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Review article

Toward a translational epidemiology of religion: Challenges and applications

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ABSTRACT

This paper explores the concept of translational epidemiology in the context of epidemiologic studies of religious determinants of morbidity and mortality. Despite a research literature of, by now, thousands of published studies, many in top-tier medical and public health journals, some resistance remains to full acceptance of this work. A principal reason may be the failure of investigators to make the case for real-world applications of epidemiologic findings on religious risk or protection for subsequent personal or population health, in keeping with the definition of translational epidemiology. To remedy this, a case is made for a translational epidemiology of religion. Three types of translation are proposed. The first two recall the standard definition of translational medicine as “from bench to bedside,” in this instance two types of bedside encounters, pastoral and clinical. The third application is to public health practice, involving multiple public health professions and specialties. As with other substantive topics within psychosocial epidemiology, research on population-health outcomes of religious exposures provides information that can be applied to development of health promotion and disease prevention programs and formulation of health policy. But this can happen only if investigators give more attention to enumerating potential uses of their findings.

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Introduction

The longstanding history and scope of epidemiologic analyses of religious exposure variables goes back further in time than perhaps most epidemiologists are aware. First summarized in detail in the 1980s [1,2], these studies extend back to the 1800s and encompass outcomes assessing overall and cause-specific morbidity and mortality for scores of diseases, including almost every cancer site and almost every major psychiatric diagnosis. The nearly dozen analyses by George Comstock and associates at Johns Hopkins [3], for example, all published in top-tier journals, are indicative of the seriousness with which this subject has been engaged among well known and reputable figures in academic medicine and epidemiology. Yet this issue remains somewhat contentious, for reasons related to legitimate concerns over the jarring intru-

sion of subjective and highly charged content about spirituality and human consciousness into scientific deliberation [4], as well as the persistent confounding of population-based studies of religion and health outcomes with controversial experimental trials of phenomena such as distant prayer and alternative healing [5]. The epidemiologic literature on population-health impacts of reliable measures of religious behavior and identity does not broach anything like that, and in most respects is garden-variety psychosocial epidemiology. But perhaps because of concerns over the term *religion* this literature still understandably raises eyebrows in some quarters within our profession.

These issues have been addressed in detail over the past couple decades, and the contentiousness over this subject within medicine and epidemiology has faded considerably, although not entirely. A principal reason for residual hesitation, even in light of substantial empirical evidence, is a general failure to make the case cogently and persuasively for the application of this information to medicine and public health. By that is meant the lamentable fact that while lots of data have been produced, including solid descriptive epidemiology, replicable analytical epidemiology, and even efforts at identifying mediating or explanatory mechanisms

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[6–8], few efforts have been made to identify the uses that this information might serve. Collectively, investigators have succeeded, one might say, at the *what* question, as well as the *who*, *where*, and *when* questions, and even perhaps the *how* and *why* questions, somewhat, but have failed mightily at what might be termed the *wherefore* question. It is not that no one has tried—a couple of excellent edited volumes, drawing on the research studies just noted, have detailed the implications of personal and communal expressions of faith and spirituality for advancing the aims of public health [9,10]. But still, we need to ask, how do we get from population-health data on the risk or protective effects of various measures of religious identity and participation to reasonable real-world applications?

Translational epidemiology

This query resembles questions that have animated what has come to be referred to as translational medicine, typically defined as the effort to apply research results from lab to clinic or “from bench to bedside” [11]. The phrase *translational medicine* first emerged around the turn of the new century [12], in reference to applications serving a “bridging function between preclinical and clinical research” [13], and by now the concept is ubiquitous throughout the medical literature. A PubMed search, at the time of this writing, uncovered over 52,000 indexed uses in NLM-listed journals. The emergence of this concept and of active research programs, academic units, and even chairs in translational medicine is an important and hopeful development for academic medicine, and is resonant with contemporary themes such as research transparency and relevancy to critical challenges.

This concept has been adapted to epidemiology as well. The proposal of a translational epidemiology has been defined as an organized effort to move “from scientific discovery to population health impact” [14, p. 519]. In other words, translational epidemiology is about asking the question of how we get from epidemiologic findings to the care of people and populations. As of the present, the phrase *translational epidemiology* has been indexed over 1300 times in PubMed, including several indexed uses in *Annals of Epidemiology*.

So the question that arises in the context of the large but still contentious epidemiologic literature on religion is simply this: Is there a reasonable application of the concept of translational epidemiology to the body of empirical findings linking religious exposures to population-health outcomes? In other words, how might a case be made for a translational epidemiology of religion?

Epidemiology of religion

As noted, clinical and population-based research on religious exposures dates to the 19th Century. The first use of *epidemiology of religion* to characterize studies of associations between religious measures and indicators of morbidity and mortality was in a review article from 1987 [15]. The phrase is still often misinterpreted and misconstrued—such as implying the use of epidemiologic methods and nomenclature to study the distribution and determinants of religious behavior—and even the lead author has expressed some regret for having coined it [16,17]. The intention was simply to denote the body of empirical research studies in which psychosocial measures of religiousness, variously defined, are treated as exposure variables and presented in association with the frequency of occurrence of health-related events, states, or processes in human populations—especially rates of overall and cause-specific morbidity and mortality—in keeping with standard definitions of epidemiology [18]. It was meant to be a label akin to behavioral epidemiology or environmental epidemiol-

ogy or genetic epidemiology, designating the epidemiologic study of a certain class of putative exposure variables.

Throughout these findings, totaling by now in the thousands of published studies, there is diversity not only in the medical and health outcomes studied, but in the religious exposures examined and populations investigated. Studies have been conducted among numerous denominations and sects of Christianity and among Muslims, Jews, Buddhists, Hindus, Parsis, and members of indigenous religions and New Age groups. There also has been variation in study populations by age, sex, race and ethnicity, marital status, nationality, region (within the U.S.), and social-class status. Exposure variables include dozens of single items and multi-item indices and scales of religious behaviors, attitudes, beliefs, values, identities, and experiences, plus indicators of a general sense of spirituality. Finally, this literature is characterized by methodological diversity, with almost every type of study design that one might find within epidemiology well represented: prospective cohort, retrospective case-control, prevalence survey, bidirectional, and quasi-experimental designs, and more. There is also a literature of critical essays offering assessments of conceptual and methodological issues, such as the likelihood of confounding and whether there is evidence for causation [19,20]. This latter issue is vitally important for the confirmation of risk or protective status for any epidemiologic exposure, but has been slow-going when it comes to religion, notwithstanding recent efforts to test for mediator effects [21,22].

On the whole, results have been mostly, but not entirely, positive—that is, indicative of a generally salutary impact of certain religious characteristics on certain physical and mental health outcomes. However, the variation in populations, religions, and both religious and health outcome concepts and measures makes it impossible—and misguided—to universalize this general finding. There are exceptions, as epidemiologic findings are expressed on average, across population, and *caeteris paribus*, or all things being equal. Oftentimes, it seems, lay consumers of news reports on this subject are looking for a pithy summary statement assuring them that “religion is good for your health,” or “religion is a risk factor for illness.” No research study, or review of studies, can possibly validate such general statements. Moreover, a study that reports, for example, a standardized mortality ratio indicating a lower mortality rate among church attenders than among non-attenders may in its reporting and subsequent citations mask the obvious fact that numerous non-attenders live long and healthy lives and survive many attenders. The same phenomenon is present for studies indicating protective effects of religiousness on geriatric depression, functional disability, cancer morbidity, and so on, as for epidemiologic studies of the impact of any exposure on any outcome. Epidemiologists understand what such population-based findings imply and do not imply, but the lay public—and indeed oftentimes the medical community—may not, and this is exacerbated by the lurid or sensationalist manner in which research findings on religion are sometimes highlighted in the news media, especially social media. Accordingly, a renewed focus on investigating the so-called dark side of religion—the detrimental effects of particular expressions of religiousness on particular health outcomes in particular people—has been wisely recommended [23].

Another consideration: despite the diversity of study topics and populations and designs, as noted, not all studies are created equal. That is, the very best of this research, methodologically, including rigorous longitudinal studies, is more typical of investigations of religious service attendance in Western (and Christian) contexts. Studies of other types of religious or spiritual exposures and in other social or religious groups have, on the whole, not been as sophisticated, with exceptions of course. This adds another important caveat in how the scope of these findings ought to be interpreted and publicized, and is a reminder that in this field—as with most

epidemiologic topics—there is considerable nuance that is at risk of being glossed over when presenting or summarizing data that might be considered novel or surprising.

In short, what this literature can do is simply point to associations between particular religious indicators (e.g., frequent attendance at worship services) and particular outcomes (e.g., rates of depressive symptomatology) in particular populations (e.g., elderly Caucasians and African Americans) affiliated with particular religions or denominations (e.g., Protestant Christianity). But generalizing beyond this to all people or all disease entities or all expressions of religiousness—or to an undefined and amorphous spirituality [24]—or to all respondents in a given study's population—is an unwarranted distortion and possibly harmful. Religion can play an abusive role in people's life and is a source of emotional distress for many [25], and, anyway, people leading a secular life can certainly be happy and healthy [26]. Epidemiologists are trained to be careful and precise in their attributions and generalizations; all the moreso is this required when dealing with such a contentious and emotion-laden set of exposures or independent variables. The concept and even the word “religion” can be a trigger for many people, and epidemiologists working in this area should be exacting in laying out what these findings mean and do not mean so as to guard against adding to the distress of people who might be alarmed to see religion invoked in a medical context.

While the initial presumption upon these studies coming to light was that they were uniformly inferior methodologically [27], this was not necessarily the case. As with any newly emerging field, there were many sketchy studies by people unaware of critical issues and of the scope of this literature and of the longstanding tradition of religious assessment in the social and behavioral sciences; as well as many other studies expertly done by reputable investigators at top-tier institutions with external funding. Excellent streams of research date back several decades, including studies of religious differences or religious effects within reproductive epidemiology in the 1940s [28], cancer epidemiology in the 1950s [29], psychiatric epidemiology in the 1960s [30], chronic disease epidemiology in the 1970s [31], and geriatric epidemiology in the 1980s [32]. There also was a series of excellent community-based studies beginning in the 1970s, including analyses using data from the Alameda County, California [33]; Framingham, Massachusetts [34]; Washington County, Maryland [3,31]; Evans County, Georgia [35]; and Tecumseh, Michigan [36] studies. While research methods have evolved since that time, these were considered state-of-the-art population studies for their era and underscore that a focus on religious exposures has a longstanding history within epidemiology. Since then, re-research findings continue to be published in all of the top public health and epidemiology journals, including studies of religious determinants of morbidity [37,38], and mortality [39,40] published in *Annals of Epidemiology* since the 2000s. This research has been summarized in systematic reviews [41] and in Oxford University Press' comprehensive *Handbook of Religion and Health*, soon to be out in its third edition [42].

The situation today is unlike 25–30 years ago when this area of investigation was first being discovered by the broader medical community. Initially, findings were called into question as substantively insignificant one-offs, perhaps because of a lack of awareness of the scope and depth of this literature. Also, some commentators questioned the motives of authors and investigators [27]. This criticism served a valuable purpose in encouraging the leading researchers in religion and health to elevate the methodological standards for this field, increasing both the rigor and sophistication of research designs and statistical methods and attentiveness to minimizing biases. The critique also served another valuable purpose: by setting a higher bar for peer-review it probably helped to select out the kind of mediocre studies that at one time indeed populated this field. By now, as noted, the studies number in the thou-

sands and the awareness that such findings exist, especially those based on reputable research by reputable investigators, is much higher. Serious studies and commentaries have begun to appear in clinical [43], epidemiologic [44], public health [45], and philosophy of medicine [46] journals. Also, methodological and analytical advances have benefited this field, including sophisticated studies using longitudinal designs [47], Cox proportional hazards modeling of longevity and mortality [48], and investigations of biomarkers such as immune function parameters [49] and leukocyte telomere length [50]. Meta-analyses of longitudinal studies of mortality [51] and mental health [52], for example, have demonstrated that use of the most sophisticated designs and methods has not inhibited the finding of protective religious effects, but rather has enabled them to be observed. These types of studies have become commonplace, though not the norm, for a couple of decades. Seeing this subject treated seriously and in a scientifically rigorous fashion is a welcome sign for researchers working in this challenging corner of psychosocial epidemiology.

Today, the existence of a substantial body of methodologically sound studies by leading scientists is becoming better known within epidemiology, public health, and academic medicine. The most serious remaining point of contention is simply this, and it is a critical point and still mostly unaddressed: What do these findings mean and how can we apply this information? That is, does any of this really matter? Are such findings a curiosity with little practical application, or do they actually provide information that serves a larger, more relevant purpose, whether for medicine or for public health?

Three domains of “translation”

As far as findings from epidemiologic studies of religious exposures, the concept of “translation” can have multiple applications. The first two to be considered here recall the definition of translational medicine as “from bench to bedside,” in this instance two types of bedside encounters, pastoral and clinical. The third application is to public health practice, involving a full range of public health professions and specialties.

One application of epidemiologic findings on a putative risk or protective factor related to religion might be termed *pastoral translation*. Pastoral encounters occur within medical care facilities, such as hospitals, as well as privately outside of formal clinic settings [53], such as in individual counseling sessions offering spiritual support. Empirical findings on the effects of religious identity and practice from research studies in psychiatric and chronic disease epidemiology can helpfully inform decision-making during such encounters and provide a context for both observations and therapeutic recommendations.

For example, studies have found significantly higher rates of certain psychiatric diagnoses, such as mood disorders [54] and anxiety disorders [55], among older adults with lower levels of formal or institutional religious participation. This can represent an additional complication among elderly or functionally restricted patients hospitalized for medical reasons who, during such times, cannot maintain continuity in their regular worship activities. The appearance of depressive symptoms, therefore, may not necessarily be the primary diagnosis but rather a sequelae of having been involuntarily separated from a meaningful social network that may, for some older adults, such as widows, provide their most important source of communal and spiritual sustenance. This has been identified as an especially pertinent concern since the onset of the COVID-19 pandemic [56]. Recognizing this set of circumstances and empirically validated associations, as well as patients' desire to find expression for their spiritual needs [57], a provider could then assist in accommodating a respective patient in maintaining his or her religious life while away from home.

This particular type of translational epidemiology of religion is most obvious and quite common—it is a foundation of healthcare chaplaincy, for example, and informs the role and work of pastoral care professionals in medical care settings. The present author recalls in the 1990s, while consulting with the old National VA Chaplain Training Center, being asked by the research staff—begged really—to provide them with any research evidence pointing to the importance of maintaining or restoring continuity in patients' religious life for their mental or physical health or psychological well-being. This information was essential, he was told, for the ongoing justification and funding of pastoral care resources within the VA system.

A second application of research findings from the epidemiology of religion is *clinical translation*. This is not a simple translation. Not all epidemiologic research on religious exposures qualifies as clinical epidemiology, or medical outcomes research—far from it. Most studies entail estimating parameters of association between religious measures and health status indicators, or rates of morbidity or mortality, retrospectively or cross-sectionally. Or, if prospective longitudinal designs are used, it is to examine the impact of religiousness as a risk or protective factor for subsequent health or illness in well populations. In other words, this does not qualify as clinical research, and there may not be an obvious pathway from population-based risk or protection due to a given exposure to specific therapeutic—medical or psychiatric—recommendations.

A simplistic non-religious example: epidemiologic studies identify tobacco use as a risk factor for subsequent coronary heart disease in both men and women [58], but smoking cessation by itself, while an important contributor to risk reduction, will not cause damaged heart tissue to fully repair itself or occluded arteries to become completely unoccluded. That is, factors—exposures, variables, constructs—associated with greater disease risk do not when removed necessarily cause complete or partial healing or remission or cure. In some instances they may; in others this may make no sense pathophysiologically [59]. Medical and/or surgical intervention may be required, as well as pharmacological therapy. The complication here, in the context of religion, is whether or not, and in what circumstances, epidemiologic studies of religious participation and the like provide any guidance for clinicians. In the case of results from the smaller subset of clinical-epidemiologic studies of religion, this question has a modestly affirmative answer.

For example, a growing literature has documented the salutary effects of religious involvement among hospitalized and nonhospitalized medical patients on a host of health services outcomes. These include quicker recovery, shorter hospital stay, and better post-operative course [60]; higher level of compliance with prescribed medical and pharmaceutical regimens [61]; and less psychological distress and greater overall well-being post-treatment [62]. These findings have been observed in different populations, with respect to various diagnoses, and in people from diverse religious backgrounds. Results would seem to provide additional confirmation of the points raised earlier in the discussion of the salutary benefit of religious continuity, and these studies provide guidance for physicians, nurses, administrators, and pastoral professionals charged with the care of infirm people within medical care settings and in clinical practice in general [63]. On the whole, however, the smaller sample sizes of clinical studies and the relative paucity of clinical-epidemiologic studies of religion limit the evidence, at present, for successful clinical translation of epidemiologic findings on religion. It is possible, and has been done, as noted, but one might consider this type of translation as a work in progress.

Another consideration unique to clinical translation is the possibility that some physicians may view epidemiologic findings on religion, whether from clinical studies or population studies, as a license to insinuate partisan religious views or religion in general

into the clinical encounter. The possibility that some clinicians may draw on these findings to proselytize patients is a concern that has troubled both religious skeptics [64] and more faith-friendly commentators [65]. This issue has been unpacked especially carefully by religiously committed physicians who one might presume would be more favorable toward such efforts, but who show deep appreciation for the ethical quandaries that may arise [66]. In negotiating this terrain, academic physicians have offered helpful recommendations for things like spiritual assessment [67], and medical speciality boards, such as in psychiatry, have adopted guidelines outlining boundaries governing what is and is not permissible regarding religion in the clinical encounter [68]. From the perspective of epidemiology, it is encouraging to see these issues taken seriously, as the misuse of epidemiologic findings should concern every one of us. But at the same time how these matters get adjudicated clinically may be well above our pay grade, as the saying goes, except that we should encourage caution lest statistical findings on one or another discrete religious variables in a particular population study get misread into advocacy for a particular religious or theological stance or be considered a referendum on God or faith or spirituality to be communicated to vulnerable patients. There is a possibility here of terrible harm being done, and, anyway, this is not a role that physicians are qualified for, nor are epidemiologists. Working out the details of such translation is ongoing, as noted, and would best be done in concert with pastoral professionals.

A third application of epidemiologic findings on religious exposures might be termed *public health translation*. This includes applications to disease prevention and health promotion efforts, monitoring of vital statistics, formulation of public health policy, and advocacy and regulatory efforts related to the environment, the distribution of health services, and relations with global NGOs, public health missions, and national health ministries. In this type of application, the target of translation is not the bedside or clinic—nor the care of an individual patient—but rather the community or population. For each of these topics, there is longstanding historical precedent for involvement by religious organizations and religious people acting to externalize their faith into the public square [69], such as by working for causes including social justice [70] or global development [71].

An extensive literature has identified ways that faith-based organizations and individual people of faith, across religions and across nations, have partnered with medical institutions and public health agencies in local, state, regional, national, and global alliances of various types [72]. Such partnerships have been especially helpful adjuncts to the public health sector, providing social capital in numerous ways that serve to address population-health disparities and challenges in respective communities [73]. The faith sector has been vital for efforts to disseminate information and services, inform needs assessment, develop strategic plans to meet the specific needs of specific populations, and provide entrée into communities for purposes of public health intervention. These multi-sector partnerships have been especially valuable and productive throughout the world during the current COVID-19 pandemic [74].

The corpus of epidemiologic findings on religion contributes to these efforts. The results of empirical studies of the population-health impact of religion inform applied work in the core fields of academic public health [75]. For example, research on chronic diseases such as diabetes and hypertension have identified religious characteristics of racial, ethnic, and sociodemographically-delineated populations at greater risk of morbidity and mortality, findings utilized by congregational and denominational health promotion and disease prevention programs for purposes of patient education, community development, and screening and referral [76]. Other studies of religious correlates of or differences

in population rates of healthcare utilization—including use of primary and ambulatory care, perinatal care, hospital services, preventive services, and home health services—have identified lacunae in access to care that have informed more responsive and effective public health policy action and healthcare management decision-making [77]. In both of these examples, population data on religiously defined risk or protection has been used to inform and enhance respective educational and policy-oriented work which addresses health disparities throughout the U.S. [78].

While epidemiologic findings indeed contribute to these efforts, such findings speak to risk or protection attributable to religious characteristics of people and populations. This by itself does not suggest that religious institutions or organizations can or should be in alliance with health care organizations or agencies in the delivery of public health services. Fortunately, there is also a substantial body of evidence from published program evaluations and evaluative research studies, both in the U.S. and globally, that validate the effectiveness of such partnerships for meeting population-health goals. These include efforts involving congregational health promotion and disease prevention, denominational-based primary care, medical and public health missions, federal faith-based initiatives, community-based outreach to special populations, and faith-supported public health advocacy [79]. Existing and advocated-for programs and projects range from local interventions in particular communities [80] to nationwide alliances focused on discrete medical outcomes such as HIV/AIDS [81] to global partnerships seeking to improve health status worldwide [82].

Conclusions

To revisit the question posed earlier, whether a case could be made for a translational epidemiology of religion, the answer appears to be a cautious yes. “Cautious,” because for any such topic which engages a construct, or meta-construct, subject to so much contention, there may always be skepticism over the reliability and validity of empirical findings linking it to morbidity and mortality rates, no matter the sophistication in measurement, methodology, and analysis that has been gained over the past couple decades. This is exacerbated by the continuing challenge here in addressing questions of causal inference [44]. But “yes,” because ongoing application of published findings to pastoral care, medical practice, and public health has already demonstrated that this information can serve a useful purpose in promoting the health and well-being of people and populations.

In the most important early discussion of translational epidemiology [14], the authors proposed a sequence of translations, or applications, beginning with the emergence of a new research finding. One application is to clinical and public health practice, the latter including behavioral, social, and policy interventions. A second application is to inform evidence-based recommendations, of the type made by professional or governmental panels. A third application is to the planning, implementation, and evaluation of health promotion and disease prevention programs. The fourth application is akin to outcome evaluation, in this instance assessing “the real world effectiveness of a candidate application in terms of population-level outcomes, such as morbidity, mortality, and disability, at the population or health-care-system level” [14, p. 521]. Each of these types of translations has been made, or attempted to be made, for epidemiologic studies of religion.

At the same time, those familiar with the history of epidemiologic research on religion might affirm the observation that for translational epidemiology “different forces . . . can accelerate or impede the translation process. . . [and] often operate independently from research evidence” [14, p. 522]. The still prevailing resistance to this research among some academic physicians and scientists with personal reservations about religious faith or practice

or particular spiritual beliefs, reservations which may be very well taken, serves to inhibit applications that could benefit the health of communities or populations. Whether or not faith is an important issue in the life of a respective epidemiologist or clinician is not really germane. Faith may be vitally important in the lives of one’s study subjects or patients. Consider, for example, that epidemiologic studies point to the health benefits of marriage and of certain dietary practices. One may not believe in matrimony and may have different eating preferences but still recognize the results of methodologically sound studies and their applicability to other people, if not to oneself. If the primary goal of epidemiologic translation is to make use of data-based evidence to reduce disparities in health outcomes and improve population health [83], then epidemiologists, regardless of their own beliefs, should welcome accurate information pointing to the health impact of religious identity and practice in respective faith communities—whether a protective effect or heightened risk—in order to guide substantive actions to meet public health objectives.

This very point was famously underscored by David Satcher, former CDC director, U.S. Surgeon General, and Assistant Secretary for Health, who noted, “Through partnership with faith organizations and the use of health promotion and disease prevention sciences, we can form a mighty alliance to build strong, healthy, and productive communities” [84, p. 3]. As noted, by now there are thousands of published studies indicating that for religiousness, variously defined and assessed, there does appear to be an observable association with rates of morbidity and mortality almost across the board, even if a full understanding of its psychosocial and biobehavioral mediators has not yet been achieved. The totality of this information, such as contained in the new edition of *Handbook of Religion and Health* [42], is a mostly untapped reserve that merits study, synthesis, and thoughtful application.

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