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Attendance at Religious Services and Mortality in a National Sample*

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Research and theory increasingly suggest that attendance at religious services is protective against premature mortality. However, prior studies are limited and do not extensively explore potential explanations for the relationship, especially in terms of religious beliefs and behaviors associated with service attendance. This study estimates the impact of service attendance on mortality in a national probability sample and provides the most extensive empirical examination of potential explanations. Individuals who report attending religious services once a month or more (just over 50 percent of the population) have a 30–35 percent reduced risk of death over a 7.5 year follow-up period after adjusting for potential confounding factors. Consistent with prior research, 20–30 percent of this effect may be explained by better health behaviors (especially physical activity) among regular service attendees. Surprisingly, other religious beliefs and behaviors do not explain, and often tend to suppress, the association between service attendance and mortality.

The idea that religion has beneficial effects for individual well-being has a long history in the social sciences. Both Durkheim ([1915] 1965, [1897] 1951) and Weber ([1915] 1946) noted the potential benefits of religious practice and belief. Several recent reviews (e.g.,

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Koenig, McCollough, and Larson 2001) have found that religious practice is associated with better self-rated health (Koenig et al. 1997), mental health (Idler and Kasl 1997a; Koenig et al. 1997), life satisfaction and happiness (Levin, Chatters, and Taylor 1995), and functional health (Idler and Kasl 1992). Studies assessing the effects of religious beliefs or subjective religiosity have also found positive associations between those variables and well-being (Ellison 1991; Koenig et al. 1992).

However, this literature has important methodological limitations (Sloan et al. 1999; Koenig et al. 2001). First, most of the empirical associations represent cross-sectional associations, many without controls for potentially confounding variables. Second, few have used data from representative national populations. Finally, the conceptualization and measurement of religion has been limited in prior

research (Williams 1994). Typically, only one or two indicators of religious affiliation, activities, or belief are used in any given study, often as a secondary focus. Thus, empirical evidence lags far behind theoretical speculations regarding the associations between religion and health.

The methodologically strongest and most consistent association of religion with health is that between religious service attendance and mortality. One study (Strawbridge, et al. 1997) showed that groups of individuals who attend religious services most frequently had a significantly lower adjusted mortality rate over a 28-year follow-up period. Using a national sample, Hummer et al. (1999) also found a protective effect for attendance. Overall, this set of studies suggests that service attendance is protective against mortality, but only the Hummer study has used a nationally representative probability sample of the full adult population. Further, few studies explore the factors that may help to explain the attendance-mortality relationship. Strawbridge et al. (1997) found that church attendance predicts changes in both health practices (smoking, drinking, weight, and exercise) and social relationships (marital status, group memberships and "close contacts"), and that these variables may account for about 25 percent of the association between attendance and mortality. Replication and extension of these results is needed in nationally representative samples that allow a comprehensive examination of this and other potential mechanisms that link attendance to mortality, such as religious beliefs or private forms of activity. Further, assessments of these effects in various subpopulations are needed to specify under what circumstances service attendance exerts its most powerful effect on mortality.

THEORETICAL BACKGROUND

Selection Factors

Despite accumulating evidence, it remains important to test potential confounding factors that may spuriously produce, or possibly suppress, the attendance-mortality relationship. These are variables that may predict both service attendance and mortality.

Sociodemographic factors. Age, gender, race, and marital status relate to both atten-

dance and mortality. Gender is likely to spuriously increase estimates of the inverse association between attendance and mortality because women are known both to live longer and to be more religious (Beit-Hallahmi and Argyle 1997). In contrast, age and race are likely to suppress the attendance-mortality association, because blacks and older people are both more likely to attend religious services and to die than younger people or whites, respectively (Levin, Taylor and Chatters 1994).

Health. The most plausible source of spuriousness in the relation between service attendance and mortality is health. Healthier people are both less likely to die in a given period and better able to engage in a wide variety of activities, including attending religious services (Ainlay, Singleton, and Swigert 1992; Sloan et al. 1999). Consequently, service attendance might serve as a proxy for health, especially among older adults.

Socioeconomic status (SES). The likely effect of adjustment for socioeconomic status on the attendance-mortality relationship is ambiguous in two ways. First, although lower SES is a major risk factor for ill health and mortality (Lantz et al. 1998), the relationship of SES variables to attendance is less clear. Evidence suggests that higher SES persons are more likely to participate in public religious activities (Beit-Hallahmi and Argyle 1997), while private prayer, doctrinal beliefs and personal religious experiences are inversely related to SES (Stark and Bainbridge 1985). Second, there is some ambiguity as to whether SES variables should be treated as causally prior to or dependent upon religious attendance, though again the available evidence is most consistent with treating SES factors as causally prior, as we do here.

Mediating or Explanatory Factors

If the protective effect of religious attendance on mortality is not spurious, as increasing evidence indicates, then other explanations for it are needed. Prior theory and research suggests some explanatory or mediating factors that are inherently religious and others that are not inherently religious but may be influenced by religion (Idler 1987). First, we consider the "nonreligious" explanations and then turn to the more intrinsically religious explanations.

Health behaviors/or practices. One common explanation is that people who are more religious are more likely to engage in healthy practices or behaviors. Mechanic (1990) suggested that religious beliefs and participation may encourage more general conventionality in beliefs and regularity in behavior that leads to healthy lifestyles. Consistent with this idea, Strawbridge et al. (1997) found that respondents who attended church regularly were more likely to quit smoking. Other evidence has shown that more religious persons have better diets (McIntosh and Shifflett 1984), engage in more physical activity (Idler and Kasl 1997b), and are less likely to abuse drugs and alcohol and have suicidal impulses (Gartner, Larson, and Allen 1991).

Social integration and support. Religious attendance and involvement may also enhance social integration and support by facilitating interaction with others who share common beliefs and values (Idler 1987). Several studies (e.g., Ellison and George 1994) have supported this assertion by showing that more religiously active people report more nonkin ties and more contact with kin and nonkin. In turn, social integration, in a variety of forms, has been shown to have strong effects on mortality, health, and well-being (House, Landis, and Umberson 1988). Religious activity has also been associated with increases in received instrumental and emotional support (Ellison and George 1994). Perhaps more importantly, regular religious service attendance is also associated with greater perceptions of support availability (McIntosh, Silver, and Wortman 1993), which also predicts health and mortality (e.g., Blazer 1982).

Religious roles and volunteering. Public religious activity might also enhance access to meaningful social roles beneficial for individual well-being. Research has shown, for example, that religious activity promotes other prosocial activities, such as volunteering (Wilson and Musick 1997); other evidence has tied this activity to lower mortality rates (Musick, Herzog, and House 1999). Likewise, Moen, Dempster-McClain, and Williams (1989) showed that multiple social roles were protective of mortality for women in a thirty-year follow-up.

Comfort. Some have posited that a primary role of religion is to serve as a source of comfort in times of trouble (see Koenig 1994a). Much of the recent empirical research on reli-

gion and health has focused on this ameliorative function of religion. For example, Koenig, George, and Siegler (1988) found that, among older adults, the most frequently mentioned form of coping behavior involved either trusting in God, prayer, or asking for strength or help from God.

Theodicy. Perhaps the most understudied facet of the religion-health connection is that of theodicy—world views or belief systems that provide individuals a cognitive framework to help interpret, understand, and find meaning in their existence (Berger 1967). Frameworks that enable the individual to understand, manage, and make sense out of adverse situations may reduce the negative effects of stress, and sometimes encourage an active orientation to cope with one's environment (Antonovsky 1979). Among the kinds of beliefs that can be promoted by religion (as well as other systems of thought) are a sense of justice and acceptance (i.e., fatalism) regarding what happens in the world and one's life; beliefs in the existence of an after life, which provides rewards for those who believe in and enter into it; and generally positive feelings about oneself and the world.

A More Proximate Mechanism?

It is also possible that the beneficial health effects of religious service attendance flow more directly from the act of participating in the worship service, rather than the secondary benefits-in activity and belief-that flow from high levels of attendance. Durkheim ([1915/1912] 1965) noted the importance of ritual itself in maintaining the well-being of religious adherents:

From the mere fact that we consider an object worthy of being loved and sought after, it does not follow that we feel ourselves stronger afterward . . . it is not enough that we think of them [the objects]; it is also indispensable that we place ourselves within their sphere of action, and that we set ourselves where we may best feel their influence; in a word, it is necessary that we act and that we repeat the acts thus necessary every time we feel the need of renewing their effects. (p. 464)

In other words, the ritual act is essential in gaining the “. . . impressions of joy, of interior peace, of serenity, of enthusiasm” (p. 464) that may be conducive to living a longer, healthier

life. While the ritualistic attachment to the sacred may be celebrated in private, he argues that these expressions are most powerful when set within a group of like believers.

Health researchers have also indicated that greater attention to the content and context of religious services may identify specific religious rituals that can promote or impair health (Williams 1994). Some suggest, for example, that the rituals of at least some public religious services provide all of the key elements present in formal psychotherapy (Griffith, Young, and Smith 1984). Exposure to religious ritual, architecture, and other symbolism in worship services may engender a range of positive emotional experiences such as empowerment, optimism, forgiveness, and serenity (Williams 1994) that can in turn affect health through immune, endocrine, and other psychophysiological pathways (Ader, Felten, and Cohen 1991).

Moderating Factors

Religious activity should be beneficial for mortality risk, but the magnitude of this benefit may vary based on several factors. Here we consider three such potential moderators: age, gender, and race.

Age. Service attendance and other forms of religious activity may be especially consequential for older people. Koenig (1994a), for example, has argued that religion fills many of the tangible and psychological needs of older adults. For instance, as functional ability declines in later life, older adults can look to other members of the church for needed emotional and instrumental social support (e.g., running errands); and evidence suggests that older adults do receive such support from church members (Taylor and Chatters 1986). Religion also provides coping mechanisms and other psychological benefits to older adults (Koenig 1994a). For those older adults who have recently lost a family member, religion provides the beliefs and rituals that are needed to overcome the loss and maintain well-being. Finally, religion can provide the beliefs necessary to overcome the fear and anxiety associated with impending death. Although religion can provide all of these elements for younger adults as well, the stresses associated with these needs are more prevalent in older adults, and so they likely have greater need for these

benefits. Younger adults may also have more alternative sources of strength and support to draw on in times of need.

Gender. Women are consistently found to regard religion as more important in their lives and to engage in higher levels of religious activity than do men. Hence, it is plausible to expect that the effect of service attendance on mortality should be greater for women than men. This was the case in two community studies on the topic (House et al. 1982; Strawbridge et al. 1997), though a third study found greater effects among men in an elderly, African American sample (Bryant and Rakowski 1992).

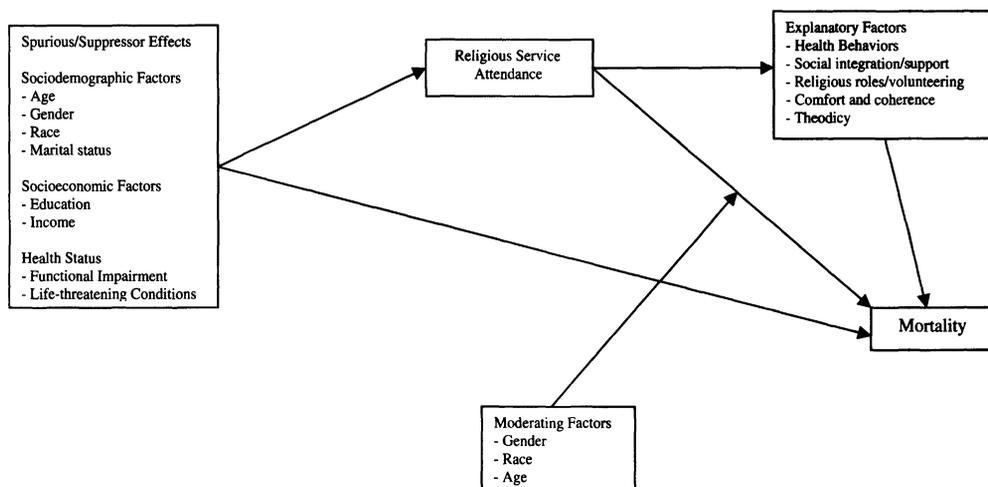
Race. Religion is of special importance in the lives of black Americans in at least two major ways. First, the African American church has historically provided an avenue for status attainment and social integration and support when other paths were blocked due to discrimination or other factors (Lincoln and Mamiya 1990). Recent empirical findings indicate that African Americans derive significant support from fellow church congregants (Taylor and Chatters 1986) and report higher levels of religious activity than whites (Levin, Taylor, and Chatters 1994). Second, Cooper-Lewter and Mitchell (1986) argue that the core beliefs that enable many black Americans to get through day-to-day experiences derive from religion.

Thus, we might expect that the effects of religious activity on health outcomes, including mortality, would be stronger for African Americans than for whites and other non-blacks. Research findings, however, are inconsistent. For example, studies using data from the southeastern United States found either stronger effects of religious activity for whites or no racial differences (e.g., Ellison 1995), while the effects of religious activity on health were strongest among African American respondents in a national sample (Ferraro and Koch 1994).

Hypotheses and Model Specification

We test four hypotheses regarding the relationship between service attendance and mortality, schematically presented in Figure 1. First is the selection effects hypothesis: Any zero-order relationship between service attendance and mortality exists because causal or

FIGURE 1. Hypothesized Model Relating Service Attendance, Prior, Explanatory, and Moderating Variables to Mortality.



temporally prior sociodemographic, socioeconomic, or health predictors are associated in the same way with both service attendance and mortality. Consequently, once those factors are controlled, the effect of attendance should disappear. The second hypothesis is that the effect of service attendance is real and is mediated by one or more of the mechanisms outlined earlier. Once these mechanisms are controlled, the effect for attendance should be substantially reduced or eliminated. The third hypothesis suggests that there is a more proximate association between service attendance and mortality risk that is not mediated by the explanatory factors covered here. That is, even after adjustments for all spuriousness and mediating factors, we should see a direct effect for service attendance on mortality. The final hypothesis is that the effects of service attendance on mortality will be strongest among older adults, women, and African Americans.

METHODS

Data

Data for the study come from the Americans' Changing Lives study (House 1995). The data were collected by the Survey Research Center at the University of Michigan on a stratified, multi-stage, area probability sample of noninstitutionalized persons aged 25 and over and living in the coterminous United

States. African Americans and persons aged 60 and over were sampled at twice the rate of non-African Americans and persons under age 60. Initial face-to-face interviews lasting 86 minutes on average were completed in the homes of 3,617 respondents between May and October of 1986. The response rate was 70 percent among sampled households and 68 percent among sampled individuals. The data are weighted in all analyses to adjust for variations in probabilities of selection and in response rates. All indices used in the analyses were created by taking the standardized mean of the component (standardized) items. Other than mortality, all variables used in the analyses were measured in 1986.

Consistent with current trends in research on survey data with item non-response, we have imputed missing data where needed (Kessler et al. 1995). Across all items used in this paper, the highest fraction of missing data was 1.2 percent, except for income, which was missing for 8.6 percent of respondents. A regression prediction equation was used to impute income; sensitivity analyses showed no substantial differences in the estimates of income's effects based on imputed vs. non-imputed data. Indices with missing data were imputed by assigning the mean of the non-missing items. This procedure is equivalent to an equally weighted regression prediction from the non-missing items, which are strong predictors of missing items in an index. In a small number of cases where the number of missing

items in an index was greater than the number non-missing, the value of the index was imputed using a regression prediction equation involving non-missing items and other variables.

Measures¹

Mortality. All-cause mortality was recorded from mid-1986 through March 1994, yielding a 7.5-year follow-up period. Death information, including date of death, was gathered through informant reports and through the National Death Index. Of the 542 deaths reported, 95.8 percent have also been confirmed through death certificates. The 4.2 percent of reported deaths that have not yet been verified through death certificates have been reviewed carefully (e.g., for age, reports of health, and nature of informant reports) to ensure that death almost certainly occurred.

Service attendance. Respondents were asked how often (from never [1] to more than once a week [6]) they usually attended religious services. In accord with previous research (e.g., Hummer et al. 1999) and our own preliminary analyses that tested for non-linear attendance effects, we recoded attendance into three dichotomous variables: (1) one to three times a month, (2) once a week, and (3) more than once a week. The reference category is attending less than once a month or never.

Sociodemographics and SES. Our sociodemographic and socioeconomic status measures include gender (*female*: 0 = male, 1 = female), race (*black*: 0 = non-black, 1 = black), age (in years), marital status (*married*: 0 = not married, 1 = married), education (in years), and income of respondent and spouse (logged dollars).

Health status. First we include a *functional impairment* index that ranges from (1) confinement to a bed or chair all day to (4) no functional impairment. We have dichotomized the index as follows: (0) no impairment and (1) some impairment. Second, *life-threatening conditions* is a count of the following conditions respondents experienced over the past year: lung disease, heart attack, diabetes, cancer, and stroke.

Health behaviors. We incorporate two health risk factors that have been used in other studies of mortality (e.g., Strawbridge et al.

1997). First, following Berkman and Breslow (1983), we created three dichotomous variables based on the Body-Mass Index (BMI): (1) *overweight* (top 15 percent of the sex-specific BMI distribution), (2) *underweight* (lowest 5 percent of the distribution), and (3) normal weight (the reference). Next, a three-item *physical activity index* reflects how often (from never [1] to often [4]) respondents: (1) work in their garden or yard, (2) engage in active sports or exercise, and (3) take walks. Four dichotomous variables were created based on a quintile split of the index with the lowest quintile serving as the reference group.

Social integration and support. First, *confidants* indicates the number of people with whom respondents can share their very private feelings and concerns. A two-item index of informal *social integration* measures how often (from never [1] to more than once a week [6]) respondents (1) talk on the phone with friends and relatives, and (2) visit with friends and relatives in a typical week. *Subjective social support* ($\alpha = .68$) is a four-item index composed of the following items: how much (from not at all [1] to a great deal [5]) friends and relatives make the respondent (1) feel loved and cared for, (2) are willing to listen to problems or worries, (3) make too many demands, and (4) are critical of respondents or what they do. Variables (3) and (4) were reverse coded to correspond with (1) and (2).

Other religious factors. To indicate the presence of role-taking within the religious setting, we include a measure of volunteering for the church (*volunteer for church*: 1 = done so in the past year, 0 = all others). A two-item index captures the comfort dimension of religiosity (*subjective religiosity/comfort*; $\alpha = .75$; $r = .61$): (1) how often the respondent seeks spiritual comfort and support when faced with personal difficulties and (2) how important religious or spiritual beliefs are in respondents' day-to-day lives. Responses for the first item range from never (1) to almost always (5) and range from not at all important (1) to very important (4) for the second item. A two-item index of *private religious activity* ($\alpha = .67$; $r = .51$) is also included, given the possibility that any effect we observe for attendance may actually be due to the practice of other religious activities, which go hand-in-hand with service attendance for many people. Respondents are asked how often

(from never [1] to more than once a week [6]) they (1) read religious books or other materials and (2) listen to religious programs on television or radio or listen to religious tapes.

*Beliefs.*² We include two measures of belief that are not explicitly religious in content but are linked to much of the religion practiced in the United States (see Rubin and Peplau 1975). *Negative justice* ($\alpha = .62$; $r = .45$) is composed of the following two items: (1) "People who meet with misfortune have often brought it on themselves"; and (2) "By and large, people deserve what they get." *Fatalism* ($\alpha = .77$) is made up of the following items: (1) "When bad things happen, we are not supposed to know why. We are just supposed to accept them"; (2) "People die when it is their time to die, and nothing can change that"; (3) "Everything that happens is a part of God's plan"; and (4) "If bad things happen, it is because they were meant to be." Responses for all the items range from strongly disagree (1) to strongly agree (4).³

Analyses

To test the hypothesized relationships, we regress date of death on the predictor variables using Cox proportional hazards models. We first test the spurious effects hypothesis by examining the effects of service attendance adjusted for the sociodemographic and SES variables in the baseline model plus the health factors in the second. In subsequent models, we test the mediating effects hypothesis by including health behaviors, social integration, other religious factors, and beliefs. Moderating effects are tested by creating cross-product terms between service attendance and race, and gender and age, with each set of cross-product terms entered separately into the main effects model. Finally, because the Americans' Changing Lives data were collected using a complex sampling design, the variances of the estimates in the regression models may be understated if one assumes a simple random sample, as is done in most statistical software. Thus, we adjust for the sampling design effects via Taylor series linearization procedures in SUDAAN (Shah, Barnwell, and Bieler 1997).

RESULTS

Descriptive

Table 1 presents the range, mean, and standard deviation of each variable, along with its associations with mortality and the ordinal six-category attendance variable. Ten percent of the sample died over the 7.5 year follow-up period. The mean for religious service attendance was 3.31, roughly corresponding to attending from once to two or three times a month. A majority of the sample was female (53 percent) and non-black (89 percent). The mean level of education was just above high school, and the mean income for respondent and spouse was \$30,449 per year. A majority of the sample was married (69 percent) and employed (66 percent). In terms of health, 15 percent of the sample reported some functional impairment, and the mean number of potentially life-threatening conditions was less than one. Turning to health risk actors, most of the respondents fell into the broad normal weight range (80 percent), and many respondents reported high (24 percent) or moderately high (24 percent) levels of physical activity. Mean levels for the belief variables hovered about the midpoint on the response scale for each of the items.

A number of variables were associated with attendance. Women, blacks, older adults, those who were married, and those with less education attended more frequently. Similarly, all of the measures of social integration were associated with attendance such that more integration or better relationships were correlated with more frequent attendance. There was almost no zero-order association with health, indicating that attendance was not a function of or proxy for health. However, attendance was associated with a favorable pattern of health behaviors. Attendees were more physically active and less likely to be underweight. Attendees were also less likely to smoke and drink, but those variables did not significantly affect mortality or the relationship between attendance and mortality; thus, they are not considered further here to avoid unnecessary redundancy in analyses and presentation. As one would expect, the religious measures were strongly associated with attendance, as was fatalism.

For mortality, attendance is negatively associated but is not significant. All of the sociode-

TABLE 1. Descriptive Statistics and Zero-order Associations with Mortality and Attendance (n = 3,617)

	Range	Mean	SD	Attendance ^a	Mortality ^b
Mortality	0-1	.10	.30	—	—
Service Attendance	1-6	3.31	1.80	—	—
< 1/month	0-1	.46	.50	—	ref
1-3 times/month	0-1	.16	.37	—	-.06
1/week	0-1	.25	.43	—	-.04
> 1/week	0-1	.13	.33	—	-.03
Sociodemographics and SES					
Female	0-1	.53	.50	.10***	-.13***
Black	0-1	.11	.31	.11***	.05
Age	24-96	47.11	16.45	.01***	.83***
Married	0-1	.69	.46	.09***	-.15***
Education	0-17	12.37	3.14	-.03*	-.31***
Income	2,500-110,000	30449	24043	-.02	-.62***
Health Status					
Functional impairment	0-1	.15	.36	-.02	.39***
Life-threatening conditions	0-3	.18	.49	-.02	.38***
Health Behaviors					
Weight					
Overweight	0-1	.15	.36	-.01	-.01
Underweight	0-1	.05	.22	-.06***	.13***
Normal weight	0-1	.80	.40	ref	ref
Physical Activity					
High	0-1	.24	.42	.09***	-.49***
Medium high	0-1	.24	.43	.10***	-.35***
Medium	0-1	.21	.41	.03	-.28***
Medium low	0-1	.17	.37	.06**	-.17***
Low	0-1	.14	.35	ref	ref
Social Integration					
Confidants	0-4	2.07	1.33	.04**	-.12***
Social integration	-3.07-1.35	.00	1.00	.11***	-.12***
Subjective social support	-1.01-4.12	.00	1.00	.11***	.15***
Religious Factors					
Volunteering for Church	0-1	.24	.43	.52***	-.10**
Private religious activity	-1.99-2.22	.00	1.13	.60***	.12***
Subjective religiosity/comfort	-2.05-1.01	.00	.90	.57***	.08*
Negative justice	-2.23-1.82	.00	1.00	-.01	.17***
Fatalism	-2.29-1.56	.00	1.00	.16***	.23***

* $p < .05$; ** $p < .01$; *** $p < .001$

^a Standardized coefficients from OLS regression of the attendance variable (scored from 1 to 6) on each predictor variable.

^b Standardized coefficients from logistic regression of mortality on each predictor variable.

mographic variables except race were moderately to strongly associated with mortality in the expected directions. The health behaviors, social integration and support, other religious factors, and beliefs were generally significantly correlated with mortality in expected directions. For example, number of confidants and informal social integration were inversely associated with mortality, but subjective social support was positively associated with mortality. Similarly, although those who volunteered for the church were less likely to have died, note that subjective religiosity, private religious activity, and beliefs in negative justice and fatalism were associated with higher mortality risk.

Explanatory Effects

Table 2 presents the hazard rate ratios from the Cox proportional hazards models. According to the hazard rate ratios in the first column, respondents who attended services once a month or more had a significantly lower hazard for mortality compared to those who attended less than once a month or never, with little difference in the hazard among the three levels of regular church attendance. The attendance effects were stronger in Table 2 than in Table 1 because the control variables, primarily age and secondarily race, suppressed these effects.

The second model includes controls for health status. As expected, for both health vari-

TABLE 2. Estimated Net Hazard Risk Ratios for Service Attendance and other Covariates on Mortality (Weighted Cox Proportional Hazards Regression Estimates; n = 3,617)

	Model 1	Model 2	Model 3	Model 4	Model 5
Service attendance					
1–3 times / month	.59**	.68*	.76	.75†	.69*
1 / week	.66**	.72*	.77†	.74†	.65*
> 1/ week	.66*	.74*	.84	.80	.65*
Sociodemographics and SES					
Female	.41***	.40***	.38***	.35***	.33***
Black	1.35*	1.33†	1.30	1.29†	1.21***
Age	1.08***	1.07	1.07***	1.07***	1.07
Married	.94	.89	.93	.93	.91
Education	1.00	1.01	1.02	1.01	1.02
Income (logged)	.69***	.74**	.75**	.74**	.75
Health Status					
Functional impairment		1.84***	1.46*	1.42*	1.40*
Life-threatening conditions		1.28***	1.33***	1.35***	1.34***
Health Behaviors					
Weight					
Overweight			.87	.87	.85
Underweight			1.88**	1.97**	1.94**
Physical Activity					
Medium low			.75	.74	.74
Medium			.65†	.64	.65†
Medium high			.57*	.57**	.56**
High			.36***	.37***	.35***
Social Integration					
Confidants				.95†	.95*
Social integration				1.04	1.04
Subjective social support				1.18*	1.18*
Religious Factors and Beliefs					
Volunteering for Church					1.01
Private religious activity					1.07
Subj. religiosity/comfort					1.09
Negative justice					1.04
Fatalism					1.02
X ² / d.f.	719.77 / 9	764.47 / 11	804.97 / 17	815.05 / 20	820.71 / 25
Pseudo R ²	.17	.17	.18	.18	.18

† $p < .10$; * $p < .05$; ** $p < .01$ *** $p < .001$

Hazard rate ratios are shown.

ables, the ratios indicate that worse health is associated with higher mortality risk. Controlling for health modestly reduced the effect of attendance on mortality, indicating that health is partially producing the attendance-mortality relationship. Yet even after these strong adjustments service attendance remained a significant predictor of mortality.

Next we tested the mediating effects hypothesis by adding measures of health behaviors, social integration, other religious factors, and beliefs into the final three models. According to the hazard rate ratios in model 3, several of the health behaviors variables were significant predictors: Respondents who were underweight or who engaged in little physical activity were at an increased risk of mortality, attributes which were negatively related to church attendance in Table 1. Consequently, the effects of attendance diminished to margin-

al or non-significance after these items were included, lending support to the mediating effects hypothesis in terms of health behaviors.

Of the social integration and support items added in model 4, only the effects of confidants and subjective social support achieved statistical significance. The beneficial effect of confidants was as expected, but respondents who reported higher levels of subjective social support had a greater risk of mortality. This finding is surprising given the amount of research showing the protective effects of social ties (House, Landis, and Umberson 1988), although most prior studies focused on measures of social interaction (e.g., number of relationships, frequency of contact) but not relationship quality. A possible explanation for this finding is that persons reporting more support are those who are in need and hence eliciting support, due to age, health problems, or

other factors. Although we have adjusted for these factors, we are unlikely to capture the full range of mechanisms at work here. Regardless, the inclusion of these items did not substantially affect the hazards for attendance.

The final model includes controls for other religious factors and beliefs. In this model, the attendance effect increased because these other factors were positively related to mortality, though not significantly so. Ancillary analyses not shown here indicate that this increase was primarily due to the suppressing effect of private religious activity: Respondents who scored higher on the private religious activity index were both at a higher risk of mortality and more likely to attend church. It is not surprising but notable that the suppression effects operated more strongly as level of attendance increases, producing the first indication that more frequent attendance may produce more beneficial effects. That is, high levels of attendance (\geq once/week) were more beneficial than moderate levels (1–3 times/month), once we adjusted for levels of private religious activity.

Moderating Effects

Finally, we tested whether gender, race, and age moderated the relationship between service attendance and mortality by adding multiplicative interactions between these and the attendance dummy variables to the final model (model 5) of Table 2. The results of these tests are shown in Table 3, which reports the main effects and interaction effects for each test. Note that all of the variables included in the final model in Table 2 are also adjusted, but not shown, in these analyses.

The results in Table 3 do not fully support our expectations. The interaction effects for gender and race are insignificant, indicating that neither of these factors moderates the effect of attendance on mortality. Age, however, appears to moderate the attendance effect. But contrary to our expectations, the beneficial effects of attendance diminish as age increases. The increase in chi-square from the full main model to the age-interaction model is significant ($\Delta \chi^2 = 14.46$; $\Delta df = 3$; $p < .01$), indicat-

TABLE 3. Estimated Net Hazard Risk Ratios for Service Attendance and Interactions with Gender, Race and Age on Mortality (Weighted Cox Proportional Hazards Regression Estimates; $n = 3,617$)^a

	Model 1	Model 2	Model 3
Main Effects			
Service attendance			
1–3 times/month	.67†	.77	.38
1/week	.62†	.62*	.11*
> 1/week	.56*	.69†	.03*
Female	.31***	—	—
Black	—	1.27	—
Age	—	—	1.06***
Gender Interaction Effects			
Gender x 1–3 times/month	1.07	—	—
Gender x 1/week	1.10	—	—
Gender x > 1/week	1.39	—	—
Race Interaction Effects			
Black x 1–3 times/month	—	.63	—
Black x 1/week	—	1.39	—
Black x > 1/week	—	.75	—
Age Interaction Effects			
Age x 1–3 times/month	—	—	1.01
Age x 1/week	—	—	1.03*
Age x > 1/week	—	—	1.04*
$X^2 / d.f.$	821.65 / 28	824.21 / 28	835.17 / 28
ΔX^2	.94	3.50	14.46
Sig of Δ^b			**

† $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

^a Hazard rate ratios are shown. All models are adjusted for gender, race, age, marital status, socioeconomic status, health status, health behaviors, and religious factors and beliefs.

^b ΔX^2 and corresponding significance levels are calculated based on changes from the final model in Table 2 ($X^2 = 820.71$).

ing that the interaction effects add to the explanatory power of the model.

To provide some sense of the age moderating effect, we divided the sample at age 60 and over and computed the final main effects model for each age group (results available in tabular form upon request). In the younger group (age 25–59), respondents who attended church on a regular basis had a significantly lower hazard rate ratio for mortality compared to those who attended less often. The hazard rate ratio was .12 ($p < .01$) for those attending more than once a week, .27 ($p < .05$) for those attending once a week, and .49 ($p < .10$) for those attending one to three times a month. In comparison, service attendance had no significant effect on mortality in the older group (age 60 and older).

The effect we find for church attendance in the younger group should be interpreted cautiously due to the small base hazard for mortality in that group. Because only 85 people in the younger group died over the follow-up period, small changes in the number of people who died at different levels of attendance could have serious consequences for the estimates shown here. However, the standard errors and significance tests for the younger age group take these properties of the mortality distribution into account, and yet we still find significant results. Nevertheless, we still view the interaction as awaiting replication before we or others make substantial efforts to interpret or explain it.

DISCUSSION

These analyses of national survey data revealed a significant and sizable (mortality hazards reduced by 30–35 percent) protective effect of service attendance on mortality, an effect which approximates that of moderate physical activity, that persisted after adjustment for a range of factors that might spuriously produce or mediate the relationship. Consistent with prior research, the analyses show that several indicators of healthy behaviors or lifestyle, notably physical activity, mediate perhaps 20–30 percent of the protective effect of church attendance, with social relationships and supports adding marginally to that mediation. The results also show that a variety of direct measures of other religious behaviors and beliefs fail to mediate or explain

the predictive association of religious attendance with mortality. Indeed, they moderately suppress the effect of church attendance because many are also associated with a greater risk of mortality.

Finally, tests for moderating effects by gender, race, and age revealed evidence of significant variation only by age, but in an unexpected direction: The effect of service attendance on mortality declined as age increased. Because this result was partly based on a small number of deaths among younger respondents, we viewed it as needing further testing and replication. One study, however, overlaps with this finding by showing slightly stronger beneficial effects of church membership on mortality for respondents in the 38–49 age range compared to those 60 and older (Seeman et al. 1987). If religious involvement affects health by altering health practices and lifestyles in health-enhancing ways, it is plausible that such effects would be more evident during the middle years, the time period during adulthood that holds the greatest potential for preventable deaths. Thus, although this interaction finding is tentative, it merits further research and analysis.

An Attendance Effect?

Why then does attendance at religious services affect mortality? Our evidence and that of prior studies makes the possibility that the effect is spurious highly implausible. Some of our explanatory variables partially mediate the relationship but do not fully explain it. Similarly, other religious behaviors and beliefs provide little or no explanatory power despite being strong correlates of service attendance. Indeed, it appears that these factors tend to suppress the effect of attendance due to their positive associations with mortality. Ancillary analyses showed that among these variables, private religious activity exerted the strongest suppression effect, yet it is unclear why such a relationship exists. As was the case with social support, it is possible that adults who have need of the comfort or interaction provided by private religious activity are in greater need of that comfort due to health conditions or other problematic circumstances. Whatever the rationale for the effect, these findings suggest that failures to adjust for private religious activity and other religious factors may under-

estimate the effect of service attendance on mortality.

Our results also indicate that respondents who attended church once a month or more have lower levels of mortality than non-attendees; yet attending once a week or more is only marginally better in terms of mortality risk. Given this pattern, it is unclear how attachment to the church, even at a low level, makes attendees different from those who have no such attachment.

We see then two major lines of explanation deserving further discussion here and increased attention in future research. First, although the set of potential confounding and mediating variables we consider is greater than in any prior research, there may remain important potential explanatory factors that we did not measure and hence cannot empirically evaluate. Health behaviors were not perfectly assessed, and our indicators of health practices did not capture the more general routinization and moderation of daily patterns of work, play, and family life that may be a critical mechanism by which religion affects health (Mechanic 1990). A more religious variant of the omitted variable problem relates to the central function of religion in providing meaning and purpose to life (Pargament and Park 1995). Some authors have noted the potential importance of these factors for generating well-being (Reker, Peacock, and Wong 1987); consequently, their inclusion might help explain the beneficial effects of attendance on mortality.

One set of omitted variables, personality and mental health, deserves special attention. Given the burgeoning literature on the ties between these factors and mortality, it is important to consider what role they play in the attendance-mortality relationship. Some literature has linked religious factors to these others (see Ellison 1994 for a review), and because we do not control for them here, we may be overstating the effect of service attendance on mortality.

Although the Americans' Changing Lives does not contain all of the possible measures that could be included in this area, it does contain several such multi-item indices: neuroticism, extroversion, self-esteem, self-efficacy, and depression. To determine whether these measures were partly responsible for the effect of attendance, we entered these indices into the final model shown in Table 2. We found that the personality and mental health variables did

not mediate the effect of attendance. Although several (i.e., extroversion, neuroticism, depression) were related to service attendance, none was a significant predictor of mortality.

These ancillary analyses, however, do not preclude the possibility that other unmeasured personality factors may mediate the association. Other possibly important factors that we cannot control are hopelessness, optimism, anger/hostility, and forgiveness. These factors have been linked to both health and religious factors (Barefoot et al. 1991; Carver et al. 1993; Dull and Skokan 1995; Everson et al. 1996; Koenig 1994b; Pingleton 1989; Scheier and Carver 1987) and deserve attention in future research on service attendance and health.

Second, we must consider whether there are special attributes of attendance at religious services per se that are protective against mortality. Services almost always involve some form of activity on the part of the congregant, including singing hymns, taking communion, or in some more sect-like denominations, speaking in tongues or spontaneously contributing to the service through music or dance. In these ways, individuals not only attend religious services, they also help produce them, and in so doing, might find their well-being enhanced. One possible explanation of these beneficial effects resides in role theory: When individuals undertake and successfully act in ways prescribed by their roles, their self-concept and sense of well-being are reinforced (George 1993). Given that religious identity is a pivotal one for many, acting in prescribed ways within religious settings may be especially conducive to well-being. Moreover, because the activity is done in conjunction with others, self-identity is further reinforced through the approval granted by others performing the activity. In other words, the social reinforcement of performing an activity granted by fellow attendees who are performing the same activity may further buttress the positive self-appraisals that come from that activity.

Besides activity in services, religious adherents can undertake other duties such as singing in the choir or serving as an usher that might further reinforce their sense of self in the religious setting. Future research should consider whether these specific religious roles (e.g., choir member, deacon) have effects over and above those provided by attending services. Although we used a measure of volunteering

for the church in our study, it is unclear whether that measure has adequately captured these religious roles.

Finally, it is also possible that for many congregants the church serves as a modern day "village." Durkheim ([1897] 1951) emphasized the importance of close-knit communities for maintaining the well-being of individuals in both the personal and social realms. Given the movement of American adults into more disjointed physical communities, such as urban and suburban areas, geographical "villages" or close-knit groups are often hard to find. Individuals can recreate these kinds of groups by joining clubs or service organizations, participating in organized sports, or doing other community activities. However, the church embodies the village idea in a much broader way. Members of religious institutions share a common set of beliefs, meet regularly, share a common commitment to help other members if needed, provide and enforce a framework for acceptable behavior, and work to maintain the overall functioning of the group through volunteer activities and contributions. In short, the investments made by individuals into this collective community imbue it with a significance that is larger than the accumulation of individuals within the group. Perhaps it is the community itself that provides beneficial effects for those who regularly interact with it. To empirically assess these collective properties of religion would be a challenge; nevertheless, it is one that we must meet if we are to understand fully how and why attendance at religious services has the power to extend the length of life.

NOTES

1. Earlier stages of this project included a number of other measures that were not used in the final models. These additional factors included employment status, self-rated health, additional health conditions, smoking, alcohol consumption, network size, attendance at meetings, and religious affiliation. Additional measures of justice and beliefs in the afterlife were included in earlier drafts but also rejected. Some of these factors exerted a significant effect on mortality; however, none of these factors had any discernable effect on the associa-

tion between service attendance and mortality.

2. The "God's plan" item is the only explicitly religious item in the theodicy and beliefs index. Consequently, we replicated our analyses with that item removed from the index. Results were essentially unchanged, suggesting that the explicitly religious item and the other items are tapping a single underlying belief system that probably has a religious base for most people.
3. We also considered the possibility that respondents' religious affiliations could be associated with the risk of mortality, and, as such, affect any relationship we observe between religious activity and mortality. In preliminary analyses we inserted dichotomous indicators of religious affiliation (i.e., conservative Protestant, moderate Protestant, liberal Protestant, Catholic, and other versus none) and found no effects.

REFERENCES

- Ader, Robert, David L. Felten, and Nicholas Cohen eds.. 1991. *Psychoneuroimmunology*. 2d ed. San Diego, CA: Academic Press.
- Ainlay, Stephen C., Royce Singleton, Jr., and Victoria L. Swigert. 1992. "Aging and Religious Participation: Reconsidering the Effects of Health." *Journal for the Scientific Study of Religion* 31:175-88.
- Antonovsky, Aaron. 1979. *Health, Stress and Coping*. San Francisco, CA: Jossey-Bass.
- Barefoot, John C., Bercedis L. Peterson, W. Grant Dahlstrom, Ilene C. Siegler, Norman B. Anderson, and Redford T. Williams. 1991. "Hostility Patterns and Health Implications: Correlates of Cook-Medley Hostility Scale Scores in a National Survey." *Health Psychology* 10:18-24.
- Beit-Hallahmi, Benjamin and Michael Argyle. 1997. *The Psychology of Religious Behaviour, Belief and Experience*. New York: Routledge.
- Berger, Peter L. 1967. *The Sacred Canopy: Elements of a Sociological Theory of Religion*. New York: Doubleday.
- Berkman, Lisa F. and L. Breslow. 1983. *Health and Ways of Living*. New York: Oxford University Press.
- Blazer, Dan G. 1982. "Social Support and Mortality in an Elderly Community Population." *American Journal of Epidemiology* 115:684-94.
- Bryant, Sharon and William Rakowski. 1992. "Predictors of Mortality among Elderly African Americans." *Research on Aging* 14:50-67.
- Carver, Charles S., Christina Pozo, Suzanne D.

- Harris, Victoria Noriega, Michael E. Scheier, David S. Robinson, Alfred S. Ketcham, Frederick L. Moffat, Jr., and Kimberley C. Clark. 1993. "How Coping Mediates the Effect of Optimism on Distress: A Study of Women with Early Stage Breast Cancer." *Journal of Personality and Social Psychology* 65:375-90.
- Cooper-Lewter, Nicholas and Henry H. Mitchell. 1986. *Soul Theology: The Heart of American Black Culture*. San Francisco, CA: Harper and Row Publishers.
- Dull, Valerie T. and Laurie A. Skokan. 1995. "A Cognitive Model of Religion's Influence on Health." *Journal of Social Issues* 51:49-64.
- Durkheim, Emile. [1897] 1951. *Suicide: A Study in Sociology*. New York: The Free Press.
- Durkheim, Emile. [1915] 1965. *The Elementary Forms of the Religious Life*. New York: The Free Press.
- Ellison, Christopher G. 1991. "Religious Involvement and Subjective Well-Being." *Journal of Health and Social Behavior* 32:80-99.
- . 1994. "Religion, the Life Stress Paradigm, and the Study of Religion." Pp. 78-121 in *Religion in Aging and Health: Theoretical Foundations and Methodological Frontiers*, edited by Jeffrey S. Levin. Thousand Oaks, CA: Sage Publications.
- . 1995. "Race, Religious Involvement and Depressive Symptomatology in a Southeastern U.S. Community." *Social Science and Medicine* 40:1561-72.
- Ellison, Christopher G. and Linda K. George. 1994. "Religious Involvement, Social Ties, and Social Support in a Southeastern Community." *Journal for the Scientific Study of Religion* 33:46-61.
- Everson, Susan A., Debbie E. Goldberg, George A. Kaplan, Richard D. Cohen, Eero Pukkala, Jaakko Tuomilehto, and Jukka T. Salonen. 1996. "Hopelessness and Risk of Mortality and Incidence of Myocardial Infarction and Cancer." *Psychosomatic Medicine* 58:113-21.
- Ferraro, Kenneth F. and Jerome R. Koch. 1994. "Religion and Health among Black and White Adults: Examining Social Support and Consolidation." *Journal for the Scientific Study of Religion* 33:362-75.
- Gartner, John, Dave B. Larson, and George D. Allen. 1991. "Religious Commitment and Mental Health: A Review of the Empirical Literature." *Journal of Psychology and Theology* 19:6-25.
- George, Linda K. 1993. "Sociological Perspectives on Life Transitions." *Annual Review of Sociology* 19:351-71.
- Griffith, Ezra, John Young, and Dorothy Smith. 1984. "An Analysis of the Therapeutic Elements in a Black Church Service." *Hospital and Community Psychiatry* 35:464-69.
- House, James S. 1995. *Americans' Changing Lives: Waves I and II, 1986 and 1989*. Ann Arbor, MI: Inter-university Consortium for Political and Social Research.
- House, James S., Karl R. Landis, and Debra Umberson. 1988. "Social Relationships and Health." *Science* 241:540-45.
- House, James S., Cynthia Robbins, and Helen L. Metzner. 1982. "The Association of Social Relationships and Activities with Mortality: Prospective Evidence from the Tecumseh Community Health Study." *American Journal of Epidemiology* 116:123-40.
- Hummer, Robert A., Richard G. Rogers, Charles B. Nam, and Christopher G. Ellison. 1999. "Religious Involvement and U.S. Adult Mortality." *Demography* 36:273-85.
- Idler, Ellen L. 1987. "Religious Involvement and the Health of the Elderly: Some Hypotheses and an Initial Test." *Social Forces* 66:226-38.
- Idler, Ellen and Stanislav V. Kasl. 1992. "Religion, Disability, Depression, and the Timing of Death." *American Journal of Sociology* 97:1052-79.
- . 1997a. "Religion among Disabled and Nondisabled Persons I: Cross-sectional Patterns in Health Practices, Social Activities, and Well-being." *Journal of Gerontology: Social Sciences* 52:S294-S305.
- . 1997b. "Religion among Disabled and Nondisabled Persons II: Attendance at Religious Services as a Predictor of the Course of Disability." *Journal of Gerontology: Social Sciences* 52:S306-S315.
- Kessler, Ronald C., Roderick J. A. Little, and Robert M. Groves. 1995. "Advances in Strategies for Minimizing and Adjusting for Survey Nonresponse." *Epidemiologic Reviews* 17:192-204.
- Koenig, Harold G. 1994a. *Aging and God: Spiritual Pathways to Mental Health in Midlife and Later Years*. New York: Haworth Pastoral Press.
- . 1994b. "Religion and Hope for the Disabled Elder." Pp. 18-51 in *Religion in Aging and Health: Theoretical Foundations and Methodological Frontiers*, edited by Jeffrey S. Levin. Thousand Oaks: Sage.
- Koenig, Harold G., Harvey J. Cohen, Dan G. Blazer, Carl Pieper, Keith G. Meador, Frank Shelp, Veeraindar Goli, and Bob DiPasquale. 1992. "Religious Coping and Depression among Elderly, Hospitalized Medically Ill Men." *American Journal of Psychiatry* 149:1693-1700.
- Koenig, Harold G., Linda K. George, and Ilene C. Siegler. 1988. "The Use of Religion and Other Emotion-regulating Coping Strategies among Older Adults." *The Gerontologist* 28:303-10.
- Koenig, Harold G., Judith C. Hays, Linda K. George, Dan G. Blazer, David Larson, and Lawrence R. Landerman. 1997. "Modeling the Cross-sectional Relationships between Religion, Physical Health, Social Support, and Depressive

- Symptoms." *The American Journal of Geriatric Psychiatry* 5:131-44.
- Koenig, Harold G., Michael E. McCollough, and David B. Larson. 2001. *Handbook of Religion and Health*. New York: Oxford University Press.
- Lantz, Paula M., James S. House, James M. Lepkowski, David R. Williams, Richard P. Mero, and Jieming Chen. 1998. "Socioeconomic Status, Health Behaviors, and Mortality: Results from a Nationally-Representative Prospective Study of U.S. Adults." *Journal of the American Medical Association* 279:1703-08.
- Levin, Jeffrey S., Linda M. Chatters, and Robert J. Taylor. 1995. "Religious Effects on Health Status and Life Satisfaction among Black Americans." *Journal of Gerontology: Social Sciences* 50:S154-S163.
- Levin, Jeffrey S., Robert Joseph Taylor, and Linda M. Chatters. 1994. "Race and Gender Differences in Religiosity among Older Adults: Findings from Four National Surveys." *Journal of Gerontology: Social Sciences* 49:S137-S145.
- Lincoln, C. Eric and Lawrence H. Mamiya. 1990. *The Black Church in the African American Experience*. Durham, NC: Duke University Press.
- McIntosh, Daniel N., Roxane Cohen Silver, and Camille B. Wortman. 1993. "Religion's Role in Adjustment to a Negative Life Event: Coping with the Loss of a Child." *Journal of Personality and Social Psychology* 65:812-21.
- McIntosh, William Alex and Peggy A. Shifflett. 1984. "Dietary Behavior, Dietary Adequacy, and Religious Social Support: An Exploratory Study." *Review of Religious Research* 26:158-75.
- Mechanic, David. 1990. "Promoting Health." *Society* 27:16-22.
- Moen, Phyllis, Donna Dempster-McClain, and Robin M. Williams, Jr. 1989. "Social Integration and Longevity: An Event History Analysis of Women's Roles and Resilience." *American Sociological Review* 54:635-47.
- Musick, Marc A., A. Regula Herzog, and James S. House. 1999. "Volunteering and Mortality among Older Adults: Findings from a National Sample." *Journal of Gerontology: Social Sciences* 54B:S173-S180.
- Pargament, Kenneth I. and Crystal L. Park. 1995. "Merely a Defense? The Variety of Religious Means and Ends." *Journal of Social Issues* 51:13-32.
- Pingleton, Jared P. 1989. "The Role and Function of Forgiveness in the Psychotherapeutic Process." *Journal of Psychology and Theology* 17:27-35.
- Reker, Gary T., Edward J. Peacock, and Paul T. P. Wong. 1987. "Meaning and Purpose in Life and Well-Being: A Life-Span Perspective." *Journal of Gerontology* 42:44-49.
- Rubin, Zick and Letitia Anne Peplau. 1975. "Who Believes in a Just World?" *Journal of Social Issues* 31:65-89.
- Scheier, Michael F. and Charles S. Carver. 1987. "Dispositional Optimism and Physical Well-Being: The Influence of Generalized Outcome Expectancies on Health." *Journal of Personality* 55:169-210.
- Seeman, Teresa E., George A. Kaplan, Lisa Knudsen, Richard Cohen, and Jack Guralink. 1987. "Social Network Ties and Mortality among the Elderly in the Alameda County Study." *American Journal of Epidemiology* 126:714-23.
- Shah, Babubhai V., Beth G. Barnwell, and Gayle S. Bieler. 1997. *SUDAAN User's Manual, Release 7.5*. Research Triangle Park, NC: Research Triangle Institute.
- Sloan, R.P., E. Bagiella, and T. Powell. 1999. "Religion, Spirituality and Medicine." *The Lancet* 353:664-67.
- Stark, R. and W. S. Bainbridge. 1985. *The Future of Religion*. Berkeley: University of California Press.
- Strawbridge, William J., Richard D. Cohen, Sarah J. Shema, and George A. Kaplan. 1997. "Frequent Attendance at Religious Services and Mortality Over 28 Years." *American Journal of Public Health* 87:957-61.
- Taylor, Robert Joseph and Linda M. Chatters. 1986. "Church-based Informal Support among Elderly Blacks." *The Gerontologist* 26:637-42.
- Weber, Max. [1915] 1946. "Religious Rejections of the World and Their Directions." Pp. 323-59 in *From Max Weber: Essays in Sociology*, edited by in H.H. Gerth and C. Wright Mills. New York: Oxford University Press.
- Williams, David R. 1994. "The Measurement of Religion in Epidemiologic Studies." Pp. 125-48 in *Religion in Aging and Health: Theoretical Foundations and Methodological Frontiers*, edited by Jeffrey S. Levin. Thousand Oaks, CA: Sage Publications.
- Wilson, John and Marc A. Musick. 1997. "Who Cares? Towards an Integrated Theory of Volunteer Work." *American Sociological Review* 62:694-713.

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