Religious Attendance Increases Survival by Improving and Maintaining Good Health Behaviors, Mental Health, and Social Relationships

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ABSTRACT

Several recent prospective analyses involving community-based populations have demonstrated a protective effect on survival for frequent attendance at religious services. How such involvement increases survival are unclear. To test the hypothesis that religious attendance might serve to improve and maintain good health behaviors, mental health, and social relationships, changes and consistencies in these variables were studied between 1965 and 1994 for 2,676 Alameda County Study participants, from 17 to 65 years of age in 1965, who survived to 1994. Measures included smoking, physical activity, alcohol consumption, medical checkups, depression, social interactions, and marital status. Those reporting weekly religious attendance in 1965 were more likely to both improve poor health behaviors and maintain good ones by 1994 than were those whose attendance was less or none. Weekly attendance was also associated with improving and maintaining good mental health, increased social relationships, and marital stability. Results were stronger for women in improving poor health behaviors and mental health, consistent with known gender differences in associations between religious attendance and survival. Further understanding the mechanisms involved could aid health promotion and intervention efforts.

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INTRODUCTION

Interest among social scientists in examining relations between religiousness and mortality goes back over a century to the pioneering work of Emile Durkheim (1). In recent years, public health scientists have added to the literature in this topic by focusing on the effects of attendance and religious beliefs on health outcomes, such as all-cause mortality and survival, following surgery (2–9). The results of these and similar studies, however, were recently questioned on methodological grounds including lack of longitudinal designs, confusion of religious involvement with affiliation, and failure to adjust for potentially confounding variables like health conditions and health behaviors (10).

In 1997, we published an analysis of the impact of weekly religious attendance on mortality utilizing 28 years of data from the Alameda County Study (11). Our methodology involved a community sample, longitudinal design, as well as adjustments for affiliation, health conditions, health behaviors, and social relationships. Further, we used the time-dependent covariate option with proportional hazards modeling to take into account changes in predictor and adjustment variables during the course of the 28-year follow up. Weekly attenders had lower mortality rates than those who attended less or not at all (relative hazard [RH] = 0.64; 95% confidence interval [CI] = 0.53, 0.77. Results were stronger for women. Adjustments for health conditions had little impact, but the relation was reduced with adjustments for health behaviors and social relationships (RH = 0.77; 95% CI = 0.64, 0.93). In the last 2 years, three other American studies have reported similar findings also using community-based samples, prospective analyses, and extensive adjustments for likely confounders (12–14). Of these, only the Koenig et al. (14) study reported results separately by gender, confirming the gender difference reported in our earlier study.

There appears to be a substantial body of evidence to support an association between frequency of attendance at religious services and mortality, as well as some evidence that the association is stronger for women than for men. The question now is, How does attendance at religious services promote survival?

On some characteristics, such as ethnicity (Black) and age (older), frequent attenders of religious services have characteristics associated with higher levels of mortality, whereas on others (gender), the reverse is true (15,16). A similar mixed picture exists for health characteristics (11,17,18). It seems clear that persons who frequently attend religious services report a higher prevalence of good health behaviors, particularly not smoking, not drinking excessively, and being more involved in networks

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of individuals and community groups (11,17,19–21). It is not clear whether religious organizations attract persons who already have these characteristics or whether their establishment and maintenance are enhanced through attendance itself.

In our earlier study, we indicated that weekly attenders of religious services who had poor health behaviors, like smoking, drinking excessively, and not exercising, were more likely than those attending less frequently to improve those behaviors over time. However, we examined neither the issue of maintenance of good health behaviors nor mental health or preventive health care. We also did not examine possible gender differences. In the analyses reported here, we examine the extent to which religious attendance is associated with both improving poor health behaviors and maintaining good ones already established. We include receiving preventive medical checkups as one of the health behaviors and examine associations between frequency of religious attendance and both depression and social relationships. Because of the stronger impact of religious attendance on survival for women, we examine results both in statistical models with gender included as a covariate and in gender-specific models.

METHOD

Alameda County Study

Begun in 1965, the Alameda County Study has assessed and tracked behaviors and health outcomes of 6,928 adults age 17 to 95 at baseline for over 3 decades (22). Alameda County is a large, urban county located on the east of San Francisco Bay; it includes the cities of Oakland and Berkeley. Participants were initially selected by a randomized household survey; follow ups occurred in 1974, 1983, 1994, and 1995, with response rates ranging from 86% to 97%. Participants are tracked regardless of age, health, or subsequent location.

Participants

The analyses reported here are based on 2,676 participants, 17 to 65 years of age in 1965, who took part in both the 1965 baseline and 1994 follow-up surveys and who had complete data on attendance at religious services and all adjustment variables. Participants with missing data on individual health behaviors, mental health, or social relationships were omitted from specific statistical models where the missing values occurred; such deletions were minor and ranged from 14 (smoking) to 55 (physical activity). The sample was 57% women and 43% men. Minorities included 8% African Americans, 3% Asian Americans, 2% Hispanics, and 2% other minorities. Baseline religious affiliation was as follows: 52% Protestant, 28% Catholic, 4% Jewish, 3% other, and 13% no affiliation. Religious attendance included weekly (26%), monthly (23%), yearly (28%), and never (23%). Women were more likely than men to attend services weekly (30% vs. 22%; $p \leq .01$ using a chi-square test).

Measures

Religious attendance. Participants were asked how often they attended religious services; for the analyses reported here, those attending weekly were compared with those attending less than weekly or not at all.

Smoking. Respondents were asked whether they were current smokers, were former smokers, or had never smoked cigarettes.

Physical activity. Physical activity included the frequency (often, sometimes, never) of four different activities: swimming, taking long walks, doing physical exercises, or taking part in active sports. Those reporting doing any of the four activities often were compared with those doing all of the activities only sometimes or never.

Alcohol consumption. Scoring for heavy drinking was based on previous analyses using the Alameda County Study data set and involved more than 45 drinks per month (heavy drinking) versus fewer or none (23).

Medical checkups. Participants were scored as having a medical checkup if they reported going to a doctor in the past year for a general checkup even though they "were feeling well and had not been sick."

Mental health. Depression was measured by a score of 5 or more on the 18-item scale of depressive symptoms developed by Roberts and O'Keefe (24). This scale contains a similar set of symptoms to both the Center for Epidemiological Studies Depression Scale and the Beck Depression Inventory (25–27).

Social involvement. Number of friends and relatives seen each month was used (scored as three or more vs. fewer).

Marriage. For those not married in 1965, stable marriage was defined as becoming married and not divorcing or separating by 1994. For those married in 1965, stable marriage was defined as staying married over the follow-up period and not divorcing or separating. In both cases, becoming widowed was included in the stable category.

Adjustment variables. Age was measured in whole years, education as 12 years or more of school versus less, and self-reported health as fair or poor versus good or excellent. This last variable was included because separate analyses not shown here indicated a strong association between it and subsequent health behaviors.

Data Analysis

To assess baseline differences by religious attendance in health behaviors, mental health, and social relationships, chi-square tests were used to compare unadjusted prevalences of each of the variables by level of religious attendance in 1965. Logistic regression was used to assess associations between 1965 religious attendance and establishment of good health behaviors, no longer being depressed, increasing social relationships, and becoming married by 1994 for those in 1965 who

were engaging in poor health behaviors, experiencing depression, having few social relationships, or not married. Maintenance of good characteristics was assessed by analyzing the extent to which 1965 religious attendance protects against the adoption of poor health behaviors, becoming depressed, decreasing social relationships, and becoming divorced or separated between the two periods for those with good characteristics in 1965. Separate models were run for each outcome.

All adjustment variables were included in each statistical model. Gender differences in outcomes were assessed by adding Gender × Attendance interaction terms. Statistical analyses were performed with the use of SAS® 6.12 software (28).

RESULTS

Baseline differences in health behaviors, mental health, and social relationships for weekly religious attendance compared with less or none are shown in Table 1. There were no statistically significant differences by attendance level for often being physically active, not being depressed, or being married. The prevalences for the other four health variables were all higher for weekly attenders. Particularly striking is the higher prevalence rate associated with weekly religious attendance for not smoking.

Improvements in health behaviors, mental health, and social relationships associated with weekly religious attendance are shown in Table 2. The first set of odds ratios includes both men and women with an adjustment for gender; the other two columns present gender-specific results using the gender interaction terms. The odds ratios compare the likelihood of improvement for each of the outcomes between 1965 and 1994 for those with weekly attendance in 1965 compared with those attending less or not at all.

For both genders combined, weekly attendance was associated with a statistically significant improvement in quitting smoking, becoming often physically active, becoming not depressed, increasing the number of individual personal relationships, and getting married. There was no attendance effect associated with stopping heavy drinking when both men and women were included, but there was a statistically significant association for women in the gender-specific model. No associations were indicated in any model for starting medical checkups.

Comparing the gender-specific results in Table 2 reveals that the odds ratios associated with weekly attendance were higher for women for each of the outcomes. Based on the interaction tests, however, the only gender differences that were statistically significant were stopping heavy drinking ($p \leq .05$) and stopping being depressed ($p \leq .03$). Results of the interaction tests for quitting smoking and often becoming physically active were $p \leq .14$ and $p \leq .16$, respectively.

Table 3 presents the analyses examining the extent to which religious attendance protects against the adoption of poor health behaviors, becoming depressed, decreasing social relationships, and becoming divorced or separated. All the odds ratios are below 1 (indicating protective effects), but only three are statistically significant: stopping medical checkups, reducing individual relationships, and becoming divorced or separated. The relatively strong protective effect indicated for starting to smoke cigarettes (odds ratio = 0.55) is not statistically significant partly because of the very small number of participants (43) who started smoking for the first time between the two periods. With a 95% confidence interval of 0.55 to 1.05, the protective effect of attendance on not becoming depressed is of borderline statistical significance. Unlike the results from Table 2, the observed gender differences are not consistent, and none were statistically significant at $p \leq .05$.

TABLE 1
Health Behaviors, Mental Health, and Marital Status Associated With Weekly Religious Attendance at Baseline

	Prevalence by 1965 Attendance	
Characteristic	*Weekly (%)*	*Less (%)*
Nonsmoker**	74	53
Often physically active	39	42
Does not drink heavily**	92	84
Had medical checkup in last year**	58	50
Not depressed	90	88
Sees three or more friends/ relatives monthly*	73	68
Married	83	80

Note. $N = 2,676$.
*$p \leq .05$. **$p \leq .001$ using a chi-square test for attendance difference.

DISCUSSION

These results support the argument that one of the means by which people who frequently attend religious services evidence increased longevity is by improving poor health behaviors, mental health, and social relationships as well as maintaining good ones. Over nearly a 30-year period, those attending services weekly were more likely than those attending less or not at all to both establish good health behaviors not already being performed and to maintain ones already established. They were also more likely to cease being depressed, increase social relationships, and initiate and maintain stable marriages. However, religious attendance appeared to have a stronger impact on improving poor health behaviors than on maintaining good behaviors even though all of the associations between religious attendance and maintenance of good behaviors and mental health were in the protective direction.

The health behaviors involved in these analyses included both basic ones like smoking, exercise, and excessive alcohol consumption as well as relational ones like interactions with friends and relatives. There is extensive literature on the health benefits of close relationships for both reduced mortality and morbidity, including a recent analysis from Sweden demonstrating a protective effect of close relationships on incident dementia (29–32).

There was also a relation demonstrated between religious attendance and continuing to receive regular medical checkups, although there was no relation between religious attendance and initiation of such checkups for those not already receiving them at baseline. Religious attendance was also associated with im-

TABLE 2
Association of Religious Attendance With Improved Health Behaviors, Mental Health, and Social Relationships Between 1965 and 1994

	Men and Women		*Men*[a]		*Women*[a]	
Model	*OR*	*95% CI*	*OR*	*95% CI*	*OR*	*95% CI*
Health behaviors						
Quit cigarette smoking:						
For those smoking in 1965						
Weekly attendance	1.78	1.22–2.61	1.21	0.65–2.26	2.19	1.36– 3.53
Less or never (reference)	1.00		1.00		1.00	
Became often physically active:						
For those not active in 1965						
Weekly attendance	1.54	1.22–1.94	1.23	0.84–1.81	1.74	1.30–2.32
Less or never (reference)	1.00		1.00		1.00	
Stopped heavy drinking:						
For those drinking heavily in 1965						
Weekly attendance	1.39	0.73–2.63	0.88	0.41–1.88	4.67	1.03–21.3
Less or never (reference)	1.00		1.00		1.00	
Started annual medical checkups:						
For those with none in 1965						
Weekly attendance	0.98	0.74–1.28	0.82	0.54–1.22	1.13	0.78–1.62
Less or never (reference)	1.00		1.00		1.00	
Mental health						
Stopped being depressed:						
For those depressed in 1965						
Weekly attendance	2.31	1.23–4.35	0.81	0.27–2.45	3.56	1.64–7.73
Less or never (reference)	1.00		1.00		1.00	
Social relationships						
Increased individual relationships:						
For those with less than three in 1965						
Weekly attendance	1.62	1.13–2.31	1.61	0.93–2.79	1.63	1.02–2.59
Less or never (reference)	1.00		1.00		1.00	
Got married and did not divorce:						
For those unmarried in 1965						
Weekly attendance	1.57	1.00–2.45	1.15	0.51–2.58	1.78	1.05–3.01
Less or never (reference)	1.00		1.00		1.00	

Note. Covariates include age, gender, education, and self-rated health. $N = 2,676$. OR = odds ratio; CI = confidence interval.
[a]ORs and CIs for women and men are estimated from single models containing Gender × Health Practice interaction terms.

proved mental health and possibly with maintaining good mental health.

It has been known for some time that frequent attenders of religious services evidence a higher prevalence of good health behaviors and higher levels of social involvement. The analyses here indicate that attenders did not all start off with such good behaviors; to some extent, their good health behaviors and more extensive social relationships occurred in conjunction with their attendance. If this is so, the commonly employed strategy in analyses focusing on associations between religious attendance and mortality of adjusting for health behaviors and social relationships over the follow-up period may actually underestimate the impact of attendance to the extent that the adjustments involve intervening variables rather than confounders. Even baseline adjustments for these variables are subject to the same error because attendance at religious services could have influenced health behaviors and social relationships before the analyses began.

The factors analyzed here are unlikely to be the only means by which religious attendance impacts health. In both our own 1997 analysis and that of Koenig et al. (14), the long-term association between attendance and mortality was reduced but was still statistically significant after extensive adjustments for health conditions, health behaviors, and social relationships (11).

Although all of the odds ratios associated with improving poor health behaviors and mental health in Table 2 were stronger for women than for men, only two of these gender differences were statistically significant. However, the interaction test we used to assess the extent of the observed gender differences has low power (33), and two of the gender differences we characterized as not significant had p values of .14 and .16. Finding that the establishment and maintenance of good health behaviors associated with religious attendance is somewhat stronger for women than for men would be consistent with analyses that have demonstrated a stronger impact of attendance on longevity

TABLE 3
Association of Religious Attendance With Adoption of Poor Health Behaviors, Mental Health, and Social Relationships Between 1965 and 1994

	Men and Women		*Men*[a]		*Women*[a]	
Model	*OR*	*95% CI*	*OR*	*95% CI*	*OR*	*95% CI*
Health behaviors						
Started smoking:						
For those never smoking in 1965						
Weekly attendance	0.55	0.26–1.18	0.57	0.19–1.72	0.54	0.19–1.52
Less or never (reference)	1.00		1.00		1.00	
Reduced physical activity:						
For those often active in 1965						
Weekly attendance	0.93	0.69–1.24	0.95	0.60–1.50	0.91	0.62–1.33
Less or never (reference)	1.00		1.00		1.00	
Started drinking heavily:						
For those not drinking heavily in 1965						
Weekly attendance	0.92	0.63–1.33	1.14	0.73–1.79	0.60	0.31–1.17
Less or never (reference)	1.00		1.00		1.00	
Stopped annual medical checkups:						
For those with checkups in 1965						
Weekly attendance	0.72	0.56–0.94	0.62	0.40–0.96	0.79	0.57–1.09
Less or never (reference)	1.00		1.00		1.00	
Mental health						
Became depressed:						
For those not depressed in 1965						
Weekly attendance	0.76	0.55–1.05	0.82	0.49–1.37	0.72	0.48–1.09
Less or never (reference)	1.00		1.00		1.00	
Social relationships						
Reduced individual relationships:						
For those with three or more in 1965						
Weekly attendance	0.63	0.48–0.83	0.56	0.36–2.76	0.68	0.48–0.95
Less or never (reference)	1.00		1.00		1.00	
Divorced or separated:						
For those married in 1965						
Weekly attendance	0.51	0.40–0.66	0.46	0.30–0.69	0.55	0.40–0.76
Less or never (reference)	1.00		1.00		1.00	

Note. Covariates include age, gender, education, and self-rated health. $N = 2,676$. OR = odds ratio; CI = confidence interval.
[a]OR and CI for women and men are estimated from single models containing Gender × Health Practice interaction terms.

for women of all ages than for men, as well as a stronger protective association for disability and depression for older women (3,11,14, 34). Other studies have also indicated that women express a stronger religious commitment than men and are more likely to use their religious faith as a coping mechanism when facing stress (35–37). For older women, religious organizations may fill a variety of social needs because a much higher proportion of them are widowed than is true for older men. For women of all ages, Idler (34) suggested that religious involvement may be consistent with a more general tendency of women to utilize social resources for coping with illness. Such social interaction may also promote the establishment and maintenance of good health behaviors if those involved engage in such behaviors themselves. Examining this gender difference further might shed additional light on the ways in which social interaction, organizational involvement, and belief systems impact health.

Our finding that religious attendance was associated with marital stability both in terms of getting and staying married to the same person says nothing about the quality of such marriages; elsewhere we have shown that religious attendance exacerbates rather than buffers the impact of family problems on depression (38). It would be interesting to examine the association between religious attendance and marital quality to see whether the increase in stability coincides with greater marital satisfaction. Remaining in an unfulfilling marriage may not promote health.

One limitation of our analyses is the small number of participants for some of the health behaviors, such as stopping heavy drinking and not initiating smoking. For sufficient statistical power, a younger sample of participants is needed for examining the extent to which religious attendance inhibits the initiation of smoking cigarettes because the vast majority of smokers start before they are 21 years old. A larger data set is also necessary to confirm our reported gender differences and better explore relations for alcohol consumption. Another limitation is that we were only able to assess a limited number of outcomes. Other longitudinal data sets should have data to assess other behaviors that promote good health, such as commu-

nity involvement, direct support, self-care behaviors, and diet. For physical activity and alcohol consumption, it would be helpful to have scaled data so that the extent to which improvement occurred could be better estimated. Finally, it is possible that our results are spurious—that some other factor is responsible both for good health behaviors and religious involvement. Again, analyses with a larger data set and including additional adjustment variables will be necessary before our observed associations could be declared causal.

If religious attendance does impact health behaviors, the specific mechanisms involved are worth understanding because these may be broadly generalizable to individual and community health promotion endeavors. Such mechanisms may include organizational edicts (such as proscribing cigarette smoking), philosophical tenets (such as viewing one's body with respect), relational aspects (such as supportive friendships and communality), cognitive (such as a stronger sense of perceived control or sense of coherence), and psychological (such as increased self-esteem). Discovering exactly how attendance impacts adoption and maintenance of good health behaviors could thus aid in the design of effective education and intervention programs and strategies to broadly promote the adoption of good health behaviors before illness strikes and provide effective self-care treatment strategies when it does.

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