

## The mismeasurement of religion in mortality research

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**ABSTRACT** *This paper reviews the existing research on mortality among members of specific religious faiths in comparison with the general population and examines the methods used to ascertain and categorize religious affiliation in mortality research. Having obtained these studies by using standard literature retrieval methods, we then noted the methods used in each of these studies to ascertain and categorize religious affiliation. We found that mortality researchers only rarely examined religious affiliation. When they have done so, they have tended to use religious taxonomies that do not adequately capture religious diversity, and too frequently have ascertained subjects' religious affiliation exclusively by inferring it from subjects' cemetery of burial or funeral home. Given the recently observed links between religion and physical health and longevity, we recommend that mortality researchers include more adequate measurements of religion in future studies.*

Around the world and through most of history, religious concerns have shaped people's attitudes, beliefs, and behaviours. In many countries, religious concerns continue to be salient factors even today. The USA, for example, is a highly religious country, with 92% of its population affiliated with a religion (Kosmin & Lachman, 1993). According to a recent Gallup survey of a nationally representative sample, 96% of Americans believe in God or a universal spirit, 42% attend a religious worship service weekly or almost weekly, 67% indicate that they are members of a church or synagogue, and 60% indicated that religion is 'very important' in their lives (Gallup, 1995). Although the USA is by far the most religious of all industrialized Western nations, a considerable percentage of citizens in most of the world's nations continue to place religious concerns quite highly in their lives (Gallup, 1979).

Given the ubiquity and salience of religious concerns in the lives of many people, it is understandable that researchers have, from time to time, attempted to assess the potential influence of religion on mortality and longevity. Many such studies have examined the role of ordinal or interval measures of religious

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involvement (such as frequency of church attendance, belief in God, or frequency of prayer), as predictors of mortality. McCullough *et al.* (1999) identified roughly 40 independent samples in which the association of a measure of religious involvement and a measure of survival, mortality or longevity was examined. In their meta-analysis of these data, representing over 100,000 subjects, they found that religious involvement played a non-trivial role in predicting mortality and that the religious involvement—mortality relationship was maintained even in studies that controlled for variables such as age, gender, physical health status, social support and depression. These findings suggest that certain religious beliefs, practices and attitudes might be related to lower mortality.

In the present paper we examine the relationship between religion and mortality, but in a different way. We explore the research data on the extent to which religious affiliation—that is, the religious faith with which one identifies—could itself be an important predictor of mortality. Second, we report the results of a systematic review of previous studies that examined the methods used to ascertain religious affiliation in mortality research. Third, we call for future research efforts to be more diligent in accurately and completely assessing subjects' religious affiliation.

### **Religious affiliation and mortality: what we know**

Over the past century, researchers have learned much about the mortality of many religious groups. To date, these studies have focused on mortality in (a) Judaism; (b) Conservative Christian religions with strong dietary and lifestyle proscriptions; (c) religious groups that eschew standard medical care. These findings have typically resulted from comparing the mortality rates of such religious groups with the mortality rates of the general population.

#### *Mortality among Jews*

Over a century ago, Billings (1891) discovered a lower death rate among Jews in a study of 10,000 Jewish families. Years later, Bolduan & Weiner (1933) published their seminal paper on the causes of death among Jews in New York City, reporting lower death rates from tuberculosis, pneumonia and uterine cancer, but higher death rates from cancers of the breast and digestive organs. Since these early studies, a considerable amount of evidence has been amassed on mortality among Jews. Using a sample of over 10,000 civil servants in Israel, Goldbourt *et al.* (1993) recently reported evidence that Orthodox Jews might have, in general, slightly longer lives than do secular Jews. Other recent research shows that Jews are at elevated risk for mortality from several forms of cancer, although they are disproportionately spared from others. Dwyer *et al.* (1990) used county-level data to examine the link between religious affiliation and county cancer rates in a sample of over 3,000 US counties. They found that, even after controlling for a variety of risk factors, counties in which Jews were

highly concentrated had higher cancer mortality rates than counties with lower concentrations of Jews. While such ecological data are provocative, they do not prove that Jews themselves are more vulnerable to cancer mortality, but only that people who live in counties with relatively high proportions of Jewish people have high cancer mortality rates.

Fortunately, many other researchers have examined cancer mortality among Jews more closely. MacMahon (1960) found that death from cancers of the stomach, colon, pancreas, ovary, kidney, and from melanoma, glioma, sarcoma, Hodgkin's disease and leukemia were more common among Jews compared with non-Jews, but that Jews suffered fewer deaths from tongue, buccal, pharynx, larynx, lung, prostate, bladder, and cervical cancers. Jewish men, in particular, appear to be at a considerably reduced risk of dying from cancer (Seidman, 1970, 1971). They appear to be at reduced risk for penile cancers (King *et al.* 1965), and cancers of the tongue, larynx, mouth and lung (Greenwald *et al.* 1975; Herman & Enterline, 1970; Horowitz & Enterline, 1970; MacMahon, 1960; Seidman, 1966). However, Jewish men appear to be at increased risk of fatal cancers of the colon, Hodgkin's disease and leukemia (Greenwald *et al.* 1975; Seidman, 1970, 1971). Conversely, Jewish women appear to have an elevated cancer risk. Seidman (1970, 1971) found that Jewish women were, overall, more likely to die from cancer than non-Jewish women, although they were protected from death resulting from cancers of the uterus. Greenwald *et al.* (1975) found higher mortality rates in Jewish females from cancers of the stomach and lung, but lower rates from cancers of the cervix and breast. King *et al.* (1965) reported very low rates of cervical cancer among Jewish women when compared with the general female population of New York. However, they also found higher rates of lung cancer among Jewish women compared with non-Jewish women. The high rates of lung cancer in Jewish women could not be explained by excess smoking among the Jewish women.

#### *Mortality among Christians with severe lifestyle proscriptions*

A second group of studies have investigated the mortality patterns of four Christian groups who have strict proscriptions against the consumption of tobacco, certain foods and certain beverages. These groups include the Latter-day Saints (Mormons), Seventh-Day Adventists, and Amish and Hutterites (two sociologically and geographically isolated Christian sects in North America).

*Latter-day Saints.* In their ecological study of mortality rates in over 3,000 US counties, Dwyer *et al.* (1990) found that counties in which Latter-day Saints (LDS — Mormons) were highly concentrated had lower cancer mortality rates than those counties with lower concentrations of Mormons. Studies conducted based on individual-level data rather than ecological data led to the same conclusion. Thanks in part to the strict proscriptions against the use of tobacco, alcohol and caffeine, LDS members enjoy roughly four additional years of life

in comparison with the general US population (Jarvis, 1977). LDS members in countries outside of the USA seem to enjoy a favourable life expectancy also (see Smith *et al.*, 1985). This protection from early death appears to result largely from lower mortality from cancer and cardiovascular disease (e.g. Enstrom, 1975, 1978, 1979, 1980; Lyon *et al.*, 1977; Lyon *et al.* 1978). To be sure, the differential life expectancy of members of the LDS is partially related to less tobacco, alcohol, and caffeine use among LDS members, but might also be related to differences in social support, physical activity, and religious factors *per se* (Jarvis & Northcott, 1987).

*Seventh-Day Adventists.* Studies involving samples from the USA (Lemon & Kuzma, 1969; Lemon & Walden, 1966; Phillips *et al.*, 1980a; Phillips *et al.*, 1980b; Phillips *et al.* 1978; Phillips & Snowden, 1983; Zollinger *et al.*, 1984), the Netherlands (Berkel, 1979; Berkel & deWaard, 1983) and Norway (Waalder & Hjort, 1981) confirm that Seventh-Day Adventists have substantially lower mortality than do members of the general population. Seventh-Day Adventists, like Latter-day Saints, are strongly discouraged from using coffee, tea, tobacco and alcohol. In addition, they are strongly discouraged from eating meat, poultry or fish. Their rates of premarital sex are thought to be low and community cohesion is thought to be quite high (Troyer, 1988). All these factors might work in concert to provide Seventh-Day Adventists with such a favourable life expectancy. Most likely, many dietary, social and psychological factors are at work, since they appear to be at reduced risk of mortality from cancer, respiratory disease, heart disease and accidents (Jarvis & Northcott, 1987). Their lives are, on average, two to four years longer than those of the general population (Berkel & deWaard, 1983).

*Amish and Hutterites.* The Amish are descendants of Swiss Anabaptists who settled in the USA at the beginning of the 18th century. They are almost completely rural, they live in tight-knit communities, they eschew modern conveniences, and they discourage alcohol and tobacco use. The Hutterites (who live in the USA and Canada) have a similar lifestyle. Neither group restricts the consumption of meat or caffeinated beverages (Levinson *et al.*, 1989; Troyer, 1988). All-cause mortality has found to be lower among Amish young women than among non-Amish young women. Conversely, Amish mortality rates are higher than the general population for women aged 70 and older (Hamman *et al.*, 1981). Amish men aged 40 and older have lower all-cause mortality than do non-Amish men in the same age group. This favourable mortality profile results from reduced mortality from circulatory, digestive and respiratory disorders (Hamman *et al.*, 1981). Hutterite men have higher death rates from leukemia than does the general population, but lower mortality from cancers of the lung (Gaudette *et al.*, 1978; Martin *et al.*, 1980). Hutterite women have lower rates of cervical cancer than do women in the

general population—an effect that might be partly the result of low rates of extramarital sex (Troyer, 1988).

*Mortality and members of religious groups that eschew standard medical care*

Some members of certain conservative religious groups reject standard medical care. The available data indicate that members of such groups are at elevated risk for child and adult mortality. For example, in a recent study, Asser & Swan (1998) reviewed records from 172 cases of religion-motivated medical neglect that resulted in the death of a child. For the most part, these deaths occurred in families that belonged to extremely isolated Christian sects which objected to the use of modern medical care. In this study, researchers found that 140 of the 172 children died of ailments that would have had more than a 90% likelihood of being cured if proper medical care had been received. Another 18% had ailments with a greater than 50% likelihood of being cured. Only three of the 172 children whose cases were reviewed had died of conditions that would not have responded positively to medical care. These findings echo the findings of other studies documenting excess child and adult mortality among religious groups that forego standard medical care (e.g. Kaunitz *et al.*, 1984; Simpson, 1989; Wilson, 1965).

**Are standard methods capable of detecting these differences?**

The above review demonstrates that many of the world's religious groups possess differing patterns of mortality. Of course, many of these differences can probably be explained in terms of differences in food and beverage consumption, alcohol and tobacco use, and sexual practices. However, important religious differences in mortality might still persist when such variables are controlled. Moreover, it is important to realize that it is, in many cases, *the religious convictions, behaviours and values* of such groups *per se* that are responsible for their mortality-relevant behaviours (such as foregoing certain foods, beverages or substances). Thus, even if the effects of religious affiliation on mortality are completely mediated by health behaviours (thereby rendering religious affiliation differences trivial when these later factors are held constant), religious affiliation could nonetheless remain a more distal cause of (and a potentially important marker for) mortality.

Given the substantial diversity of the world's religious landscape, it cannot be taken for granted that subjects' religious affiliation is adequately measured in standard mortality research. In the USA, for example, the law prevents the US Census Bureau from assessing any aspects of religious involvement or belief. In the absence of such official religious statistics, researchers have had to rely on indirect methods and their own wits to collect religious affiliation data on subjects in large survey samples. Despite the valiant efforts of researchers to assemble religious information in the absence of official religious statistics, two methodological weaknesses in how religious affiliation is typically measured in

mortality research might potentially limit the validity and utility of the findings from this corpus of research.

First, many of the taxonomies used to classify subjects' religions are extremely limited in their capacity to capture religious diversity. For example, a commonly used taxonomy for religious affiliation is a four-class taxonomy that classifies subjects as (a) Catholic, (b) Jewish, (c) Protestant, or (d) affiliated with another religion or no religion. However, given that literally thousands of religious traditions exist, such simple taxonomies blur potentially important mortality-relevant distinctions among religious groups. Second, some researchers have used methods for ascertaining religious affiliation that have limited validity. One common practice for ascertaining religious affiliation in mortality research has been to infer subjects' religious affiliation from the cemetery in which they were buried or the funeral home to which their bodies were taken after death (a datum that is noted on death certificates in some US states). Thus, subjects buried in Catholic cemeteries have been classified as 'Catholic', those buried in Jewish cemeteries have been classified as 'Jewish', and those buried in 'Protestant' or 'non-sectarian' cemeteries (or who were cremated) have been classified as 'Protestant'. This practice apparently began in 1957 with MacMahon & Koller, who, to their credit, examined the validity of these inferences by checking inferred religious affiliation against hospital records. They found that people buried in Catholic cemeteries generally are Catholic, and that people buried in Jewish cemeteries generally are Jewish. However, they found that Protestant and non-sectarian cemeteries contained a significant proportion (37%) of non-Protestants. Despite the low correspondence between Protestant burial and the deceased actually having been affiliated with a Protestant denomination, we suspect that researchers following in the footsteps of MacMahon & Koller (1957) may have abandoned the expensive step of cross-validating data on religious affiliation obtained from death certificate data.

In the present study, we examined the seriousness of the problem of limited classification or misclassification of religious affiliation in research on religious affiliation and mortality. In particular, we examined (a) the frequency with which religious affiliation has been considered in research on mortality, and (b) the degree to which this body of research employed inadequate taxonomies of religious affiliation, unreliable means for ascertaining subjects' religious affiliation (e.g. inferring denomination from the cemetery of burial), and the use of such unreliable methods without cross-validations on their validity.

## **Method**

The review of the published literature proceeded in three steps that were consistent with previous systematic reviews (e.g. Craigie *et al.* 1988; Larson *et al.*, 1989; Larson *et al.*, 1986). First, we performed a literature search for studies examining the link between religion and mortality up to 1996 using five CD-ROM databases relevant to medicine (Medline), psychology (PsycLIT),

sociology (Sociofile), nursing (CINAHL) and education (ERIC). In this search we crossed multiple search terms related to religion (e.g. religion, religiousness, religiosity, religious) with multiple search terms related to mortality (e.g. mortality, survival, longevity). Second, we examined the bibliographies of the studies retrieved in the computer-aided search to identify additional relevant studies. Third, we examined previous reviews of the literature to identify any additional studies. We excluded studies that were designed to contrast the mortality pattern of any particular group (e.g. Seventh Day Adventists) with that of the general population (i.e. members of all other religious groups), even though such studies abound. The introductory literature review in this paper reviews much of the research that contrasts the mortality of specific religious groups with the mortality of the general population.

After retrieving the relevant studies, we recorded three features from each study: (a) the taxonomy used to classify people according to religious affiliation; (b) whether death certificate data on cemetery of burial or funeral home were used to infer subjects' religious affiliation; and (c) whether such death certificate data were cross-validated against another source information (e.g. interviews with the deceased's significant others, clergy or funeral directors).

## **Results**

We identified and retrieved 16 relevant studies from the published literature (marked in the reference section with an asterisk). Of the 16 studies identified and retrieved, 10 studies (62.5%) used a simple three-class taxonomy (e.g. Protestant, Catholic, Jewish) to measure religious affiliation and one study (6.25%) measured religious affiliation with a puzzling two-class taxonomy (Catholic vs non-Catholic), even though Catholics only constituted 18% of the study sample. Three studies (18.75%) used a four-class taxonomy (e.g. Protestant, Catholic, Jewish, Other). Only two studies (12.5%) used a five-class taxonomy (i.e. Protestant, Catholic, Jewish, Other, None).

Of the 16 studies, 10 (62.5%) inferred subjects' religious affiliation from cemetery of burial or funeral home as listed on the death certificate. Among these 10 studies, only two checked the validity of these inferences by consulting another informant (e.g. significant other or clergy). In four of the 16 studies (25%), religious affiliation was determined through interviews with patients before death. In two of the studies (12.5%), the method used to ascertain religious affiliation could not be determined.

## **Discussion**

The findings from the present systematic review indicate that only rarely have researchers examined the role of religious affiliation as an influence on mortality and longevity. In our search of five electronic databases covering hundreds of thousands of studies in the medical and social sciences, we found only 16 mortality studies that included a measure of religious affiliation, even though

thousands of studies have examined mortality and longevity. Given the importance of religious faith in the lives of many people and the growing body of research suggesting that certain elements of religion are indeed relevant to physical health outcomes (Goldbourt *et al.*, 1993; Kark *et al.*, 1996; Strawbridge *et al.*, 1997), it is likely that this neglect has unnecessarily limited progress in a potentially fruitful area of research.

Much of the neglect of religion in mortality research is probably caused by the difficulty of obtaining objective information on subjects' religious affiliation. Because such information is not readily available in official vital statistics, researchers have typically had to devise indirect methods for assessing religious affiliation. The present findings indicate that religious affiliation has been most frequently measured with either a three-class taxonomy (Catholic, Jewish, Protestant) or a four-class taxonomy (Catholic, Jewish, Protestant, None). Only two studies employed a minimally acceptable five-class taxonomy (Catholic, Jewish, Protestant, Other, None). Such crude categorization of religious affiliation leads inevitably to the blurring of important differences between religious groups which might be quite dissimilar. Indeed, the mortality patterns of Latter-day Saints, Seventh Day Adventists and other conservative religious groups (which appear, from our introductory literature review, to be so different from the general population) could not be estimated from the typical methods used to ascertain religious affiliation, since members of such groups would most likely be lumped in with 'Protestants' or 'Other/Nones'

A related problem has been the limited validity of inferring subjects' religious affiliations based on the religious affiliation of the cemetery or funeral home to which their bodies were taken after death. Ten studies used such death certificate data to infer subjects' religious affiliation. MacMahon & Koller (1957) found that such death certificate data led to the correct identification of religious affiliation for the dead buried in Catholic and Jewish cemeteries. However, they found that 37% of those buried in Protestant cemeteries were affiliated with Catholicism, Judaism, non-Protestant religions or no religion at all. Besides MacMahon & Koller (1957), only one other group of researchers (King *et al.*, 1965) actually interviewed morticians, clergy or relatives to cross-validate data gleaned from death certificates, thereby improving the accuracy of their inferences. Therefore, most researchers using the death certificate data were apparently willing to accept the misclassification of the religious affiliations of a substantial percentage of subjects. Fortunately, no published studies have used the 'cemetery of burial method' for assessing religious affiliation in over 15 years.

Besides gathering religious affiliation information from interviews with significant others, researchers using retrospective data to study mortality probably have few good options for assessing subjects' religious affiliation. However, researchers who conduct prospective studies of mortality can probably do a great deal to improve the quality of religious affiliation data. We recommend that researchers employ more complex classification systems, perhaps by gathering religious affiliation information at the most basic level possible (e.g. when



possible, asking subjects to identify the religion with which they are affiliated, c.f. Kosmin & Lachman, 1993). From basic information regarding membership in, for example, Episcopal, Presbyterian and Methodist churches broader categories, such as 'Protestant' can be abstracted. Obviously, however, the converse is not also true. By beginning with classifications such as Jewish/Catholic/Protestant/Other/None, the mortality profiles of groups such as the Latter-day Saints and Seventh Day Adventists (not to mention Amish, Hutterites, and small Christian sects) will be completely irrecoverable from prospective studies. Thus, only by obtaining religious affiliation at such basic levels will mortality researchers be able to identify people whose religions (or the lifestyles prescribed by such religions) might put them at differential risk for mortality from specific causes.

In addition to acquiring basic information on religious affiliation (preferably at very low levels of abstraction), mortality researchers could also include measures of religious involvement and subjective religiousness, such as frequency of religious service attendance, number of people known in one's religious congregation, and self-rated importance of one's religious beliefs. Such measures have been widely used in research on religion and health, and would add considerable depth to our understanding of the relationship between religion and mortality (for reviews, see Hill & Hood, 1999; Larson *et al.*, 1998; McCullough *et al.*, 1998).

## **Conclusion**

The advancement of science relies on accurate measurement of the phenomenon under study. The present review suggests that the research literature on the role of religious affiliation in mortality has been deficient on this criterion. Thus, in spite of the interesting differences in mortality and longevity that have been observed among some religious groups in contrast to the general population, it appears that standard research practices would not allow the detection of such differences in population-based surveys. Through improved measurement of religious affiliation and the use of other measures of religious involvement, researchers who study mortality can shed greater light on the role that religion might play in mortality and longevity. If such improved methods were customarily employed in mortality research, the work would help establish a hard core of findings on whether reliable differences in mortality exist among the world's religious groups. Such findings, if consistent and robust, could have considerable value in surveillance, screening and prophylactic efforts designed to predict and, possibly, prevent, mortality in the population.

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\* Indicates articles included in the systematic review.

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