# The Relationship Between Religious Activities and Cigarette Smoking in Older Adults

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*Background.* The objective of this study was to examine the relationship between religious activities and cigarette smoking in community-dwelling older adults.

*Methods.* Cigarette smoking and religious activities were assessed in a probability sample of 3968 persons age 65 years or older participating in the Duke Populations for Epidemiologic Studies of the Elderly (EPESE) survey. Participants were asked if they currently smoked, if they ever smoked, and how many cigarettes per day they smoked. Attendance at religious services, participation in private religious activities (prayer or Bible study), and use of religious media (religious TV or radio) were also assessed. Data were available for Waves I–III of the survey (1986, 1989, and 1992). Analyses were controlled for age, race, sex, education, alcohol use, physical health, and in the longitudinal analyses, smoking status at prior waves.

*Results.* Cross-sectional analyses revealed that participants who frequently attended religious services were significantly less likely to smoke cigarettes at all three waves. Likewise, elders frequently involved in private religious activity were less likely to smoke (Waves II and III). Total number of pack-years smoked was also inversely related to both attendance at religious services and private religious activities. Watching religious TV or listening to religious radio, on the other hand, was not related to smoking at Waves I and II nor to total pack-years smoked, but was postively related to current smoking at Wave III. Among those who smoked, number of cigarettes smoked was inversely related to frequency of attendance at religious services (Wave I), private religious activities (Wave III), and religious TV/radio (Waves II and III). Retrospective and prospective analyses revealed that religiously active persons were less likely to ever start smoking, not more likely to quit smoking.

*Conclusions.* Religiously active persons are less likely to smoke cigarettes, and if they do smoke, smoke fewer cigarettes. Given the association between smoking and disease, and the widespread prevalence of both smoking and religious activity, this finding has implications for public health.

CIGARETTE smoking is a common behavior in the United States, where over 25% of the population smokes regularly (1). Most persons begin smoking during their youth and continue this behavior into adulthood. People continue to smoke not only because of preference or habit, but because they become dependent on nicotine which is more addictive than alcohol, marijuana, or cocaine (2). Although age is inversely related to cigarette smoking, and 34% of persons aged 65 or older have quit, between 12 and 20% of older adults continue to smoke regularly (1,3). Cigarette smoking causes an acceleration of the aging process of the lung and a loss of lung reserve (4). The incidence of lung cancer, now the leading cause of cancer death in both men and women in the United States, is about 10 times higher in smokers compared with nonsmokers (5,6). Smoking has also been associated with increased cancer of the larynx (7,8), tongue (8), pharynx (8), esophagus (8), pancreas (9), and cervix (10), and has been related to leukemia and myeloma (11), hypertension (12), and coronary artery disease (13). In fact, almost 50% of the dif-ference in mortality rate between the sexes in the United States can be accounted for by smoking alone (14). Cessation of smoking by older adults, on the other hand, is associated with a rapid reduction in pulmonary and cardiovascular morbidity and mortality (15).

Religious belief and activity are also important to many older Americans. Recent Gallup Polls and Barna surveys indicate that 53% of persons age 65 or older attend religious services at least weekly, over 60% read religious scriptures during a typical week, and 90% pray (16,17). Consequently, it is not surprising that nearly 75% of older adults report that religion is "very important" to them (16). In fact, participation in church or synagogue activity is more common in later life than all other forms of voluntary social activity combined (18). When health problems prevent older adults from attending religious services, personal religious activities like prayer, Bible study, or religious media viewing may become particularly important (19,20). Religious beliefs and practices, in turn, may impact health and health behaviors (21).

Religious groups have long instructed members on what is permissible with respect to diet, hygiene, exercise, and alcohol, drug, or tobacco use (22). Examples include Kosher laws that regulate diet and hygienic practices for Jews (23), John Wesley's teachings concerning health practices among Methodists (24), and prohibitions concerning alcohol and cigarette smoking by Mormons and Seventh-Day Adventists (25). Although other groups such as Catholics, Episcopalians, Lutherans, Presbyterians, and Baptists promote no specific health practices as essential for membership, each tradition encourages behaviors that enhance health and well-being and discourage use of substances that adversely affect the physical body ("a temple of the Holy Spirit") (26).

The initiation and maintenance of cigarette smoking during the teen years is strongly influenced by the smoking behavior of both parents and peers (27). Active religious participation at that time might reinforce negative attitudes toward use of tobacco and enhance social pressure to avoid smoking. As expected, higher levels of religious belief and activity have been associated with lower rates of tobacco use in adolescence and young adulthood (28–32). Thus, persons who are religiously active during their early years may never acquire the smoking habit and therefore may be spared many smoking-related diseases later in life.

A number of studies have now demonstrated lower rates of certain types of cancers, cardiovascular diseases, respiratory diseases, and overall mortality in Mormons (33) and Seventh-Day Adventists (34), findings that have been explained at least in part by smoking behavior. Greater religious activity or commitment has also been linked with lower rates of smoking among young adult African American women (35) and adults in New Zealand (36) and the U.S. (37,38). No study, however, has examined the relationship between cigarette smoking and religious activity in persons age 65 and older in the United States. We expect certain forms of religious activity, particularly organized religious activity, to be associated with lower rates of smoking in older adults, many of whom may receive much social support from members of the religious community (18,39). Private religious activities like prayer or Bible study, being reflective of greater religious commitment, might also be associated with lower rates of smoking. More passive religious involvement, however, such as religious TV viewing or radio listening, may have less of an effect on such behavior.

In the current study, we examine religious behaviors and cigarette smoking in a random sample of 3,968 older adults living in North Carolina. North Carolina is located in an area of the United States where religious activity is prevalent. Likewise, a relatively large proportion of the population smokes cigarettes, and the tobacco industry continues to be an important contributor to the state's economic well-being, as it has been for many years. Thus, a high rate of both cigarette smoking and religious activity in this location makes it an ideal setting to study the religion-smoking relationship. In addition, the multiwave nature of this study enables the examination of how religious activity influences smoking behavior over time.

We hypothesize that (a) increased frequency of religious activity will be associated with lower rates of current and previous cigarette smoking (particularly among elders who frequently attend religious services *and* pray or study the Bible); (b) among those who currently smoke, the number of cigarettes smoked per day will be lower among those who are more religiously active; (c) greater religious activity will be associated with cessation of smoking in the past, and (d) religious activity at earlier waves will predict lower rates of smoking at later waves.

METHODS

The sample consisted of participants in the three in-person interviews (henceforth referred to as Waves I–III) conducted as part of the National Institutes of Health sponsored Establishment of Populations for Epidemiologic Studies of the Elderly (EPESE) project, Duke University site. Subjects were identified for the initial interview (Wave I) using a four-stage stratified probability sample of persons from five contiguous counties (one urban, four rural) in central North Carolina. In the first stage, 450 primary sampling units of approximately equal population size were selected from the survey area. In the second stage, one listing area was selected from each sampling unit. In the third stage, all households in a listing area were enumerated and a certain number were randomly selected from this list. In the fourth stage, the Kish method (40) was used to select a person age 65 or older from each eligible household (persons were identified not by letter or telephone call but by knocking on doors). Approximately half of the final sample came from the urban county and the rest from the rural ones. Because one of the original study aims was to examine black–white differences, blacks were oversampled.

In this manner, 5,223 eligible persons were identified; 4,162 persons (80% response) completed Wave I in-person interviews in 1986. Of these, 162 proxy interviews were excluded from the present analysis, leaving 4,000 participant interviews. Data on both smoking and religious activities were available on 3,968 respondents who formed the Wave I sample for this report. Wave II took place in 1989 when 3,336 in-person or proxy interviews were conducted; 664 subjects were not reinterviewed because they had either died (three quarters), refused, or were lost to follow-up. Data were available on both cigarette smoking and religious activities for 3,152 subjects, the Wave II sample for this report. Wave III took place in 1992 when 2,568 in-person or proxy interviews were conducted; the remaining 1,432 participants had either died (80%), refused, or were lost to follow-up. There were data on both cigarette smoking and religious activities for 2,396 subjects, the Wave III sample.

*Measures*

In-person interviews were conducted by trained research assistants. Included in the survey was information on participants' demographic characteristics, religious activity, and denomination, health status, and health behaviors (smoking and alcohol use).

*Demographic variables.*—Age (years, as a continuous variable), sex (male = 0, female = 1), race (white = 0, black = 1), education (years, as a continuous variable), and religious denomination were measured at Wave I.

*Religious activity.*—Religious activities measured at each wave included frequency of attendance at religious meetings or services (measured on a six-point scale, from never to more than once a week), frequency of prayer, meditation or Bible study (measured on a five-point scale, from never to daily or more often), and frequency of watching religious TV or listening to religious radio (six-point scale ranging from never to more than once a week). For categorical analyses, response options were combined to reduce the number of categories and ensure adequate cell size for analysis; for other analyses (e.g., correlations), response categories were left in continuous form.

*Physical health.*—Different religious activities are known to be either less common (church attendance) or more common (private prayer/Bible reading) among those in poorer health, and cigarette smoking is known to have adverse health effects (41). The health measure used in this study was based on the presence of five physical conditions at Wave I: heart problems, hypertension, diabetes, stroke, and cancer (42). For each condition (e.g., level of hypertension), 36 physicians provided ratings to indicate its impact on physical health (43). Physician raters were faculty or fellows in the Division of Geriatrics, Department of Medicine, Duke University Medical Center; all had extensive experience with elderly adults. When a condition was present, a respondent was given a score equal to the mean physician rating for that condition. These scores were summed across conditions to form a continuous variable (other analyses not shown here indicate that the effects of having multiple physical illnesses are probably additive, but not multiplicative). For categorical analyses, the variable was dichotomized at the midpoint of its distribution in the population (good health = 0, poor health = 1); for other analyses (correlations), it was left as a continuous variable.

*Health behaviors.*—Cigarette smoking was determined at each wave by the following questions: (a) "Do you smoke cigarettes regularly now?"; (b) if no, "Did you ever smoke cigarettes regularly?" (Wave I); and (c) "On the average how many cigarettes per day did you [or do you] usually smoke?". Number of "pack-years" was also determined for current or former smokers at Wave I. Participants were asked how old they were when they first began smoking and how old they were when they last smoked cigarettes regularly. The number of years the subject smoked was then multiplied by the average number of packs of cigarettes smoked per day (20 cigarettes per pack) during that time.

Alcohol use is known to correlate with both smoking (44) and religious activity (45). In this study, alcohol use was determined at each wave by asking the following questions: "Have you had any beer or ale during the past year?"; "Have you had any wine during the past year?"; "Have you had any liquor in the past year?". Answering "yes" to any of these questions indicated alcohol use.

*Statistical Analyses*

Sample weights were used to adjust the sample distributions for probability of selection within households of varying sizes, to adjust for biases due to nonresponse, and to match the demographic characteristics of the five county area determined by the U.S. Bureau of Census (particularly necessary because blacks were oversampled). All statistical analyses and percentages, unless otherwise noted, were weighted; numbers of subjects (Ns) were actual numbers, not weighted numbers. Cross-tabulation was used to examine the distribution of smoking status (yes/no) by level of religious activity. For categorical outcomes, two-step logistic regression was used to examine the association between smoking status and each religious variable. First, the religious variable was examined alone in the model; second, the covariates age, sex, race, alcohol use, education, and physical health were added to the model to control for their effects. Odds ratios were obtained from the logistic regression procedures. For analyses predicting future smoking status (e.g., Wave I religious activity predicting Wave II smoking status), smoking status during the previous wave (e.g., Wave I) was included in the model (residualized change analysis). For continuous variables (number of cigarettes smoked per day or number of pack-years), Pearson correlation was used for bivariate comparisons. Partial correlation was then used to partial out the effects of age, sex, race, education, alcohol use, and physical health.

RESULTS

Table 1 gives the characteristics of participants at each of the three waves of the survey. Median age at the baseline evaluation was 73 years; about two thirds of the sample were women and over 50% were black (due to oversampling). The effects of dropouts were quite small, although there was a trend towards less alcohol use, decreased cigarette smoking, and increased private religious activities from Wave I to Wave III among participants remaining in the study. In general, frequency of religious activities tended to remain stable during the six-year follow-up period; there was no evidence for greater religiousness among those who died or dropped out.

*Hypothesis 1*

*Increased frequency of religious activity will be associated with a decreased frequency of smoking.* This hypothesis was supported for attendance at religious services and private religious activity such as prayer or Bible study but not for religious TV or radio. Religious service attendance was significantly related to smoking status at all three waves (Wave I attendance vs Wave I smoking, Wave II attendance vs Wave II smoking, and Wave III attendance vs Wave III smoking) (Figure 1 and Table 2). These associations persisted after controlling for age, sex, race, education, alcohol use, and health status. Persons who attended religious services at least once a week at Wave I were 25% more likely not to smoke cigarettes at Wave I than those who attended less frequently (odds ratio 1.25, $p < .0001$).

Frequency of private prayer and Bible study was related to smoking status at Waves II and III, but not at Wave I. Unlike attendance at religious services and private religious activities, however, religious TV watching or radio listening was unrelated to smoking status—except at Wave III, where it was *positively* related (e.g., persons who watched religious TV/radio frequently were more likely to smoke).

Table 1. Characteristics of the Sample at Wave I (1986), Wave II (1989), and Wave III (1992) (Unweighted)

| | Wave I (n = 3968)* | Wave II (n = 3152)† | Wave III (n = 2396)‡ |
|---|---|---|---|
| | Mean (SD) / Col. % | Mean (SD) / Col. % | Mean (SD) / Col. % |
| Age, years | 73.3 (6.5) | 76.9 (6.2) | 79.2 (5.8) |
| Sex (% women) | 65.0 | 66.9 | 68.0 |
| Race (% black) | 53.9 | 54.2 | 54.8 |
| Education, years | 8.6 (4.1) | 8.6 (4.1) | 8.8 (4.0) |
| Alcohol use (% yes) | 32.0 | 27.7 | 24.2 |
| Cigarette smoking (% yes) | 17.3 | 13.6 | 10.8 |
| Former cigarette smoker§ (% yes) | 33.1 | — | — |
| Cigarettes per day‖ | 16.2 (10.2) | 14.4 (9.4) | 13.2 (9.5) |
| Religious denomination (% Baptist) | 59.3 | 59.4 | 59.1 |
| Attend religious services (% one or more per week) | 53.3 | 55.8 | 56.8 |
| Religious TV/radio (% once or more per week) | 75.0 | 73.0 | 76.1 |
| Private religious activities (% daily) | 56.4 | 61.3 | 69.3 |

*Note:* Col., column.
*Participants with both religious activity and smoking data; n may vary up to 3%.
†n may vary up to 9% (primarily due to missing data on alcohol use).
‡n may vary up to 10% (primarily due to missing data on alcohol use).
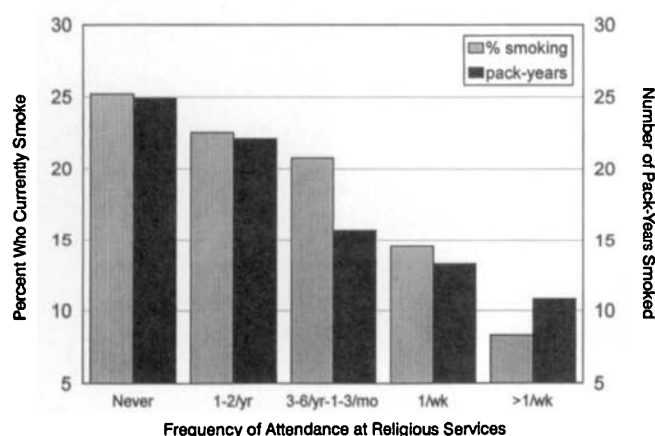§Among those not currently smoking.
‖Among those who smoke.



Figure 1. Attendance at religious services and cigarette smoking by older adults (n = 3968).

Next, the association between smoking status and four combinations of religious attendance and private prayer/Bible study were examined at Wave I. Dummy variables for "high-high," "low-high," "high-low," and "low-low" attendance-prayer combinations were created and included along with the six covariates in a logistic regression model predicting smoking status. Subjects who *both* attended religious services and prayed or studied the Bible frequently (high-high category, n = 1329) were almost 90% more likely not to smoke than persons who attended services infrequently and prayed or studied the Bible infrequently (low-low category, n = 923) (odds ratio 1.88, $p < .0001$).

*Pack-years smoked.*—To examine the association between religious activities at baseline and overall life-time exposure to cigarette smoking, we examined the total number of pack-years smoked. Frequency of attendance at religious services was inversely related to number of pack-years smoked by both current and former smokers ($r =$

$-.18$, $p < .0001$, n = 3793) (Figure 1). This association remained significant after controlling for age, sex, race, alcohol use, years of education, and health status (partial $r = -.15$, $p < .0001$, n = 3654).

Private religious activity, such as prayer or Bible study, was also inversely related to pack-years smoked ($r = -.16$, $p < .0001$, n = 3704), although controlling for covariates weakened the association (partial $r = -.04$, $p < .05$, n = 3565). The average pack-years smoked by persons who rarely or never engaged in private religious activities was 25.7, compared with 12.5 pack-years among those who prayed or studied the Bible once per day or more. Although frequency of religious TV or radio listening was inversely related to pack-years ($r = -.12$, $p < .0001$, n = 3785), the association disappeared when covariates were controlled (partial $r = -.01$, n = 3646).

### Hypothesis 2

*Among those who smoke, the number of cigarettes per day will be lower among the more religiously active.* This hypothesis was supported for all three types of religious activity (Table 3). Among those who smoked, attendance at religious services was inversely related to number of cigarettes smoked at each wave, but only the Wave I analysis retained statistical significance after other covariates were controlled. Private religious activity was also inversely related to number of cigarettes smoked at each wave, although the association retained its significance after controlling for other covariates only at Wave III. Religious TV or radio listening, on the other hand, was more consistently related to cigarettes smoked. This activity was inversely related to number of cigarettes smoked at all three waves, and associations at Waves II and III retained their significance when other covariates were controlled.

### Hypothesis 3

*Greater religious activity will be associated with cessation of smoking in the past.* To explore the relationship

Table 2. Religious Activities and Cigarette Smoking (Raw Unadjusted Weighted Percentages)

| | | Do you smoke cigarettes regularly now? (yes) | | |
| --- | --- | --- | --- | --- |
| | | Wave I | Wave II | Wave III |
| Attendance at Religious Services | | Row % | % | % |
| Wave I | Never/almost never | 25.2 | 19.8 | 14.2 |
| 1986 | 1–2 times/year | 22.5 | 16.8 | 12.7 |
| (n = 3968)* | Every few months or 1–2 times/month | 20.8 | 16.4 | 13.8 |
| | Once per week | 14.5 | 11.3 | 9.6 |
| | More than once per week | 8.3¶ | 6.7 | 6.3 |
| Wave II | Never/almost never | — | 19.7 | 13.0 |
| 1989 | 1–2 times/year | — | 20.4 | 13.1 |
| (n = 3152)† | Every few months or 1–2 times/month | — | 16.1 | 14.2 |
| | Once per week | — | 10.9 | 10.1 |
| | More than once per week | — | 7.9¶ | 6.6 |
| Wave III | Never/almost never | — | — | 15.1 |
| 1992 | 1–2 times/year | — | — | 12.9 |
| (n = 2396)‡ | Every few months or 1–2 times/month | — | — | 14.8 |
| | Once per week | — | — | 9.9 |
| | More than once per week | — | — | 6.8¶ |
| Private Prayer, Meditation, Bible Study | | | | |
| Wave I | Rarely or never | 21.8 | 19.4 | 15.7 |
| | Few times a month | 19.4 | 15.8 | 10.9 |
| | Once/week or several times/week | 19.2 | 14.7 | 12.3 |
| | Daily or more often | 13.8 | 9.7§ | 7.9 |
| Wave II | Rarely or never | — | 24.3 | 18.5 |
| | Few times a month | — | 19.8 | 18.9 |
| | Once/week or several times/week | — | 13.0 | 7.9 |
| | Daily or more often | — | 10.7¶ | 9.0 |
| Wave III | Rarely or never | — | — | 16.2 |
| | Few times a month | — | — | 21.2 |
| | Once/week or several times/week | — | — | 11.8 |
| | Daily or more often | — | — | 9.4§ |
| Religious TV or Radio | | | | |
| Wave I | Never/almost never | 19.4 | 13.7 | 12.5 |
| | 1–2 times/year to 1–2 times/month | 15.5 | 11.7 | 9.7 |
| | Once per week or more | 16.8 | 13.1 | 10.1 |
| Wave II | Never/almost never | — | 14.1 | 11.8 |
| | 1–2 times/year to 1–2 times/month | — | 12.5 | 9.8 |
| | Once per week or more | — | 13.5 | 10.3 |
| Wave III | Never/almost never | — | — | 9.4 |
| | 1–2 times/year to 1–2 times/month | — | — | 13.4 |
| | Once per week or more | — | — | 11.1§(+) |

*n may vary up to 2%; †n may vary up to 6%; ‡n may vary up to 10%.

§p ≤ .05, ¶p ≤ .001 (controlling for age, sex, race, alcohol use, education, physical health, and in the longitudinal analyses, Wave I or Wave II smoking status).

between religious activities and cessation of smoking, we reexamined associations at Wave I this time with three categories of smokers: never smoked, smoked but quit, and current smokers. There were 2,190 participants who had never smoked cigarettes, 1083 who had smoked previously, and 688 who were currently smoking.

Comparing participants who attended religious services one or more times a week with those who attended less than once a week, we found that frequent attenders were more likely to have never smoked (57.8% vs 46.5%), about as likely to have quit smoking (29.9% vs 30.6%), and less likely to be currently smoking (12.3% vs 23.0%) (p < .001,

after controlling for the six covariates using multinomial logistic regression). Participants who engaged in daily prayer or Bible study were more likely to have never smoked (59.9% vs 44.2%), less likely to have quit smoking (26.3% vs 35.4%), and less likely to be smoking now (13.8% vs 20.4%) (p < .05, after controlling for covariates). Those watching or listening to religious TV or radio at least once a week were also more likely to have never smoked (55.1% vs 47.2%), were less likely to have quit smoking (28.0% vs 35.0%), and were about as likely as less frequent viewers to be currently smoking (16.8% vs 17.8%) (p < .05, after controlling for covariates). Thus, in this retrospec-

Table 3. Among Those Who Smoke, Religious Activities and Number of Cigarettes Smoked Per Day

| | How many cigarettes per day do you usually smoke? | | |
| --- | --- | --- | --- |
| | Wave I<br>Correlation (*n*) | Wave II<br>Correlation (*n*) | Wave III<br>Correlation (*n*) |
| Attendance at Religious Services | | | |
| Wave I, 1986 | −.16* (672)‖ | −.19 (421)‖ | −.19 (256)§ |
| | −.11† (656)§ | −.05 (363) | −.07 (219) |
| Wave II, 1989 | — | −.12 (416)§ | −.17 (248)§ |
| | — | −.06 (402) | −.13 (206) |
| Wave III, 1992 | — | — | −.18 (251)§ |
| | — | — | −.12 (249) |
| Prayer, Meditation, Bible Study | | | |
| Wave I | −.08 (641) | −.09 (407) | −.13 (246)‡ |
| | −.02 (625) | .04 (349) | −.09 (210) |
| Wave II | — | −.12 (412)‡ | −.15 (246)‡ |
| | — | −.08 (398) | −.01 (204) |
| Wave III | — | — | −.27 (249)‖ |
| | — | — | −.24 (247)‖ |
| Religious TV or Radio | | | |
| Wave I | −.18 (670)‖ | −.20 (421)‖ | −.33 (256)‖ |
| | −.07 (654) | −.02 (363) | −.13 (219) |
| Wave II | — | −.26 (415)‖ | −.32 (247)‖ |
| | — | −.12 (401)‡ | −.12 (205) |
| Wave III | — | — | −.29 (251)‖ |
| | — | — | −.16 (249)§ |

*Pearson correlation (bivariate analysis).

†Partial correlation, adjusting for the effects of age, sex, race, alcohol use, education, physical health, and in the longitudinal analyses, number of cigarettes smoked at Wave I or Wave II.

‡$p \le .05$.

§$p \le .01$.

‖$p \le .001$.

tive analysis, greater religious activity was primarily related to never having smoked, rather than to the cessation of smoking (although, because highly religious people were more likely to never smoke, a smaller proportion of them were at "risk" for smoking cessation).

*Hypothesis 4*

Greater religious activity at earlier waves in the survey will predict lower rates of smoking at later waves. By Wave II (1989), 44 persons not smoking at Wave I (1986) began to smoke and 129 persons smoking at Wave I stopped smoking. By Wave III (1992), 30 persons not smoking at Wave I began to smoke and 151 persons smoking at Wave I stopped smoking. We examined the ability of religious activity at Wave I to predict smoking status at Waves II and III, using logistic regression to control for smoking status at Wave I, age, sex, race, education, alcohol use, and health status; the same was done for religious activity at Wave II predicting smoking status at Wave III.

Attendance at religious services and religious TV/radio activity at Wave I and Wave II were weak and nonsignificant predictors of smoking status at Wave II and Wave III (Table 2). Private religious activity at Wave I, on the other hand, was a significant predictor of smoking status at Wave II. Persons who prayed or studied the Bible more often at Wave I were more likely than other participants not to

smoke cigarettes (either stop or continue not to smoke) at Wave II; this effect weakened by Wave III and did not replicate for Wave II private religious activity predicting Wave III smoking status. Subanalyses revealed that private religious activity was primarily related to continuing not to smoke (odds ratio 2.00, $p = .04$) rather than to smoking cessation (odds ratio 1.15, $p = .53$).

DISCUSSION

Cigarette smoking is the principal cause of preventable disease and premature death in industrialized countries throughout the world. Cigarette smokers, taken as a whole, have a 30–80% higher death rate than nonsmokers, with most of the excess mortality due to coronary heart disease and lung cancer (46). In the present study, we found that older adults who frequently attended religious services or engaged in private religious activities like prayer or Bible study were significantly less likely to smoke cigarettes, and if they did smoke, smoked fewer cigarettes per day than less religiously active elders. Those who *both* attended religious services at least once a week and prayed or studied the Bible at least daily were almost 90% more likely not to smoke than persons less involved in these religious activities. Participants more likely to pray or study the Bible at Wave I were also significantly less likely to be smokers at Wave II. Although religious TV or radio activity was unre-

lated to or positively related to cigarette smoking, those who smoked *and* frequently watched or listened to religious media programs smoked fewer cigarettes per day than other smokers. Thus, all three forms of religious activity measured here were related to less overall cigarette smoking.

Durkheim (47) emphasized the socially integrative aspects of religious participation, and how social influences from a religious group may contribute to the development of personal identity and consequently affect behavior. Religious groups model prosocial behaviors, and as we noted earlier, may have proscriptions against the use of addictive or physically harmful substances. Religious practice offers the person an opportunity to form social bonds with others who share positive beliefs concerning health and health habits. This process likely begins in adolescence or early adulthood, when socialization experiences within religious settings may be particularly powerful in preventing the onset of tobacco use.

Futhermore, older adults who participate in religious activities may cope better with stress and therefore experience less of a need to depend on tobacco use. Cigarette smoking has increasingly become a marker for deprivation (48), a stressful lifestyle (49), neuroticism (50,51), and is associated with consumption of other drugs and alcohol (48,52). In contrast, studies have demonstrated lower rates of depression (38,53–55), anxiety (56), and alcohol abuse (38,57) for persons who are more religiously involved. The positive association between current cigarette smoking and religious TV/radio activity may be relevant in this regard. Other reports have found that persons who frequently watch or listen to religious TV or radio have poorer physical health and may be more troubled in a variety of ways (41,56), perhaps making them more prone to smoking (analyses in the present study, though, were adjusted for physical health). We have hypothesized elsewhere that passively watching religious TV programs or listening to religious radio programs may not have the health benefits of more active religious participation (41).

Interestingly, the lower rates of cigarette smoking among religiously involved elders in this study did not appear to be due to a higher rate of smoking cessation but rather to never having smoked. This emphasizes the importance of religious activity in terms of disease prevention, particularly because the negative health effects of smoking tend to be cumulative and relate to total exposure to cigarette smoke over a lifetime (46). If religious involvement can help prevent the onset of smoking in adolescence and young adulthood (28–32), it may have considerable impact from a public health perspective. A lower smoking rate among the religiously active can also help explain the lower overall mortality of this group in general (58–61) and their lower death rate from cardiovascular diseases (62–64) in particular.

To get a better sense of the impact that smoking might be having on the health of study participants, we examined the effects of being a smoker at Wave I on mortality over the next six years (1986–1992) controlling for age, sex, and education using Cox proportional hazards regression. Dates of death were confirmed using death certificates. As expected, smokers were over 50% more likely to die than were non-smokers (hazard ratio 1.54, 95% CI 1.33–1.78, $p < .0001$). Thus, we would anticipate that lower rates of smoking among religiously active elderly persons is likely to have substantial health benefits.

*Limitations*

Although the findings from this study include longitudinal data suggesting that religious activity at one point in time can influence smoking behavior 3 years later, these results were not as robust or as consistent as were the cross-sectional associations. This makes statements about religious activity "causing" lower rates of smoking quite tentative. An alternative explanation could be that cigarette smoking has a negative impact on participation in religious activities. It is also possible that other unmeasured variables could account for the associations between religious activity and smoking observed here. Nevertheless, the size and consistency of the associations, the similar results reported by other investigators examining different populations and age groups, and the clear rationale for the presence of such associations, argue for the validity of these results.

Lack of an objective measure of smoking status may have also affected the results of this study, because religious persons may have minimized the amount they smoked. The major focus of the EPESE survey, however, was not about religion. The few questions pertaining to religion were imbedded in a questionnaire with literally hundreds of other questions about health and social activities, which was administered by trained secular interviewers. Furthermore, given the widespread knowledge of smoking's effects on health and the health of others, there is probably a general tendency to minimize reports of smoking (65). We are aware of no data, however, that suggest that religious persons are intrinsically less honest about their habits than nonreligious persons.

Finally, the generalizability of our findings may be limited by the geographic location of the study in the Bible Belt region of the United States, where religious activities are part of the social fabric of society and over 60% of the population is Baptist. Over one half of our sample attended religious services at least weekly, prayed, or read the Bible at least daily, and three quarters watched religious media programs at least once a week or more. As noted before, however, older Americans tend to be quite religious in general (16,17).

*Future Research*

Future studies are needed to clarify what specific aspects of religious activity are responsible for the inverse relationship with smoking. Is it the social aspects of religion, the personal commitment to religion, or the specific content of religious belief that primarily fuels this relationship? For example, it may be interesting to compare a group of agnostic elderly persons who attend the YMCA several times a week or some other social group activity where smoking is prohibited and see if differences in smoking are similar in magnitude to that seen with those who participate in religious activities.

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