in Table 9, religion or spirituality was associated with a poorer recovery from acute illness (Fitchett et al., 1999; M. King et al., 1999; Pargament et al., 2001). Thus, we evaluated the evidence of the opposite hypothesis—that religion or spirituality impedes recovery from acute illness. Two of these studies found that negative religious coping (also called religious struggle—e.g., "feel God has abandoned me"), after adjustment for confounders and established protective factors, was associated with poorer functional ability in medical rehabilitation patients (Fitchett et al., 1999) and with higher two-year mortality in elderly inpatients (Pargament et al., 2001).

The third study (M. King et al., 1999) found that spirituality, measured as a belief in a power apart from one's existence, was associated with poorer nine-month clinical outcome in patients hospitalized in the cardiology or gynecology units (OR = 2.2, $p = 0.03$), after adjustment for an array of demographic, health, social, and emotional factors. The weaknesses of this study are that clinical outcome was rated subjectively but blindly by two of the investigators from medical records and that only 60% of the original participants who were still alive at follow-up were evaluated for outcomes. Its strength is that it was a replication of an earlier pilot project (M. King, Speck, & Thomas, 1994) and relied on a measure of spirituality that had been validated previously (M. King, Speck, & Thomas, 1995).

In general, there have been consistent failures to support the hypothesis that religion or spirituality improves recovery from acute illness, with only one notable exception. In contrast, there is some evidence to support the hypothesis that religion or spirituality impedes recovery.

Table 9
Hypothesis 8: Religion or Spirituality Improves Recovery From Acute Illness

Study	Sample	Follow-up	Predictor	Mediated model		Independent model	
				Relative risk	Rating	Relative risk	Rating
Pargament, Koenig, Tarakeshwar, & Hahn (2001)	596 elderly patients	2 years	Positive religious coping Negative religious coping	(*ns*) 1.05**	A	(*ns*) 1.06**	B
M. King, Speck, & Thomas (1999)	145 patients (cardiac, gynecology)	9 months	Royal Free Interview for Religious and Spiritual Beliefs	—	—	2.2**	B
Fitchett, Rybarczyk, DeMarco, & Nicholas (1999)	96 patients[a] (medical rehabilitation)	4 months	Spiritual injury Positive religious coping Negative religious coping, attendance, number of people known in congregation Depth of religiousness, strength & comfort	— — — —	—	(*ns*) (*ns*) $\beta = -0.229$** (*ns*)	B
Koenig et al. (1998)	262 elderly patients in VA hospital	9–10 years	Religious Coping Index	—	—	(*ns*)	A
Oxman, Freeman, & Manheimer (1995)	232 patients (cardiac)	6 months	Attendance ≥ every few months Number of people known in congregation Depth of religiousness Strength & comfort Religious denomination Religious Index Public religiousness Private religiousness	— — — — — — — —	—	(*ns*) (*ns*) (*ns*) 0.31** (*ns*) (*ns*) (*ns*) (*ns*)	B

Note. Dashes indicate that the analysis was not done in the particular study. Blank cells in the Rating columns occur because the study examined several different religion variables but the study was only rated once. The different religion variables had their own relative risks. *ns* = nonsignificant; A = conclusive; B = generally sound.
[a] Cohort representative of population from which it was drawn.
** $p < .05$.

More studies with strong, rigorous designs are needed in this controversial but important area of research.

Hypothesis 9: Being Prayed for Improves Physical Recovery From Acute Illness

This hypothesis poses a question about the impact of distant intercessory prayer by healers on the recovery of patients with acute illness. It tests, in essence, whether human intention can affect the physical world at a distance. Although a number of studies have tested this hypothesis (see Abbot, 2000; Roberts, Ahmed, & Hall, 2000, for reviews), only three have sufficient rigor for review here (Table 10).

Two studies used similar designs to examine the impact of intercessory prayer on recovery in the coronary care unit (CCU; Byrd, 1988; Harris et al., 1999). In the Byrd (1998) study, 393 CCU patients were randomized either to a control group or to a treatment group that received daily prayers from distant healers. A significantly better hospital course, as rated by a masked abstractor of medical records, was observed for the treated patients, but no difference was observed on the number of days in the CCU or in the hospital. The Harris et al. (1999) study replicated the Byrd study but with a larger sample size of 990 CCU patients. Results were remarkably similar to those of the Byrd study in that the treatment group received a better score on a composite index of hospital course but experienced no difference from the controls in days in the CCU or days in the hospital. Thus, for both studies, the strongest treatment effect was observed only on the most subjective outcome. Moreover, in both studies, treatment was also evaluated using a large number of specific events that occurred after admission (Byrd study: 26 events; Harris et al. study: 34 events). No adjustment for making these multiple comparisons was conducted in either study.

Table 10
Hypothesis 9: Being Prayed for Improves Physical Recovery From Acute Illness

Study	Sample	Follow-up	Intervention	Outcome	Results: Treatment	Results: Control	Rating
Harris et al. (1999)	990 hospitalized patients in CCU	Until hospital discharge	4 weeks of daily intercessory prayer	MAHI CCU course score	6.35**	7.13	B
				"Good" Byrd course score	67.4%	64.5%	
				Days in CCU	1.12	1.23	
				Days in hospital	6.48	5.97	
Sicher, Targ, Moore, & Smith (1998)	40 patients with advanced AIDS	6 months	10 weeks of distant healing	Outpatient visits	9.2***	13.0	B
				Hospitalizations	0.15	0.6	
				Days of hospitalization	0.5	3.4	
				Illness severity	0.8**	2.65	
				AIDS diseases acquired	0.1**	0.6	
				AIDS diseases recovery	0.3	0.1	
				CD4+ change	31.1	55.5	
				Deaths	0	1	
Byrd (1988)	393 hospitalized patients in CCU	Until hospital discharge	Daily prayer until hospital discharge	"Good" Byrd hospital course score	84.8%***	73.1%	B
				Days in CCU	2.0	2.4	
				Days in hospital	7.6	7.6	
				Number of discharge medications	3.7	4.0	

Note. Blank cells in the Rating column occur because the study examined several religion variables but the study was only rated once. MAHI = Mid America Heart Institute; CCU = coronary care unit; B = generally sound; CD4+ = Cluster of Differentiation 4+ (a measure of helper–inducer T lymphocytes).
** $p < .05$. *** $p < .01$.

In the third study (Sicher, Targ, Moore, & Smith, 1998), 40 patients with advanced AIDS were randomized to 10 weeks of distant healing ($n = 20$) or to control. Results indicated that the treated group had lower medical utilization (doctor visits, hospitalizations, and days of hospitalization), fewer new AIDS-defining illnesses, and lower illness-severity scores than did the control group. However, baseline nonequivalence of groups on minority status and smoking status could provide an alternative explanation for results. When differences in minority status were accounted for, the significance of the differences on the medical utilization variables was eliminated.

In all three of these studies, the strongest findings were for the variables that were evaluated most subjectively. This raises concerns about the possible inadvertent unmasking of the outcomes assessors. Moreover, the absence of a clearly plausible biological mechanism by which such a treatment could influence hard medical outcomes results in the inclination to be skeptical of results. Nonetheless, there is some evidence to support the hypothesis that being prayed for improves recovery from acute illness. It is critical to design extremely well-controlled trials that are virtually free of flaws to test this hypothesis rigorously.

Discussion

Religion and/or spirituality could have an impact on physical health as a protective resource that prevents the development of disease in healthy people (tested in Hypotheses 1–5 and 7) and/or as a coping resource that buffers the impact of disease in patients (tested in Hypotheses 6, 8, and 9). Evidence is strongest and most consistent for a protective effect in healthy people, and this support centers largely on the hypothesis that church/service attendance protects against death. Seven independent studies, most of which drew on large, representative populations, found that healthy church/service attenders had approximately a 30% reduction in risk after adjustment for important confounders and a 25% reduction in risk after further adjustment for established risk/protective factors. When cause-specific mortality was examined, this association was largely but not totally accounted for by established risk/protective factors. This suggests that church/service attendance confers some generalized type of protection against mortality.

Studies of the mechanisms by which church/service attendance reduces risk of mortality in healthy individuals beyond that conferred by healthy lifestyle behaviors are needed. Several possibilities exist. Regular church/service attendance may encourage meaningful social roles that provide a sense of self-worth and purpose through the act of helping. This is in contrast to the more common conceptualizations of social support where the emphasis is on being helped. The seminal work of Langer and Rodin (1976) demonstrated that those nursing home residents who were given work responsibilities lived longer than those who were relegated to passive roles. Helping others appears to bolster feelings of personal control and to lower

feelings of depression (Krause, Herzog, & Baker, 1992). Activities that encourage helping, such as volunteerism, are common among congregation members and have been shown to reduce mortality (Musick, Herzog, & House, 1999; Oman, Thoresen, & McMahon, 1999).

Religious social support may be deeper and broader than support obtained in a secular setting. Some have referred to religious support as sacred experiences (Emmons, 1999) or the provision of global meaning of life (Park & Folkman, 1997). Among the most striking examples of this are a congregation's response to personal crises, responses that can include the provision of help with children, financial help, meals, emotional support, and moral support for such virtues as forgiving (Plante & Sherman, 2001).

Regular church/service attendance may be associated with the ongoing experience of positive emotions, not simply with the absence of negative emotions. As Idler and Kasl (1997b) so eloquently described, "Worshiping together with the religious congregation may offer . . . a route, through prayer, or receiving the sacraments, or appreciation of the beauty of the place, to a transcendent state in which the body and its frailties don't matter much" (p. S315). These positive emotions may not be limited to the experience of the service. To the extent that regular Judeo-Christian attenders keep the Sabbath (one of the Ten Commandments), for example, they essentially commit to an entire day of rest (Muller, 1999). The value of habitual periods of rest and rejuvenation as a resistance resource, including meditation and quiet reflection, is understudied.

Frequent church/service attendance may increase the opportunity to observe vicariously yet consistently those who model a variety of positive, hopeful, compassionate, and caring behaviors, attitudes, and beliefs that are highly conducive to living a healthy lifestyle (Bandura, in press; Oman & Thoresen, in press). This social modeling may be especially influential in life situations where there is a lack of exemplars demonstrating positive healthy behaviors, relationships, and beliefs. For example, such models could be particularly helpful in demonstrating calming and compassionate coping in situations in which pain and suffering abound.

Regular church/service attendance may offer a lifeline of resources to those who are most disadvantaged. Although the data are limited, there is the suggestion that church/service attendance provides greater physical health benefits for the more disadvantaged segments of the population when such disadvantage is in the form of poor health (Zuckerman et al., 1984), minority status (Steffen, Hinderliter, Blumenthal, & Sherwood, 2001), low educational attainment (Krause, 1998b), or female gender (Goldman et al., 1995; House et al., 1982; Strawbridge, Cohen, & Shema, 2000). The congregation is a readily accessible community institution that may connect individuals with resources they would not otherwise receive. This broad array of resources is likely to include social connectedness, instrumental support, and a coherent belief system that may allay feelings of isolation, low control, and despair and improve one's sense of self-efficacy (Thoresen & Harris, 2002).

In contrast to the strong and consistent evidence for the link between church/service attendance and mortality, there was little evidence that any measure of depth of religiousness offered similar protection. Repeated tests from eight different investigative teams resulted in repeated failures. The only exception to this was the observation of associations in subgroups identified on a post hoc basis. Problems with the measurement of religious factors, which bias results toward the null hypothesis, cannot be ruled out as an explanation for these null findings.

Interest in the concept of depth of religiousness or intrinsic religiousness (Allport & Ross, 1967) is based on the assumption that church/service attenders are not a homogeneous group but instead comprise those who attend for the purpose of growing spiritually and those who attend for other reasons. If it were possible to identify individuals who conduct their day-to-day activities in ways that are consistent with those virtues that their religions teach, their protection against death might be found to be greater than the 25% observed here. Such individuals may differ from other attenders in their experience of the religious service, their daily activities and interactions with others, and a style of coping with stressors that may translate into health-related processes. Development of more precise conceptualizations of such religious virtues as forgiveness, altruism, hope, prayer, and volunteerism, and of psychometrically sound operationalizations of them, would foster an ability to take this new direction.

The findings for the impact of religion or spirituality on disability were largely negative, with the one notable exception of the New Haven, Connecticut, elderly among whom an association between church/service attendance and lower disability was found in some but not all of the 12 annual follow-ups conducted (Idler & Kasl, 1997b). Perhaps the most important finding in this study is that this association was stronger for the two thirds of the sample who had some level of disability at baseline. For these disabled individuals, religious attendance "appeared to be a kind of lynchpin that connected them to other networks of friends and relatives, to holiday celebrations, and to other social and cultural activities" (Idler & Kasl, 1997b, p. S315). When one considers that attending religious services is an inexpensive but widely available resource in the community, this could be a very cost-effective way to maintain the health of elderly people with disability or chronic diseases.

It is possible that religion or spirituality is more powerful as a coping resource that buffers the impact of disease in patients who are ill than as a resistance resource in healthy people. If this were the case, then it would support the recognition of spiritual counselors as an important part of the medical team, a proposal that has met with considerable controversy. Evidence based on well-controlled empirical studies to date is inadequate to support such an assumption. Studies that have examined the impact of religion or spirituality on recovery from physical illness have failed consistently to find the hypothesized associa-

tion, with one notable exception (Oxman et al., 1995). This does not, however, bear on the issue of the value of spiritual counseling at times of sickness and loss in providing emotional and instrumental support and comfort.

The recovery literature has uncovered a potentially health-limiting effect of religion or spirituality on both death and disability in medical patients. Religious people who become upset by the belief that God has abandoned them or who become dependent on their faith, rather than their medical treatment, for recovery may inadvertently subvert the success of their recovery. It is important for future research to examine such health-limiting aspects of religion or spirituality in patients (Thoresen, Oman & Harris, in press).

The hypothesis that being prayed for improves recovery from illness is perhaps the most controversial in this entire area of research. Among the reasons for this controversy is the lack of any accepted theory available to explain such results (see "Letters to the Editor," 2000). In our opinion, as well as the opinion of others (Dossey, 2000), empirical inquiry should not depend on the fluid state of current knowledge. None of the three studies reviewed have designs that are free of any flaws, but all present suggestive results. Further tests of this hypothesis using strong clinical trial designs with objective outcome measures are needed before any conclusions can be drawn.

To summarize, we conclude that a relationship between religion or spirituality and physical health does exist but that it may be more limited and more complex than has been suggested by others. The robust association between church/service attendance and all-cause mortality in healthy participants weakens when different aspects of religion or spirituality, or different physical health outcomes, are examined. Large voids in this literature exist not only in availability of studies pertinent to specific hypotheses but also in availability of studies of individuals who are not from Judeo-Christian backgrounds. There is no way to estimate the potential impact of the file drawer effect, that is, the impact of unpublished studies on the conclusions drawn from this review. To the extent that these studies were not published because of their negative results, it is possible that they would weaken any conclusions drawn about the positive studies that do exist. Alternatively, it is also possible that the benefits of religion or spirituality on physical health have been underestimated because of such things as imprecise measurement of religion or spirituality and inadequate control for such suppressor variables as private religious practices, both of which have the effect of biasing findings toward the null hypothesis. Clearly, there is a dearth of studies of the impact of spirituality on physical health. Because spirituality not only overlaps religion but is also distinctive from religion, it deserves careful operationalization and study.

Thus, we tend to agree with Sloan et al. (1999) that past reviews may have been overly optimistic, but we clearly disagree with their conclusion that "suggestions that religious activity will promote health are unwarranted" (p. 667). Rather, we think that this conclusion is premature and that the intriguing evidence to date warrants continued and careful investigation.

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