

Frequency Of Attendance At Religious Services And Mortality From Multiple Causes In A U.S. National Cohort

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Abstract

Objective. To determine whether frequency of attendance at religious services is associated with reduced mortality from the major causes of death in the US.

Methods. In a national health survey, 20,024 American men and women 17 years-of-age and older, examined from 1988–1994, had a mortality follow-up through 2000. Of these, 3,384 were deceased and 16,640 were assumed alive. At baseline they reported frequency of attendance at religious services, other biopsychosocial variables and had physical and biochemical measurements. After all exclusions, the analysis included 14,223 persons and 2,033 deaths, which were grouped by underlying cause category.

Results. At baseline, 26.1% reported attending religious services weekly and 8.6% more than weekly. Compared to never attenders, the demographic, socioeconomic-adjusted hazard ratio (HR) for circulatory deaths (95% confidence limits) for weekly attenders was 0.77 (0.63–0.94, $p < 0.01$), and for more than weekly attenders was 0.76 (0.57–1.02, $p < 0.10$). The HR for cancer death were 0.84 (0.65–1.10), and 0.39 (0.26–0.59), $p < 0.01$. After adjusting for all confounders, the HR for more-than-weekly attenders remained significant for cancer death: 0.41, 0.27–0.63, $p < 0.01$. In further models, this association was limited to African Americans, among whom health behaviors and social support failed to explain the association with cancer death.

Conclusions. After controlling for confounders including demographic, socioeconomic, and health status variables, compared to never attenders, the hazard ratio for persons attending religious services more than weekly had significantly lower than 1.0 for mortality from cancer.

INTRODUCTION

Religious affiliation, attendance at religious services, and other religious behavior is more prevalent in the US than in any other industrialized nation. ¹ A number of studies have been published suggesting that people affiliated with US religious groups have lower mortality risks than people affiliated with other or no religious groups. ² Although lack of religious participation has been suggested as a “fundamental cause” of mortality similar to low socioeconomic status, it has not been studied in the medical and social science literature. ³ The number of large, population-based cohort studies of religious attendance and mortality with multivariate analyses to control for confounding factors supporting this finding is small, but remarkably consistent in finding an inverse association of attendance and mortality independent of demographic,

socioeconomic, and health status variables.

^{4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20} For example, a recent study of more than 2,000 deaths in a national cohort of approximately 21,000 people, followed for nine years (1987-1997) found that persons who never attended religious services had a mortality risk 87% higher than those attending more than weekly. ²¹ Furthermore, the association was graded and an excess risk of 72% persisted after adjustment for health status and socioeconomic variables at baseline. Social support and health behaviors seemed to mediate only part of the association. These results for mortality from all causes were recently confirmed in another national cohort. ²² Most investigators report effect modification by age and gender, and a few, by ethnicity or location. Private religious activity, attitudes, or beliefs rarely have been studied in large cohorts; available evidence indicates an inconsistent association with mortality. ^{11,23,24} Cohort studies of religious affiliation among

Christians or Jews or among faiths as the sole measure of religiousness yield results that are difficult to integrate with studies of attendance.^{23,25} Few studies incorporate physical or biochemical examination data for control of confounding factors such as baseline illness and inflammation.

Possible mediators of the association have been identified. In US studies, evidence is growing that greater public religiousness as indicated by a high frequency of attendance at religious services is associated with beneficial health behaviors (e.g. smoking avoidance), increased social integration and support, improved coping with stressful life events, and reduced depression leading to decreased chronic sympathoadrenal activation, improved immune function, and less chronic inflammation.^{2,3,26,27,28,29,30,31,32,33} Some researchers suggest more proximate affects of ritual on psychophysiological pathways.⁵

A significant inverse association of religiousness and mortality, even if modest in magnitude, would be of great interest in the US, given that greater than 180,000,000 persons reportedly actively participate in public religious activities.^{34,35} Therefore it is important to confirm the reported association in more recent data from large, national cohorts and to explore modifiers of the association.

The objectives of the present study were to (1) determine whether frequency of attendance at religious services (FARS) is associated with decreased risk of cause-specific mortality independent of confounding factors; (2) determine the strength of any association between FARS and mortality; and (3) determine whether any association is modified by gender, age, and ethnicity (4) to determine whether a stronger association of attendance exists among various causes of death. Data used were from a newly released data set from a large, multi-ethnic, national sample of adults, the Third National Health and Nutrition Examination Survey (NHANES III) linked to subsequent mortality data. Unlike most previous studies, this analysis included variables from a physical examination and biochemical measurements in multivariate models. Furthermore, it represents only the second large study in Hispanic Americans.⁴

METHODS

The Third National Health and Nutrition Examination Survey (NHANES III) was conducted from 1988-1994 on a nationwide multi-stage probability sample of 39,695 persons from the civilian, non-institutionalized population of the US. Of these, 33,994 were interviewed and of these 31,311

(78.9% overall) were examined. Details of the plan, sampling, operation, and response have been published as have procedures used to obtain informed consent and to maintain confidentiality of information obtained.³⁶ The NHANES III Linked Mortality Files (NHLMF) were created to permit longitudinal study of participants in NHANES III who were 17 years-of-age and older at the time of the survey in 1988-1994 (for details see http://www.cdc.gov/nchs/r&d/nchs_data linkage/nhanes_data_linkage_activities.htm). The NHLMF contains information based upon the results from a probabilistic match between NHANES III and the NCHS National Death Index (NDI) records. The NHLMF provides mortality follow-up data from the date of NHANES III survey participation (1988-1994) through December 31, 2000. The personal interviews and physical and laboratory examinations of NHANES III provided the baseline data for the study. Of 33,994 persons with baseline interview data, 13,944 were under the age of 17 years, and 26 lacked data for matching leaving 20,024 eligible for mortality follow-up.

Of the 20,024 persons eligible for mortality follow-up, 1,875 were not examined, 455 were examined at home, two deaths were excluded for missing data on cause of death, leaving 17,694 for follow-up. Also excluded from all analyses were pregnant women due to effects of pregnancy on blood pressure and weight (n=338), persons of ethnicities other than those mentioned below (718) as well as persons with missing data for religious attendance (n=23), education, marital status, self-reported health status, history of cancer (other than skin), histories of heart attack, congestive heart failure, stroke, diabetes, emphysema, chronic bronchitis, cigarette smoking status, alcohol intake status, mean systolic blood pressure, current blood pressure medication, body mass index, C-reactive protein, leisure time physical activity, personal physician, and non-religious social support. After all exclusions, 14,223 persons remained for mortality analyses (including 6,283 European Americans, 4,014 African Americans, and 3,926 Mexican Americans; 6,792 men and 7,431 women). The length of follow-up of survivors in the NHEFS for mortality analyses ranged from 0.02 to 12.1 years, mean 8.5 years, median 8.7 years (inter-quartile range, IQR, 7.1–10.2 years).

Demographic data, years of education completed, medical history including self-assessed health status and doctor-diagnosed chronic diseases, and behavioral information including frequency of attending church or religious services

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were collected by household interview. Persons were asked, "How often do you attend church or religious services?" Values ranged from 0 to 1,825 times per year. Values in excess of 365 were coded missing, as were "don't know" responses. No data on religious affiliation were available. Technicians obtained 3 blood pressure (BP) readings during the home interview. During examinations carried out in a mobile examination center, physicians obtained an additional 3 readings. The average of all available BP readings was used. In addition technicians asked about pregnancy, measured height and weight, and obtained blood specimens for measurement of C-reactive protein. Self-assessed limitation of mobility from the home interview was available only for those aged 60 and over. For those under 60 and those over 60 with missing values, physician assessed limitation of mobility, which correlated significantly with self-assessed mobility in the subset of persons with both, was used to impute limitation of mobility. (Physician assessed limitation of mobility correlated significantly with self-assessed in the subset of data with both: $r=0.4$, $p<0.0001$.)

Outcome variables. Specific-cause groups of deaths used were as follows based on the underlying cause of death: circulatory disease ischemic heart disease, cerebrovascular disease, other circulatory disease (atherosclerosis etc.), cancer, respiratory cancer, digestive cancer, other cancer, respiratory disease, diabetes, and external causes (e.g. injury), residual (all other causes not mentioned) (Codes of the International Classification of Diseases available from authors). Following an approach in the literature, causes of death were also grouped as preventable versus non-preventable.

Statistical analysis. Detailed descriptive statistics and measures of association were computed using SUDAAN statistical software (Version 9.0), to take into account the complex survey design and design effect in producing point and variance estimates using Taylor series linearization for variance estimation.³⁷ Estimates of the risk of death for persons with higher religious attendance relative to those never attending in the past year are derived from Cox proportion hazards regression models with age as the time scale using the SURVIVAL procedure in the SUDAAN. Persons who died of other causes in cause-specific analyses were censored at the date of death. Survivors were censored at the end of follow-up. Validity of the proportion hazards assumption was assessed by creating a time-varying age

strata variable and testing the interaction of that variable with attendance after controlling for demographic characteristics (gender, race/ethnicity, education, region, and metropolitan residence). The test indicated that the relative hazard of most cause-specific deaths by attendance was constant across the different age stratum. These results were consistent with results from logistic regression models (not shown), but the results shown here were consistently the more conservative of the two.

RESULTS

Table 1 shows the number of deaths by cause and attendance category. Among 14,223 persons, 2,033 deaths occurred and there were 120,424 person-years of observation. Results for all causes were reported previously.³⁸

Figure 1

Table 1: Number of deaths (crude rate, percent) by attendance at religious services in US adults aged 17 years and over, NHANES III

| | Frequency of Attendance at Religious Services | | | | |
|----------------------------|---|---------------|---------------|---------------|---------------|
| | Total | Never | <weekly | =weekly | >weekly |
| Population at risk | 14,223 | 4,672 | 3,931 | 4,223 | 1,397 |
| All cause | 2,033 (14.3) | 751 (16.1) | 403 (10.3) | 680 (16.1) | 199 (14.2) |
| Circulation | 907 (6.4) | 332 (7.1) | 168 (4.3) | 313 (7.4) | 94 (6.7) |
| Ischemic heart disease | 508 (3.6) | 196 (4.2) | 84 (2.1) | 173 (4.1) | 55 (3.9) |
| Cerebrovascular | 174 (1.2) | 65 (1.4) | 39 (1.0) | 58 (1.4) | 12 (0.9) |
| Other circulation | 225 (1.6) | 71 (1.5) | 45 (1.1) | 82 (1.9) | 27 (1.9) |
| Cancer | 461 (3.2) | 155 (3.3) | 98 (2.5) | 167 (4.0) | 41 (2.9) |
| Respiratory disease | 196 (1.4) | 83 (1.8) | 38 (1.0) | 56 (1.3) | 19 (1.4) |
| Diabetes | 68 (0.5) | 29 (0.6) | 14 (0.4) | 21 (0.5) | 4 (--) |
| External | 106 (0.7) | 44 (0.9) | 24 (0.6) | 26 (0.6) | 12 (0.9) |
| Other cause | 295 (2.1) | 108 (2.3) | 61 (1.6) | 97 (2.3) | 29 (2.1) |

*Cause-specific death was defined based on 113 underlying cause of death record all years (ICD-10)

Age-adjusted cross-tabulations of the following variables by four religious attendance categories revealed that attendance was significantly associated with the following variables: gender, African American ethnicity, Mexican American ethnicity, residence in the South, metropolitan residence, low education, fair or poor health, chronic illness, limited mobility, current smoking, alcohol use, no leisure time physical activity, low social support, systolic blood pressure ≥ 140 mmHg. No significant association was seen for marital status, obesity (BMI ≥ 30 kg/m²), and elevated C-reactive protein (detailed table available from authors).

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In proportional hazards regression analyses for persons 17 years-of-age and older, interaction of age and attendance was not significant for circulatory, cancer, respiratory disease, diabetes or external causes. No significant interaction was found for gender and attendance for any cause.

Table 2 shows adjusted hazards ratios with 95% confidence intervals (CI) for death by attendance level, with never attenders as the reference group. Controlling for demographic and socioeconomic variables (Model I), persons attending services weekly and/or more than weekly had significantly reduced risk of circulatory, cancer, diabetes mortality compared to never attenders.

Figure 2

Table 2: All cause or cause-specific mortality and attendance at religious services (US adults aged 17+)

| | Model I | | Model II | | Model III | |
|-------------------------------|---------|-------------|----------|-------------|-----------|-------------|
| | HR | 95% CI | HR | 95% CI | HR | 95% CI |
| Circulation | | | | | | |
| <weekly* | 0.84 | 0.66 - 1.08 | 0.94 | 0.73 - 1.21 | 0.99 | 0.77 - 1.27 |
| =weekly | 0.77** | 0.63 - 0.94 | 0.88 | 0.73 - 1.06 | 0.93 | 0.76 - 1.13 |
| >weekly | 0.76 | 0.57 - 1.02 | 0.88 | 0.66 - 1.16 | 0.93 | 0.70 - 1.24 |
| Ischemic heart disease | | | | | | |
| <weekly | 0.68* | 0.49 - 0.95 | 0.76 | 0.55 - 1.06 | 0.82 | 0.59 - 1.13 |
| =weekly | 0.71* | 0.53 - 0.95 | 0.81 | 0.61 - 1.07 | 0.86 | 0.66 - 1.13 |
| >weekly | 0.76 | 0.52 - 1.12 | 0.87 | 0.60 - 1.28 | 0.93 | 0.64 - 1.35 |
| Cancer | | | | | | |
| <weekly | 0.80 | 0.53 - 1.20 | 0.86 | 0.56 - 1.31 | 0.94 | 0.60 - 1.47 |
| =weekly | 0.84 | 0.65 - 1.10 | 0.90 | 0.68 - 1.19 | 1.06 | 0.78 - 1.44 |
| >weekly | 0.39*** | 0.26 - 0.59 | 0.41*** | 0.27 - 0.63 | 0.50** | 0.32 - 0.78 |
| Diabetes | | | | | | |
| <weekly | 0.21** | 0.09 - 0.51 | 0.27** | 0.11 - 0.66 | 0.33* | 0.13 - 0.84 |
| =weekly | 0.25** | 0.09 - 0.69 | 0.35* | 0.13 - 0.92 | 0.46 | 0.16 - 1.31 |
| >weekly | 0.06*** | 0.01 - 0.29 | 0.09** | 0.02 - 0.39 | 0.11** | 0.02 - 0.54 |
| External | | | | | | |
| <weekly | 0.47 | 0.20 - 1.10 | 0.48 | 0.20 - 1.11 | 0.48 | 0.20 - 1.18 |
| =weekly | 0.44* | 0.20 - 0.96 | 0.45* | 0.20 - 1.00 | 0.46 | 0.19 - 1.11 |
| >weekly | 0.63 | 0.26 - 1.53 | 0.65 | 0.27 - 1.57 | 0.69 | 0.24 - 1.99 |

+ P < 0.05, ++ P < 0.01, +++ P < 0.001.

*Reference category is "never" attend religious services

Model I adjusted for baseline socio-demographic variables

Model II adjusted for the above plus baseline health and mobility variables

Model III adjusted for the above plus mediating variables

Causes of death unrelated to attendance were cerebrovascular, other circulatory diseases, digestive cancers, respiratory diseases, and other causes

If religious attendance were simply a marker of baseline health status, controlling for baseline morbidity and mobility limitation should statistically remove the association.

However, when potential confounding by self-reported health status, physician-assessed mobility limitation, and history of major chronic disease were controlled for (Model II), the associations were little changed for cancer, diabetes and external causes, but weakened for circulatory death (Table 2).

To further control for confounding by baseline variables, Table 2 shows the effect on HR of controlling for baseline morbidity and mobility limitation and for baseline levels of variables identified in the literature as potential mediators of healthy behaviors, inflammation, non-religious social

support. In these analyses (Model III), little of the association of weekly attendance for diabetes and external causes but most of the association for circulatory death seemed to be explained by these variables. For more than weekly attendance, most of the association was mediated for circulatory death but little for cancer or external causes.

Results for subgroups of circulatory death were similar to those for circulatory death (Table 2). For subgroups of cancer death, significant reductions in risk of death for those attending more than weekly compared to never were seen for respiratory cancer and other cancer but not digestive cancer (not shown). For respiratory death (not shown) and death from external causes, negative associations with attendance did not attain statistical significance. Numbers of deaths from other specific causes were too small for detailed analysis.

A significant interaction of attendance with African American ethnicity was seen for cancer and with Mexican American ethnicity for diabetes. Figure 1 and Table 3 show results of stratified analyses for cancer to address interactions of attendance with ethnicity. Weekly and more than weekly attenders were combined due to small numbers. After controlling for the first two blocks of confounding factors (Models I and II), only non-Hispanic African Americans attending weekly and more than weekly had significantly lower risk of cancer death compared to never attenders. This trend persisted after controlling for the third block of confounding factors (Model III). This stratified analysis could not be done for diabetes because of small numbers.

Figure 3

Table 3: Cancer mortality by attendance and ethnicity among adults aged 17+, NHANES III

| | FARS | Model I | | Model II | | Model III | |
|--------------------------|---------|-------------|--------|-------------|--------|-------------|--------|
| | | HR | 95% CI | HR | 95% CI | HR | 95% CI |
| Cancer | | | | | | | |
| European American | | | | | | | |
| <weekly* | 0.81 | 0.50 - 1.30 | 0.90 | 0.54 - 1.49 | 0.98 | 0.58 - 1.67 | |
| ≥weekly | 0.75* | 0.57 - 0.98 | 0.84 | 0.62 - 1.12 | 0.97 | 0.70 - 1.34 | |
| African American | | | | | | | |
| <weekly | 0.54* | 0.29 - 0.99 | 0.62 | 0.35 - 1.10 | 0.73 | 0.41 - 1.32 | |
| ≥weekly | 0.31*** | 0.18 - 0.54 | 0.39** | 0.22 - 0.68 | 0.59 | 0.31 - 1.11 | |
| Mexican American | | | | | | | |
| <weekly | 0.89 | 0.32 - 2.45 | 0.90 | 0.34 - 2.41 | 0.92 | 0.34 - 2.51 | |
| ≥weekly | 1.17 | 0.49 - 2.77 | 1.14 | 0.49 - 2.69 | 1.07 | 0.45 - 2.54 | |

+ P < 0.05, ++ P < 0.01, +++ P < 0.001.

Model I adjusted for baseline socio-demographic variables

Model II adjusted for the above plus baseline health and mobility variables

Model III adjusted for the above plus mediating variables

*Reference category is "never" attend religious services; analysis excludes persons of other race/ethnicity group

Figure 4

Figure 1: Kaplan-Meier curves for cancer free survival among European Americans, African Americans, and Mexican Americans aged 50 years and over: NHANES III follow-up, 1988-2000.

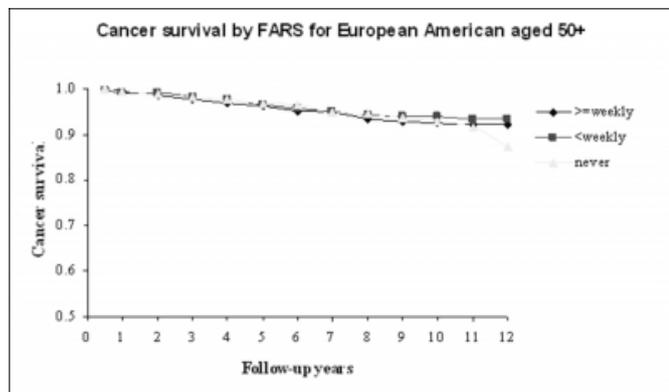


Figure 5

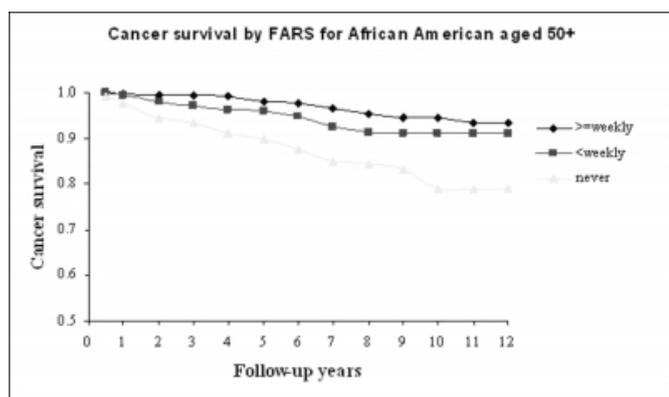
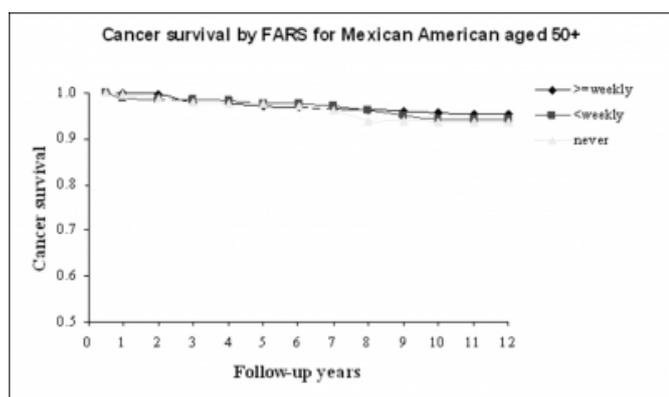


Figure 6



DISCUSSION

The current report describes results from the follow-up of the NHANES III cohort. NHANES III is the one of the largest studies to provide population-based data on the association of attendance at religious services and survival in

nation-wide representative samples of Americans and the first to incorporate examination and biochemical data. NHANES III data show that mortality over the follow-up period was lower among persons who attend religious services weekly or more than weekly than among those never attending. The association was seen for circulatory and cancer death and was strongest for death from diabetes. Controlling for demographic and socioeconomic variables did not change the negative association of religious attendance and mortality. That is, persons who attend religious services frequently had a risk of mortality lower than would be expected given their socio-demographic profile, suggesting a protective effect of religious participation. A part of the association was explained statistically by confounding factors of baseline health status and mobility. That is, some of the apparent protective effect was due to persons in poor health being unable to attend frequently. Most of the residual association for circulatory deaths could be explained statistically by putative mediators health behaviors, social support, blood pressure, and inflammation. However, the apparent protective effect for cancer in African Americans could not be explained by any of the variables controlled for.

As mentioned above, possible mechanisms for an inverse association of participation in the activities of a religious institution and mortality have been discussed at length elsewhere.¹⁸ Participation may promote healthy lifestyles and behaviors (e.g. smoking avoidance), increase social integration and support, enhance psychological resources, enhance coping, induce positive emotions, and induce health-promoting physiological effects including reduction in stress hormone levels, blood pressure, and inflammation. Public Health practitioners are increasingly working with faith-based and community-based organizations to promote healthy lifestyles.

In the analysis presented here, we controlled for confounding elements and tested for a mediating effect of health behaviors, health status, social support, and inflammation. Several studies were consistent, with some of the effect of attendance being mediated by health behaviors, and inflammation, but little by social support, personality, mental health, private religious activity, or fatalism.^{5,26,31} However, it is possible that residual effects may be due to confounding or mediation by variables not measured such as immune function, other health behaviors, adherence to medical advice, regarding medication and diet, and religious

coping with stress.

COMPARISONS WITH PREVIOUS REPORTS

Several dozen population-based studies have reported negative associations of religiousness and mortality or survival, but only two recent population studies have consistently controlled for confounding by socio-demographic, socioeconomic, and health status variables or assessed effect modifiers and mediating variables for specific causes of death in a US national sample.^{6,21} In the only other large, national study there was a nine-year follow-up of over 21,000 persons in the Cancer Risk Factor Supplement-Epidemiology Study of the 1987 National Health Interview Survey with over 2,000 deaths. Consistent with NHANES III findings, the investigators reported significantly higher risk of death from all causes and for 5 of 7 cause-of-death categories in never attenders compared to more than weekly attenders after controlling for socioeconomic and demographic variables.²¹ The association with the seventh (external causes) was strong (HR 2.2) but not significant. In contrast to NHANES III, no significant association was seen for cancer death (HR 1.26, $p < 0.10$). In a California cohort followed from 1965 to 1996 with 1,532 deaths, significantly increased socio-demographic-adjusted risk of death in those attending less than weekly compared to more than weekly was reported for circulatory (HR=1.45), cancer (HR=1.33), digestive (HR=2.67), and respiratory causes (HR=2.34), but not external (HR=1.46) or residual causes (HR=1.41). Except for cancer, significant associations persisted after controlling for baseline health status.⁶ A 16-year follow-up of residents of Kibbutzim in Israel, found a higher mortality risk in secular than religious kibbutzim for circulatory and non-circulatory causes.³²

LIMITATIONS AND STRENGTHS

NHANES III is only the second cohort study to provide population-based data on the association of attendance at religious services and survival in nation-wide representative samples of Americans. The present study attempted to avoid the shortcomings of several previous studies by use of pre-specified study hypotheses, large representative samples, and extensive control for confounding factors. Due to its longitudinal nature and its endpoint, the study provides some information about the association of religion and mortality, since reverse causality (the presence of overt disease leading to increased religious attendance seen in cross-sectional studies) is excluded. However, several unavoidable

limitations of the present study include possible bias arising from survey non-response and from missing values for some variables and from possible changes in attendance or other variables over the follow-up period. Several special studies of NHANES III data have indicated little bias due to non-response.³⁹ Religious attendance is relatively stable in older adults with $r=0.69$, $p < 0.001$ between measures 6 years apart²⁶.

At least 12 dimensions of religiousness/spirituality have been defined and instruments developed that measure one or multiple dimensions.⁴⁰ Attendance at religious services is an indicator of organizational religiousness. Since data on multiple dimensions were unavailable in NHANES III, this variable was used because it is related to health outcomes, it is correlated with other dimensions of public and private religiousness, and it provided data that are directly comparable with a body of research data on this variable spanning many decades.^{5,20} Over-reporting of religious attendance is likely¹; however the NHANES III variable should serve well to separate the most frequent from least frequent attenders. Furthermore, the never category, likely having high validity, was chosen as the reference group. "Attendance at religious services" provides limited specificity. The United States is home to many racially, ethnically, religiously and ideologically diverse groups. These groups can vary broadly in organizational structure, race and ethnicity, education, emphasis on health promotion, and other areas. There are differences between faiths, within the same faith, and even within the same denomination or congregation. "Attendance at religious services" could reflect anything from a brief devotional to an all day event, depending on one's congregation of choice. Different results may have been obtained had private religious activity been studied.

Confounding by variables not available to be controlled for cannot be excluded. Preliminary analyses showed that serum lipid values were not associated with religious attendance and hence were not controlled for. Given the uncertainty about the nature of the association, it is unclear which other variables should be controlled for as confounders. The representativeness of the sample and the use of sample weights provide generalizability of the results to US non-institutionalized population of the same ages. Further research is needed including longitudinal studies of the ability of non-organizational (private) religiousness and/or spirituality to independently predict death or disease

occurrence and of heterogeneity of risk among frequent attenders.

CONCLUSIONS

In this large, national cohort, persons attending services more than weekly had a significantly lower risk of mortality from cancer and diabetes compared to those who never attended, even after controlling for confounders including demographic, socioeconomic, health status variables. The differences in the association according to specific causes of death and in different ethnic groups raise several questions regarding what might cause such fluctuations. Because a detailed discussion of possible implications of these findings for the public health is beyond the scope of this paper, the reader is referred to other sources for such elaboration^{20,35,41}. However, the authors believe that further research should be done to examine specific mechanisms for the association between attendance and mortality, to determine why the association varies in different ethnic groups, and to determine if this information can contribute to the betterment of public health.

DISCLAIMER

The findings and conclusions in this report are those of the author(s) and do not necessarily represent the views of the funding agency.

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