# A Longitudinal Study of Religiosity and Mortality Risk

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# A Longitudinal Study of Religiosity and Mortality Risk

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## Abstract

The relation of adult religiosity to longevity was studied in 993 participants from Terman's 70-year Life-Cycle Study. Key social and behavioral variables of physical health, psychological well-being, socioeconomic status, social support, and health behaviors were also considered. Results indicate that women who viewed themselves as more religious in adulthood (approximately age 40) had a lower risk for premature mortality than those who were less religiously inclined. These women had healthier behaviors, more positive feelings about their futures, and reported being somewhat happier than their less religiously inclined peers. In this bright, middle-class, 20th century sample, religiosity among women seems to be part of a generally healthy lifestyle, but not necessarily a direct cause of it.

## Keywords

*healthy lifestyle, healthy personality, mortality, religion, religiosity*

PHYSICIANS, the media, and constantly updated health reports proclaim the benefits of healthy behaviors, social integration, healthy personality characteristics and coping, and safe environments. Mixed in among these known predictors of health and longevity are issues of religiosity. Increasing evidence indicates that religious beliefs and practice may be associated with longevity (Idler & Kasl, 1997; Koenig, Kvale, & Ferrel, 1988; Krause, 1998; Levin & Schiller, 1987; Seeman, Kaplan, Knudsen, Cohen, & Guralnik, 1987; Strawbridge, Cohen, Shema, & Kaplan, 1997). Although direct causal links explaining the relation between religiosity and longevity have not been established, a number of studies have identified psychosocial variables related to religiosity that may point toward causal explanations. For example, religious commitment has been shown to influence health status because of its relation to lower rates of smoking, drinking, drug use, and other unhealthy behaviors, as well as with positive expectations for healing and healthy lifestyles (Idler & Kasl, 1997; Jarvis & Northcott, 1987; McFadden & Levin, 1996).

## Social support

Social theories suggest that the religious community provides a social support network that reduces feelings of isolation and establishes belonging and tangible assistance, with the likely consequence of reducing morbidity and mortality risk (Jarvis & Northcott, 1987; Johnson, 1995; McFadden & Levin, 1996; Seeman, 1996; Strawbridge et al., 1997). In some research, being affiliated with church groups emerges as the most significant support predictor of self-rated happiness and life satisfaction (compared to membership in other types of associations, e.g. Cutler, 1976). Further, religion often provides a safe haven, fostering feelings of calmness and peace (McFadden & Levin, 1996). Numerous studies have identified a connection between social support (e.g. being married, interacting with friends and/or family, and belonging to organizations) and longevity (Cohen & Syme, 1985; House, Landis, & Umberson, 1988; Tucker, Friedman, Wingard, & Schwartz, 1996; Uchino, Cacioppo, & Kiecolt-Glaser, 1996).

## Coping

In the realm of coping with stress and physiological responses, immature or hostile people may exhibit excessive responses to interpersonally challenging tasks that evoke anger-related emotional states (Suarez, Harlan, Peoples, & Redform, 1993), activating the sympathetic adrenal medullary system and increasing the risk of cardiovascular disease (Contrada, Leventhal, & O'Leary, 1990). Further, Colby, Linsky, and Straus (1994) found that those who experienced higher levels of stress smoked more heavily and were more likely to die from lung cancer and heart disease than those who experienced fewer stressful events.

Some studies have associated religiosity with an increased ability to cope with life's difficulties, resulting in better adjustment to such challenges as bereavement, illness, and isolation (Ellison, 1991; Hathaway & Pargament, 1992; Jarvis & Northcott, 1987; Johnson, 1995; Krause, 1998; McFadden & Levin, 1996; Pargament & Park, 1995). For example, Koenig, Siegler, Meador, and George (1990) found that individuals who used religion to cope with problems and difficulties in life scored lower on aggression, hostility, and rebelliousness than non-religious copers, although this approach may be counterproductive if more rational solutions are appropriate to the specific challenge. When a situation is uncontrollable, religion may be a way of obtaining secondary control by understanding and accepting the event rather than focusing on ways to change it (Frankl, 1985; Hathaway & Pargament, 1992).

## Methodology

Although insightful research has examined the relationship between religiosity and health status, these studies have often contained confounds and methodological shortcomings. One problem is the abundance of zero-order analyses (simple correlations), with failure to control for social and behavioral variables that are associated with health outcomes (Levin & Markides, 1986; Strawbridge et al., 1997). Controls for covariates with religiosity and mortality risks, as well as the time sequence of the data (e.g. prospective, retrospective, concurrent), are essential to valid inference about causality.

While it is important to control for variables having a known direct effect on mortality risk, such as smoking and drinking, variables with indirect effects on longevity should also be controlled. For example, lower levels of education and income are associated with a higher prevalence of health risk behaviors (e.g. smoking, physical inactivity, being overweight) resulting in increased mortality risk (Lantz et al., 1998).

## Personality

Well-designed studies are of special importance in this area because of the numerous relevant psychosocial and behavioral pathways to morbidity and mortality risk (Friedman & Booth-Kewley, 1987; Suls & Rittenhouse, 1990). For instance, some people have a temperamental predisposition that produces physiological hyperreactive responses, affecting their psychosocial reactions and magnifying their biological vulnerability to disease. Another pathway involves personality leading to morbidity through unhealthy or risk behaviors; for example, a person who is chronically anxious may overeat, leading to obesity which, in turn, may lead to diabetes or heart disease. Personality influences health through impacts on smoking, nutrition, driving, muscle tension, exposure to violence, cooperation with medical treatments, and many other behaviors (Friedman, 1990, 1991, 1992). On the social side, some personality characteristics tend to evoke negative responses from others while other characteristics elicit positive social support; in particular, hostile or depressed individuals tend to have trouble initiating and maintaining close relationships, as do repressive persons (Cohen & Syme, 1985; Emmons, 1992; House et al., 1988; Taylor, Repetti, & Seeman, 1997; Temoshok, 1990; Tucker & Friedman, 1996; Uchino et al., 1996). The connection between personality and religiosity is complex. Individuals with certain personality traits may be more inclined toward religion than individuals lacking those traits. Conversely, religious upbringing may affect the development of personality, stimulating the development of certain traits while inhibiting others (Koenig et al., 1990). It is unclear whether or when a specific type of personality or set of characteristics influences one's level of religiosity or whether a religious upbringing or training influences one's personality.

## The present study

Religiosity has complex relations to personality, social relations, reaction patterns, and health behaviors (Koenig, 1998). Some of this web of interrelations can be untangled if precursors, correlates, and sequelae of religiosity are examined in a prospective design, with an ultimate focus on longevity. The present study begins such an analysis by examining the role of religious inclination in the lives of participants who were studied in the Terman Life-Cycle Study from childhood, in the early 1920s, until the present (many are now dead). In particular, the present study examines: (1) the extent to which participants' religiosity in adulthood predicts mortality risk over the following four decades; (2) the extent to which health behaviors are positively associated with religion, thereby partially explaining a relation between religiosity and mortality risk; (3) the relationship among personality characteristics, social relations, religiosity, and longevity; and (4) the extent to which religiosity is related to greater happiness in both mid- and late adulthood.

## Method

### *Participants*

The data were derived from the Terman Life-Cycle Study which was begun in 1921–2 by Lewis Terman (Terman & Oden, 1947, 1959), and which has been supplemented by further information gathered and derived by Friedman and colleagues, including smoking data and death certificates (Friedman et al., 1995). The original sample consisted of 856 males and 672 females, most of whom were recruited from schools in California after being identified by their teachers as gifted and achieving a Stanford-Binet IQ score of at least 135. The average year of birth for participants was 1910, so their average age at the onset of the study was 11 years. The sample was homogeneous in terms of ethnicity and socio-economic status, consisting of participants selected mostly from white, middle-class families. Terman was interested in the traits, characteristics, and life paths of gifted children (Terman & Oden, 1947). Participants

(and sometimes parents, teachers, and/or spouses) were administered questionnaires every 5 to 10 years throughout their lives.

In the present study 267 of Terman's 1528 participants were initially eliminated: (1) 155 participants (10 percent) were excluded because they were not of school age when data collection began; (2) 112 participants (7 percent) either died, dropped out of the study, or were lost to follow-up prior to 1950, the year during which the adult religiosity data used in this study were collected. (Participants lost from the Terman study are not known to differ in any systematic way from those who remained in the study; Sears, 1984.) Of the 1261 participants remaining in 1950, a total of 993 (547 males, 446 females) responded to the 1950 religiosity question and were consequently included in the present study. As of 1991, 517 (52 percent) of these individuals were still alive, 403 (40 percent) had died (almost all verified by death certificates we collected), 6 (1 percent) were known to be dead but their death date was unknown, 41 (4 percent) were known to be alive but had not responded since 1978, and 26 (3 percent) had an unknown vital status.

## Cause of death

Death certificates (through 1991) were obtained, whenever possible, for deceased participants from state bureaus (Friedman, Tucker, & Martin, 1994). A certified nosologist supervised by our physician-epidemiologist, Dr Criqui, coded the death certificates for underlying cause of death (using the ninth revision of the International Classification of Diseases: ICD-9, 1980). In cases where death certificates were unavailable, information from next-of-kin was used by Dr Criqui to classify cause of death. Deaths were grouped into five broad categories: cardiovascular disease; cancer; injury; other; and unknown. The number of deaths from each cause, for the 403 verified dead participants, is as follows: 143 (35 percent) deaths from cardiovascular disease, 134 deaths (33 percent) from cancer, 29 deaths (7 percent) from accident or injury, 60 deaths (15 percent) from all other causes, and 37 deaths (9 percent) from unknown causes.

## Religiosity measure

In 1950, participants were asked, 'As an adult, to what extent are you religiously inclined?' Four response options were available: 1 = not at all; 2 = little; 3 = moderately; and 4 = strongly. This question did not require respondents to be affiliated with a particular religion or to regularly attend religious services; rather it was more global in nature, assessing one's general feelings of religious conviction whether expressed publicly or privately. Levin and Markides (1986) warn against measuring religiosity by examining religious attendance *exclusively*, arguing that the ability to attend religious functions (or any other functions for that matter) is an indicator of other things such as one's physical capacity to be active. Thus, although general, this question may in some ways be a better reflector of religiosity than certain more specific measures.

This 1950 measure of religiosity was highly correlated with a measure assessed 10 years earlier, 'Amount of interest in religion' (5-point scale), for males $r$ (493) = .54, $p < .001$ and for females $r$ (417) = .55, $p < .001$. Thus the 1950 measure seems to be a reliable single item. The 1940 measure was in turn significantly associated in expected ways with other 1940 religious activities measures such as length of time attending Sunday school ($r$ (610) = .21, $p <$ .001) and whether a member of a church at time of marriage ($r$ (615) = .26, $p < .001$). It is important to note, however, that assessing a multidimensional construct such as religiosity with a single item greatly simplifies a complex phenomenon and thereby limits the conclusions that can be drawn. This limitation, however, can be balanced against the strengths the present study gains by using a rich longitudinal data set with a longevity outcome, verified by death certificates.

*Control variables* We selected a number of theoretically relevant variables for further exploration as possible mediators of any relationship between religiosity and mortality risk. These are outlined below.

*Physical health*: Participants rated their own physical health in 1950 using a 5-point Likert scale (1 = very poor, 2 = poor, 3 = fair, 4 = good, and 5 = very good).

*Psychological well-being*: An overall assessment of participants' psychological well-being was compiled in 1950 by Terman and his

colleagues. At several assessments, participants were asked whether they had experienced any 'tendency toward nervousness, worry, special anxieties, or nervous breakdown'. If participants had experienced any of these difficulties, they were asked to explain the situation. Participants' psychological well-being was rated by Terman's researchers based on cumulative information derived from participants' responses as well as other sources, such as parents and spouses. The psychological well-being variable was coded on a 3-point scale (0 = no difficulty, 1 = some difficulty, 2 = considerable difficulty). Participants in the first category coped well with everyday problems and were considered typical in terms of their emotional make-up. Those in the second category had experienced feelings of inferiority or inadequacy, anxiety, or emotional conflicts but were nevertheless functional. The third category included those who showed marked symptoms of anxiety, depression, personality maladjustment, psychopathic personality, or had suffered a nervous breakdown (whether hospitalized or not).

*Adult income*: Participants' income was recorded each year between 1946 and 1949 and this variable indicated the participants' mean income from 1946 through 1949. (Note that some participants received other income, such as room and board, which was not included in this measure; as such, income may be underestimated for some participants.)

*Education level*: Participants' educational level as of 1950 was indicated by the highest grade completed, up to a maximum of 22 (6+ years of postgraduate education).

*Marital status*: In 1950, marital history and status was assessed based on a dichotomous measure (1 = marriage was intact as of 1950, 2 = participant had experienced divorce as of 1950). Participants who were widowed (very few) or had never married at the time of this assessment were excluded from these analyses.

*Organizational involvement*: In 1950, participants indicated the number of organizations that they belonged to (0 = no organizations, 1 = one organization, and 2 = two or more organizations).

*Drinking and smoking*: Alcohol consumption was assessed in 1950 through self-reports. Participants were classified as abstainers (coded as 0: never taking a drink or only on rare occasions), light to moderate drinkers (coded as 1: never or seldom intoxicated), or heavier drinkers (coded as 2). While some studies have found moderate drinkers to be at a decreased mortality risk (Kaplan, 1992; Mertens, Moos, & Brennan, 1996), there is no evidence that moderate alcohol consumption is protective for individuals in the Terman study (Friedman et al., 1995; Martin et al., 1995). Therefore, alcohol use was described as a continuous variable ranging from 0 through 2.

Smoking information was obtained in 1991–2 (Friedman et al., 1995). Participants who could be located were sent a postcard asking whether they smoked cigarettes, for how many years they had smoked, and the average number of cigarettes per day they smoked during the years that they smoked. If participants were not alive or could not be located, a close relative (if known) was sent a postcard requesting the same information. Not all participants or families could be contacted. Therefore, the sample size for analyses involving the smoking measure is smaller, leaving the potential for bias in this subsample (since those who chain-smoked and died young were less likely to be located, the mediating effect of smoking may be underestimated). The number of 'packyears' was computed for each participant as: [(Total number of years smoked × Average number of cigarettes per day smoked during those years) / 20]. This variable was recoded into a 4-category smoking variable (0 = never smoked, 1 = .01–16 packyears, 2 = 16.01–44 packyears, 3 = 44.01–180 packyears).

### Personality and happiness predictors and sequelae

The following variables were used to examine whether or not personality characteristics (theoretically related to morbidity and/or mortality) and self-rated happiness were associated with religiosity. The inclusion of childhood characteristics assists in determining whether or not distinct personality characteristics, developed young in life, were related to religiosity in adulthood.

*Childhood* In 1922, when participants were about 12 years of age, their teachers rated them on prudence and forethought, conscientiousness, and generosity and unselfishness using 13-point

scales (low scores indicating lack of prudence, low conscientiousness, etc.). Previous research found that childhood conscientiousness was strongly predictive of longevity (Friedman et al., 1993). In 1928, when participants were in their late teens, their parents rated them on freedom from vanity and egotism and on sympathy and tenderness using the same 13-point scales.

*Mid-adulthood ratings* In 1950, when participants were approximately 40 years of age, they rated their happiness of temperament, how conforming they were to authority, and self-confidence (an 11-point Likert scale).

*Later adulthood* In 1972, at approximately 62 years of age, participants rated their feelings about their upcoming years (age 70–75) using a 4-point scale (where 1 = expect to dislike being retired and 4 = expect to enjoy these years thoroughly). In 1977, participants rated their lifetime satisfaction with religion (a 5-point scale ranging from 'not at all satisfying' to 'highly satisfying') and their present level of happiness (a 3-point scale ranging from 'not too happy' to 'very happy').

### Analytic procedures

The analyses proceeded in the following order. First, distributions were computed for each variable in order to evaluate whether their variability was adequate for further analyses. Second, to examine whether the extent to which participants were religiously inclined predicts mortality risk, survival analyses (Cox's proportional hazards regression) were used. Survival analyses estimate how mortality risk increases as one ages. These analyses were replicated using the parametric Gompertz model, which is more rigid with respect to the hazard function but allows a test of whether the effects vary as a function of age. Both types of analyses produced near-identical results. To calculate mortality risk for those who were known dead, either their age at death, based on a death certificate (most cases), or their age at death, based on other reliable information (such as contemporary reports from relatives) is used. Approximately 30 percent of the Terman sample were known to still be alive in 1991 (the year through which analyses were conducted). It is not known how long these individuals will live, but the fact that they lived to at least 1991 is included in the survival model. For those who are not known to be dead, the last year that they participated in the study is used. The time or age at which one begins observing participants is also included in the survival analysis. The survival analyses in the present study were restricted to the period after 1950, the year when the religiosity information was gathered. Additionally, we examined whether religious inclination was related to all-cause mortality or differentially related to specific cause of death. The RATE software program (Tuma, 1980) was used for survival and cause of death analyses.

Third, to examine the extent to which psychosocial factors and health behaviors positively associated with religion, thereby partially explaining a relation between religiosity and mortality risk, the relationship between religiosity and possible control variables was examined and control variables were entered in survival analyses separately. Finally, Pearson correlation coefficients were conducted separately by sex to examine the relationship between religiosity and personality characteristics (related to religiosity and longevity), happiness, and feelings about the future.

## Results

### Adult religiosity and mortality risk

Cox proportional hazards regression analyses (survival analyses) were conducted to determine whether 1950 religiosity was related to mortality risk. When 1950 religiosity was included in the model, controlling for sex, religiosity was marginally protective for the overall sample ($rh$ (993) = .92, $p < .10$). Proportional analyses indicate the relative hazard, an estimate of the relative risks of dying, associated with a 1-point change on the variable of interest. Therefore, in the present analyses the relative risks of dying are calculated by comparing a rating of 1 'not at all' religiously inclined and a rating of 2 'little' religiously inclined, between 2 'little' religiously inclined and 3 'moderately' inclined, and so forth.

Analyses were then conducted separately by sex to determine whether the relation between religiosity and mortality was different for men and women. For males, religiosity had only a slight relation to longevity ($rh$ (547) = .98, NS)

but females who were more religiously inclined in adulthood were at a 16 percent lower mortality risk than females who were less religiously inclined ($rh$ (446) = .84, $p < .05$).

Control variables were then analyzed regarding possible causal links. Based on correlational analyses, self-reported physical health (1950) ($r$ (993) = −.02, NS), psychological well-being (1950) ($r$ (969) = −.01, NS), marital status (1950) ($r$ (870) = −.03, NS), income ($r$ (729) = −.03, NS), and education ($r$ (958) = −.06, NS) were not related to religiosity and were therefore not considered further. Organization involvement ($r$ (72) = .13, $p < .001$), smoking ($r$ (613) = −.21, $p < .001$), and drinking ($r$ (967) = −.20, $p < .001$) were correlated with religiosity and predictive of longevity (in previous survival analyses; Friedman et al., 1995) and were therefore entered in survival analyses as possible mediating variables.

When correlations were examined by sex, females who were religiously inclined were involved in more organizations ($r$ (435) =.19, $p < .001$), smoked less ($r$ (299) = −.22, $p < .001$), and drank less ($r$ (432) = −.23, $p < .001$) than females who were less religious. Religiously inclined males were more likely to have an intact marriage ($r$ (488) = −.11, $p < .05$), were involved in more organizations ($r$ (537)= .09, $p < .05$), smoked less ($r$ (314) = −.17, $p < .01$), and drank less ($r$ (535) = −.14, $p < .002$) than less religious males.

Each control variable was added to the Cox model separately to determine whether the relation between religiosity and mortality risk remained after controlling for each. When organizational involvement was included in the model, religiosity remained significantly related to mortality for females ($rh$ (972) = .85, $p < .05$), indicating that being involved in organizations, an activity associated with social support, did not account for the relation between religiosity and a lower mortality risk. When smoking was included in the model with religiosity, the relation between religiosity and mortality risk was no longer statistically significant. The relative hazard for females remained at .84 indicating that religiosity was protective for females ($rh$ (299) = .84, NS), but no longer at a statistically significant level. Similarly, when alcohol consumption was included in the model, the relation between religiosity and morality risk remained only marginally significant for females ($rh$ (432) = .87, $p < .10$).

For males, the relation between religiosity and mortality risk remained minimal when controlling for organizational involvement, smoking, and alcohol consumption ($rh$ (537) = 1.01, NS; $rh$ (314) = 1.04, NS; $rh$ (535) = 1.01, NS, respectively).

### *Cause of death*

We examined whether or not religiosity was differentially related to specific cause of death, or whether it predicted all-cause mortality. To do this we compared a model in which religiosity was free to predict more or less strongly to specific causes of death with one in which religiosity was constrained to predict all causes equally. The unconstrained model did not provide a significantly better fit to the data than the constrained model (change in $\chi^2$ = 2.13, d.f. = 4, NS). Thus, although religiosity is related to mortality risk for women, it is not related differentially to specific causes of death.

### *Religiosity, personality characteristics, and sequelae*

Correlational analyses were conducted to explore why religiosity was protective for females and to understand why the relationship between religiosity and mortality was significant for females and not for males within this sample. Variables were chosen based on personality characteristics expected among religiously inclined individuals that would also be related to morbidity and/or mortality. For example, people prone to religiosity were expected to have developed positive characteristics such as unselfishness, tenderness, prudence, and generosity. These characteristics are often encouraged by religious affiliations and religious teachings. Further, individuals possessing such characteristics may seek others who share the same attributes and consequently be attracted to religious organizations. Individuals possessing these characteristics would then be more likely to elicit social support as well as have healthy personalities (e.g. non-hostile, non-competitive). Religious involvement and convictions may prescribe specific behaviors and lifestyle that, in turn, result in greater happiness and increased longevity.

Personality characteristics and levels of hap-

piness were examined separately by sex using childhood, mid-adulthood, and later adulthood assessments.

*Childhood* Using 1922 teacher ratings (when participants were approximately 12 years of age) of participants' traits, females who were religiously inclined in adulthood tended to have more prudence and forethought ($r$ (376) = .13, $p$ < .05) and be more generous and unselfish ($r$ (374) = .15, $p$ < .01) than females who were less religiously inclined in adulthood. Conscientiousness was not related to religiosity among these women ($r$ (426) = .08). For males, religiosity was not significantly related to prudence and forethought ($r$ (451) = .01), generosity and unselfishness ($r$ (461) = .02), or conscientiousness ($r$ (533) = .05).

In 1928, when participants were in their late teens, females who were more religiously inclined as adults were more likely to be rated by their parents as sympathetic and tender ($r$ (256) = .12, $p$ < .05) than those less religious. Religiosity was not significantly related to freedom from vanity and egotism among females ($r$ (253) = .04). For males, religiosity was not significantly related to parent ratings of sympathy and tenderness ($r$ (286) = .11) or freedom from vanity and egotism ($r$ (287) = .06).

*Mid-adulthood* In 1950, when participants were approximately 40 years of age, self-reports indicated that females who were religiously inclined as adults also had a happy temperament ($r$ (439) = .12, $p$ < .05). Religiously inclined females conformed to authority ($r$ (439) = .26, $p$ < .001), tended to lack self-confidence ($r$ (375) = −.15, $p$ < .01), and were not as easy to get on with ($r$ (375) = −.11, $p$ < .05) compared to less religious women.

Religiously inclined males conformed to authority ($r$ (543) = .26, $p$ < .001) and tended to lack self-confidence ($r$ (502) = −.18, $p$ < .001) compared to less religious men. No significant relationship was found between males' level of religiosity and their happiness of temperament ($r$ (536) = .08) or how easy they were to get on with ($r$ (504) = −.05).

*Later adulthood* In 1972, when participants were approximately 62 years of age, women who were religiously inclined expected to enjoy their upcoming years of age 70 to 75 more th those less religiously inclined ($r$ (287) = .20, < .001). In 1977, the more religious women h experienced greater satisfaction with religi throughout their lives ($r$ (198) = .36, $p$ < .00 and were happier later in life ($r$ (331) = .18, $p$ .01) than less religious women.

In 1972, males who were religiously inclin in adulthood expected to enjoy their upcomi years more than those less religiously inclined (332) = .11, $p$ < .05). In 1977, males who we religiously inclined had experienced greater s isfaction with religion throughout their liv than less religious men ($r$ (202) = .50, $p$ < .00 but religiosity was not significantly related their happiness in later life ($r$ (331) = .04).

## Discussion

This study of mostly white, middle-class adu born early in the 20th century, demonstrated th women who were more religiously inclined mid-adulthood (around age 40) had a lower ri of premature mortality during the following fo decades than women less, or not at all, re giously inclined. Due to the prospective natu of the study design, and because religiosity w not confounded with socio-economic statu education, or pre-existing health, we can reasonably confident that it is something abo religiosity and its correlates that is predictive lower mortality risk.

Although religiously inclined women b longed to more organizations than less religio women, controlling for organizational involv ment had only a modest impact on the relati between religiosity and mortality risk. Soc involvement does not fully account for the rel tion between religiosity and mortality risk. Ho ever, women in this sample with greater religio inclination smoked and drank less than wom less religiously inclined. When controlling f each of these health behaviors, the mortality ri associated with religiosity was substantial decreased, suggesting that good health practic may explain the relation between religiosity a mortality risk among these women. This mak sense considering the well-established morbidi and mortality risks associated with smoking a drinking, and there may be other (unmeasure associated health behaviors such as diet that al contributed to the effect.

Interestingly, religiously inclined women self-ported greater happiness both in mid-life and later life than those less religiously inclined. oes this link between religiosity and happiness omehow affect longevity? A positive relation-ip was found between happiness and sub-ctive life expectancies (Joubert, 1992) and etween happiness in old age and survival time Deeg & van Zonneveld, 1989). Among the lderly, happiness (as rated by interviewers) has een found to be related to decreased mortality isk after controlling for health status and gender Zuckerman, Kasl, & Ostfeld, 1984). Perhaps he happiness experienced by the religiously nclined women may have been a component ontributing to reduced mortality risk.

The results of this study not only suggest a decreased mortality risk associated with adult religiosity for the women in this sample but they also provide insight into these women's complex personalities and lives. For example, a religiously inclined woman, by mid-adulthood, was involved in a number of organizations, avoided unhealthy habits, and was happy. She tended to conform to authority and considered herself lacking in self-confidence. By late adulthood, she felt an overall satisfaction with religion throughout her life, continued to be happy, and she looked forward to and expected to enjoy the future. Considering the childhood characteristics associated with these religiously inclined women (e.g. prudence and forethought, generosity and unselfishness, and sympathy and tenderness), these women were not likely to have developed hostile or competitive personalities—another factor possibly contributing to their longevity.

Two limitations of this study are worth noting. First, the Terman sample, born in the early 1900s, is relatively homogenous in terms of intelligence, ethnicity, and socio-economic status and consequently is not a representative sample of the US population as a whole. These characteristics may restrict the generalizability of the results to other groups of individuals and to individuals at a different point in time. However, in the present study, the sample's homogeneity is advantageous in minimizing demographic confounders, allowing for the examination of religiosity and mortality within a sample that had adequate nutrition, access to medical care, and had an understanding of health information. Future studies should investigate whether variability in these demographic characteristics impinges upon the relations between religiosity and longevity.

A second limitation of the study is the measure of religiosity. For example, the effect of private religious practice on longevity cannot be compared to the effect of public religious practice on longevity. Measures of behaviors such as lifelong prayer and scripture reading are not available to examine their influence on the relation between religiosity and longevity.

In this intelligent, well-educated sample of Californians, religious commitment often seemed to be part of women's generally prudent lifestyle, with significantly less likelihood of smoking and drinking. This study thus provides previously unavailable information about religiosity and health in a lifespan context in a bright, educated sample. Since this was not an experimental or interventional study, however, it leaves unanswered questions about the extent to which risk-averse people may select themselves into a religious context. In fact, girls with a prudent and unselfish personality grew up to be somewhat more religious in adulthood. In other words, it seems very possible that certain prudent people choose religious and community involvement, as opposed to the concept of a religious intervention single-handedly improving the coping skills and health habits of those not so predisposed. Future research that addresses such questions more directly should remain cognizant of the many possible interrelated pathways of associations between religiosity and health, many of which do not involve a causal relationship.

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