

# POSSIBILITIES AND LIMITS OF MEDICAL SCIENCE: DEBATES OVER DOUBLE-BLIND CLINICAL TRIALS OF INTERCESSORY PRAYER

by Wendy Cadge

*Abstract.* This article traces the intellectual history of scientific studies of intercessory prayer published in English between 1965 and the present by focusing on the conflict and discussion they prompted in the medical literature. I analyze these debates with attention to how researchers articulate the possibilities and limits medical science has for studying intercessory prayer over time. I delineate three groups of researchers and commentators: those who think intercessory prayer can and should be studied scientifically, those who are more skeptical and articulate the limits of science around this topic, and those who focus primarily on the pragmatic applications of this knowledge. I analyze these contests as examples of what Thomas Gieryn calls “epistemic authority” as medical researchers engage in what he describes as “boundary-work” or “the discursive attribution of selected qualities to scientists, scientific methods, and scientific claims for the purposes of drawing a rhetorical boundary between science and some less authoritative residual non-science.” (Gieryn 1999, 4 (Gieryn 1999, 4)).

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Can prayer heal? Answers to that question and the question itself are on the minds of many Americans. “Can Spirituality Promote Health?” is asked on the cover of *Time* magazine, and articles with headlines like “Religion and Health: The Prayer Cure,” “Faith and Health,” and “Mixing Prayer, Health” appear regularly in the *Wall Street Journal*, *Newsweek*, *Houston Chronicle*, and other magazines and newspapers (Holmes 1996; Bernstein 2000; Kalb 2003). More than 90% of Americans pray regularly (Gallup and Lindsay 1999). Recent national surveys show that close to 80% of Americans regularly or sometimes pray for their own health, and large fractions believe a personal illness has been cured, at least in part, by prayer ((Glazer 2005); *Newsweek* (November 1, 2003); CBS News (April 29, 1998); Yankelovich Partners (June 14, 1996); Princeton Religion Research Center (June 1996)). General prayers for health are offered weekly in churches, mosques, and synagogues across the United States, and Internet

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prayer chains for everything, from diabetes to cancer, link millions of people across the country.

Alongside newspaper reports about the power of prayer on health are a second set of articles about scientific studies designed to assess the impact of prayer on health. Unlike many Americans who believe, on faith, that prayer influences health, scientists across the disciplines are working to demonstrate these relationships empirically, according to the norms of scientific scholarship. With financial support from various sources, these studies investigate everything from whether people who pray are healthier than others to whether people who pray together, or are prayed for, tend toward better health (for an overview, see Glazer 2005). Results are described in scientific journals as well as in newspapers under headlines such as “A Prayer for Health: Scientists Attempt to Measure What Religions Accept on Faith” (*Boston Globe*), “Prayer’s Effect on Health Called Nil by Duke Study” (*Baltimore-Sun*), “A Frontier of Medical Research: Prayer” (*Christian Science Monitor*), and “Will God Cooperate in Prayer Study?” (*Boston Globe*) (Raymo 1997; Lampmann 1998; Stroh 2005; Dembner 2005).

Scientific studies of prayer sometimes raise eyebrows inside and outside of medical communities. A front-page article in the *New York Times* in October 2004 argued, “Can Prayers Heal? Critics Say Studies Go Past Science’s Reach,” and the editors of scientific journals frequently receive letters to the editor after publishing such studies (Carey 2004). Some critics charge that religion generally, and prayer specifically, should not be the subject of scientific inquiry, whereas others argue that the scientific methods, data, and analyses used to investigate these questions are flawed in specific studies. Although debates about research methods and analyses take place in the scientific community regardless of the topic being studied, debates about prayer have been particularly intense and ongoing.

Among scientists investigating the influence of prayer on health, a collection of medical researchers conducting double-blind clinical trials of prayer are the subject of a disproportionate share of public attention and debate. Working in small teams, these seventy-five researchers have published numerous studies since 1965 that rely on the gold standard of medical scholarship, the double-blind clinical trial (Meinert and Tonascia 1986). Prayers, specifically intercessory prayer or the prayers of one person on behalf of another, are the treatment tested in these trials. One group of people is prayed for by others, the second group is not, and neither the patients nor the doctors or study administrators usually know who is in which group. The people doing the praying, the intercessors, are recruited locally or nationally and pray for the people in the study from a few to many times.

Using double-blind clinical trials, one of the most respected research tools in medical science, to investigate whether the prayers of one person

on behalf of another influence the other's health has led to intense debate within the medical community. Although some researchers have been willing to accept the results of these studies and the possible influence of prayer on health by reasoning, within accepted modes of scientific thought, that individuals' prayers for themselves might influence their body chemistry or physical composition in ways beneficial for health, entertaining the possibility that prayers by one person on behalf of another have a measurable effect on the other's health requires a larger conceptual leap. If the people being prayed for are aware of the prayers, some argue, they might feel more socially supported or feel more cared about, which might have an effect on their health. But if they are not aware of the prayers and the prayers are offered by strangers at a distance and appear to have some effect, scientists begin to run out of explanations within current epistemologies about why these prayers might have any effect.<sup>1</sup>

When double-blind clinical trials of prayer were first conducted by medical scientists, primarily doctors, in the mid-1960s, the medical community largely ignored them. In the past 20 years, however, these studies have increased in number and have been published by physicians and Ph.D.-level medical researchers, not on the fringes or only in alternative and complementary medical scholarship but in prominent medical journals, including the *Southern Medical Journal*, the *Journal of Reproductive Medicine*, the *American Heart Journal*, the *Mayo Clinic Proceedings*, and the *Annals of Internal Medicine*. The individuals conducting this research do not work on the edges of medicine institutionally but at universities, including the University of Missouri, Duke, Columbia, Harvard, University of New Mexico, and other prominent hospitals and medical schools. Debate about scientific studies of intercessory prayer within the medical community is fierce, and it is renewed each time a new study is published. Letters to the editors of the medical journals in which these studies appear ask whether it is *possible* to study religion in the form of prayer via double-blind clinical trials, whether prayer *should* be studied this way, and what the ideological, conceptual, and practical challenges are to so doing. Arguments are strongly made on all sides as religion and medical science are constructed in these exchanges as contradictory, complementary, and/or limited as ways of understanding whether prayer heals.

This article traces the intellectual history of scientific studies of intercessory prayer published in English between 1965 and the present, focusing on the conflict and discussion they prompt in the medical literature. For additional information about the research methods, see Cadge (2009). I analyze these debates with particular attention to what researchers say in them about the possibilities and limits of medical science for studying intercessory prayer. One group of medical researchers, primarily study authors, argue that there is no limit to what can be studied scientifically. Intercessory prayer, like a new cancer drug or new treatments for diabetes,

can and should be studied in double-blind clinical trials following the conventions of medical scientific scholarship and criticized when studies do not meet those conventions. A second group of people, some of whom are represented among the authors of letters to the editor in medical journals, see medical science and the double-blind clinical trial as inherently limited when it comes to questions about prayer and view medical science as one way of knowing among many. Although these critics have different opinions about the appropriateness of studying religion and prayer, they are self-conscious in their responses about the limits of the scientific method for studying intercessory prayer through double-blind trials. A third group of participants respond to these debates pragmatically, focusing not on whether it is right or possible to study prayer via double-blind clinical trials but by asking what is to be done, if anything, with the knowledge gathered. Rather than viewing medical science as limitless as the first group or inherently limited as the second, this group accepts the idea of religion and medical science as separate spheres set up in the debate to argue about whether it is practical—following the lead of pragmatic philosophers—to investigate this question based on the possible applications of the results.<sup>2</sup>

I analyze these conflicts as contests over what sociologists Michele Lamont and Virag Molnar call “symbolic boundaries” or “conceptual distinctions made by social actors to categorize objects, people, practices, and even time and space” (Lamont and Molnar 2002, 168). This case study particularly illustrates debates over what Thomas Gieryn calls “epistemic authority,” as medical researchers engage in what he describes as “boundary-work,” or “the discursive attribution of selected qualities to scientists, scientific methods, and scientific claims for the purposes of drawing a rhetorical boundary between science and some less authoritative residual non-science” (Gieryn 1999, 4).<sup>3</sup> The science in question here is medical science, and the boundaries have been flexible and continually shifting over the 40 years these debates have been waged. As in other examples at the edges of science, these boundaries have been socially constructed by the actors involved in ways that powerfully reflect their institutional positions, interests, and assumptions, and their continual struggles to establish their views as “true” and “reliable” (Gieryn 1999, 15).<sup>4</sup>

Rather than coming to consensus over time, the medical researchers studying intercessory prayer continued to make a broad spectrum of arguments. Studies with positive results garnered more debate than those with null findings, and those published in more mainstream journals have led to the most conflict. On the surface, these debates have been about the studies. What makes them so heated, however, is what is at stake between the lines—questions about religion (specifically prayer) and the possibilities and limitations of medical science, using its most common tool, the double-blind clinical trial, to understand it.

## INITIAL FORAYS: INTERCESSORY PRAYER STUDIES BEFORE 1990

Scholars and the public at large have long been interested in the effects of prayer on health, and almost every religious tradition has not one but a series of prayers and rituals conducted when someone is ill. Scientific studies of these prayers by physicians and medical researchers in the United States began in the mid-1960s and have continued to the present, primarily by asking whether individuals who pray regularly are healthier than others (for an overview, see Koenig, McCullough, and Larson 2001). A separate set of questions about whether the prayers of one person can be shown scientifically to influence the health of another first captured the attention of the American public in 1988 when Robert Byrd, a physician and assistant professor of medicine at the University of California San Francisco, published results of a study in the *Southern Medical Journal* that he argued showed that “intercessory prayer to the Judeo-Christian God has a beneficial therapeutic effect in patients admitted to the CCU [cardiac care unit]” (Byrd 1988, 826). Patients who were prayed for by born-again Christians they had never met, he argued, had better health outcomes than those who were not the object of prayer.

Dr. Byrd, like other early intercessory prayer researchers, traced his research to the classic (contentious) work of nineteenth-century English scientist Francis Galton (Galton 1872; Gieryn 1983; Thomson 1996; Clarfield 2002). Inspired by Galton’s belief that prayer can and should be studied scientifically, the first medical studies of intercessory prayer in this century were conducted before Byrd’s by researchers at London Hospital Medical College in 1965 and Meadowbrook Hospital in New York in 1969. While focusing on two very different populations, the authors of both of these early papers believed prayer could be studied scientifically and presented statistical evidence they interpreted in stronger and weaker ways as indicating that people who are prayed for may recover from illnesses more rapidly than others.

C. R. B. Joyce, a reader in psychopharmacology at London Hospital Medical College in London, and her co-author R. M. C. Weldon published, “The Objective Efficacy of Prayer: A Double-Blind Clinical Trial” in the *Journal of Chronic Disease* in 1965. They justified their study as medical science writing, “If physical and mental effects do indeed occur as a result of intercessory prayer, it should be possible to assess these and to establish their clinical and statistical significance in a similar way to that for any medical form of treatment” (Joyce and Weldon 1965, 368). Failure to apply “modern methods of [scientific] assessment” to prayer because prayer is not a conventional medical treatment, they argued, is simply not scientific and “replaces scientific objectivity with medical trade unionism” (368). Although they mentioned various objections to scientific studies of prayer, the only concern they viewed as reasonable was a scientific one

concerning measurement—that “the [scientific] tools of assessment may not only be too insensitive to demonstrate the therapeutic media, but they may actually interfere with the therapy” (Joyce and Welldon 1965, 368).

Their study involved 48 patients at two outpatient clinics at a London hospital suffering from chronic stationary or progressively deteriorating psychological or rheumatic diseases. Each patient was examined at the start and end of the trial, and standard medical care was continued without interruption during the duration of the trial (between 6 and 18 months).<sup>5</sup> Patients were paired based on their sex, age, diagnosis, marital status, and religion, and one person in each pair was prayed for by a Christian intercessor belonging to one of six prayer groups.<sup>6</sup>

On the basis of the data gathered, the authors found no health differences between those who did and did not receive prayer. Rather than concluding that such prayers have no effect, however, the authors systematically described parts of their study, which suggested that prayer did heal and suggested ways to change or improve the study design that might lead to that conclusion. They described patterns in the data, for example, which suggested that people who were prayed for earlier in the study had improved health that could show that prayer “worked” but the intercessors got tired over time. They pointed also to limitations of their statistical methods that might not have enabled them to determine the effect of prayer and reinforced, again, the importance of continuing to study prayer scientifically. The paper concludes by calling the study “only a baptism,” and calling for additional studies, “the methods used in this trial need more testing, just as its conclusions require confirmation” (375).

Several years later (1969), Dr. Platon J. Collipp, the chairman of the Department of Pediatrics at Meadowbrook Hospital in New York, conducted and published a similar study in *Medical Times* to determine whether prayer influenced the health and survival of children with leukemia. Eighteen children were included, ten of whom were prayed for daily by a prayer group affiliated with a Protestant Church. After 15 months of prayer, Collipp found that seven of the ten children being prayed for were still living, while only two of those not being prayed for were still alive. Based on statistical tests he concluded that “our data does support the concept that prayers for the sick are efficacious” (202). While noting scientific ways the study could be improved by including more patients, changing how the study and control groups were divided, and addressing the possibility that people not among the study’s intercessors might have been praying for the children, Collipp revealed his own beliefs, concluding the article with references to biblical passages that support the healing power of prayer (Luke 18:1–8, 1 Kings 9:3, James 5:16, Matthew 7:7–11). He also concluded with a parable “pointing out that the greater the number of prayers, the more likely they are to be answered,” to argue

that prayer is the “oldest” and perhaps “most successful” form of medical therapy (Collipp 1969).

Although these two early articles were published with little contention, medical debates over intercessory prayer studies began in earnest in 1988 with Robert Byrd’s article in the *Southern Medical Journal* (Byrd 1988). Believing that medical scientific methods could be applied to prayer just as to a new drug or therapy, Byrd and his assistants conducted a double-blind study of intercessory prayer in which 393 people admitted to the cardiac care unit at San Francisco General Hospital knowingly agreed to participate. The patients were randomly assigned to the prayer or nonprayer group, and neither the patients nor their doctors knew who was in which group. Those in the prayer group were each prayed for by three to seven Christian intercessors. Before prayer as the intervention, statistical tests were conducted that showed, in Byrd’s words, “no statistical differences between the two groups at entry, . . . the two groups were statistically inseparable, . . . results from the analysis of the effects of intercessory prayer would be valid” (827).

Byrd found significant differences between the two groups. Patients who were prayed for were more likely to have “good” health outcomes (85%) than those who were not (73%), and those who were not prayed for were more likely to have “bad” outcomes (22%) than those who were (14%). He wrote, “In this study I have attempted to determine whether intercessory prayer to the Judeo-Christian God has any effect on the medical condition and recovery of hospitalized patients. . . . Based on these data there seemed to be an effect and that effect was presumed to be beneficial” (829). Byrd made his own perspective clear when he thanked God, among others, in the acknowledgment section of the article, “for responding to the many prayers made on behalf of the patients” (829).

Byrd pointed to the scientific problems and limitations of the study while holding to his belief that prayer can be studied following his approach. For example, in a standard clinical trial one group receives the new treatment and the second does not. That was impossible in a “pure” sense here because there was no way to ensure that those not in the prayer group did not receive prayers from relatives or friends in addition to the intercessors. “How God acted in this situation is unknown,” Byrd explained while arguing that it would be unethical to completely restrict prayers to people in a study (829). Also, Byrd was not able to assess whether the patients prayed themselves and how their own personal religious beliefs may have influenced their health outcomes. He discussed how this independent variable could have had an effect and would need to be measured in future studies.

The *Southern Medical Journal* published the article alongside a supportive commentary by Dr. William Wilson, a Professor Emeritus of Psychiatry at Duke Medical Center, under the heading “Religion and Healing” (Wilson 1988). Rather than trying to downplay or doubt the

results, Wilson highlighted the limits of medical science rather than of this particular study, writing that the “problem is the challenge of the theory of quantum mechanics to our cosmology. It has changed our mechanistic view of the universe. . . .” (819). Rather than doubting Byrd’s data, in other words, Wilson doubted the epistemologies traditionally used to understand them. Although Wilson could have placed Byrd’s topic and question firmly outside the bounds of medical science, he did just the opposite, calling the questions Byrd investigates, “valid ones for scientific inquiry” and calling on science to expand its vision so as to ask and answer them. “It seems to me that we in medicine who claim a holistic approach to diagnosing and treating the whole man should throw away our deterministic prejudices, expand our knowledge, and enlarge our therapeutic armamentarium. We need not only a change in the way we think [i.e., an expansion of medical science] but also more research on the role of religion in healing” (820).

As an example of what sociologist Thomas Gieryn calls “expulsion” or the process through which “real” science is demarcated from “posers” (1999), critics of Byrd’s study were quick to counter Wilson’s effort to expand the boundaries of medical science by articulating the boundaries of medicine in ways that placed the ideas of both Wilson and Byrd firmly outside. “Medicine’s greatest accomplishments since the Age of Enlightenment,” Steven Kreisman, an emergency room physician in North Carolina, wrote in a letter to the editor, “were made possible by the fundamental characteristics of that age: a respect for reason.” Quoting Dr. Leonard Peikoff in *The Ominous Parallels*, Kreisman argued that medicine since the eighteenth century has abided by an epistemology based on scientific laws that “permit no miracles and which are intelligible without reference to the supernatural.” Refusing even to acknowledge Byrd’s claims about the medical scientific basis of his work, Kreisman argued that these articles do a “disservice to the science of medicine . . . by trying to undermine reason and by giving credence to faith as a valid epistemology.” He called on the *Southern Medical Journal* to no longer permit articles “of this kind,” arguing, in the vein of scientific progress, that they are an “attempt to return medicine to the Dark Ages, and to reduce physicians to the same status as witch doctors and faith healers” (Kreisman 1988).

Asserting his authority as a gatekeeper and his refusal to categorically limit or deny any authors access to the journal, the journal editor responded, explaining that the papers in question were “medical science” having been subjected to the usual peer review process, “and judged to report properly designed and executed scientific investigation with a recommendation for publication” (1598). Refusing to let Kreisman have the last word, the journal editor responded in a comment after his letter challenging the dichotomy he attempted to establish between religion and rationality; “whether the findings are rational or not would appear to be a matter of opinion,” the editor wrote, not a matter of science.

CONFLICT IN THE 1990S: HARRIS ET AL. AND THE ARCHIVES OF  
INTERNAL MEDICINE

Following Byrd's study in the 1980s, three double-blind studies of intercessory prayer were published in the 1990s, two in *Alternative Therapies in Health and Medicine* and one in the *Archives of Internal Medicine*. Neither of the articles in *Alternative Therapies in Health and Medicine* generated extensive discussion. They studied people in treatment for alcohol abuse and the mental health of healthy volunteers showing that intercessory prayer had a significant influence on the recipients of prayer (O'Laoire 1997; Walker et al. 1997).

The third article by William S. Harris and nine colleagues in the *Archives of Internal Medicine*, on the other hand, found positive results and added another contentious chapter to the debate about intercessory prayer in mainstream medical science (Harris et al. 1999). Rather than focusing directly on the boundaries of medical science as in the Byrd study, this conflict centered on scientific criteria more indirectly through debates about the methodological requirements for medical knowledge and the extent to which Harris et al.'s study met these criteria.<sup>7</sup>

Starting from a central tenet of the scientific method, that experiments should be replicable, Harris et al. conducted this study "to attempt to replicate Byrd's findings by testing the hypothesis that patients who are unknowingly and remotely prayed for by blinded intercessors will experience fewer complications and have a shorter hospital stay than patients not receiving such prayer" (2273). They focused on 990 patients consecutively admitted to the coronary care unit (CCU) at the Mid America Heart Institute (MAHI) in Kansas City, Missouri. The patients were not told they were participating in the study, and only the secretary of the chaplaincy department knew which patients were assigned to the prayer group and which to the nonprayer or control group. Intercessors represented a range of Christian traditions.

Patients who were prayed for and those who were not were compared along multiple outcome measures during their hospital stays. The amount of time they spent in the CCU and the hospital were examined, as were a wide range of clinical health measures individually and as summarized in a MAHI-CCU score, a general measure of health ranging from excellent to catastrophic. Prayer was not found to have any influence on how long patients stayed in the CCU or the hospital but did have a significant influence on the summary MAHI-CCU score. Patients who were prayed for did 10% better than others who were not. "These findings are consistent with Byrd," Harris et al. argued, reporting "that intercessory prayer for hospitalized patients lowered the hospital course score but did not significantly affect length of stay" (2275). Because at least half of the patients in the study stated that they had a religious preference, the authors

were careful to note that they were most likely studying the effects of supplementary intercessory prayer, or prayer by the intercessors, in addition to the prayer offered by families and friends.

The authors concluded their article with a discussion of the factors that might explain the relationship between intercessory prayer and patients' health they believed they documented. They based this discussion squarely in the realm of what is knowable scientifically. "Natural" explanations, they posited, "would attribute the beneficial effects of intercessory prayer to 'real' but currently unknown physical forces that are 'generated' by the intercessors and 'received' by the patients" (2277). These kinds of explanations, posited by Harris et al., are within the realm of science even if they are not currently well understood. Much as James Lind aboard the HMS *Salisbury* in 1753 determined that lemons and limes cured scurvy even though explanations about nutrients and ascorbic acid were centuries away from being articulated, Harris et al. argued that the inability to know why intercessory prayer influences health does not invalidate their observations, findings, or the appropriateness of studying the issue scientifically (2277). Supernatural explanations, on the other hand, are mentioned by Harris et al. in their discussion as "by definition, beyond the ken of science" and not elaborated in any detail. With both their own study and the study by Byrd "now suggesting the possible benefits of intercessory prayer," Harris et al. concluded their article by calling for additional studies using standardized outcomes measures and variations in prayer strategy "to explore the potential role of prayer as an adjunct to standard medical care" (2278). They called, in other words, for better and more detailed medical scientific studies that would further substantiate their findings.

Following publication, debate erupted on the pages of the *Archives of Internal Medicine* when the journal published fourteen letters to the editor that took issue with the study from many sides. One group of writers made no direct comment about the appropriateness of studying prayer scientifically. They focused on the research methods and statistical analyses used in the article, commenting on the ways they were flawed and could be improved by focusing on the measures and levels of statistical significance (Hamm 2000; Hoover and Margolick 2000; Price 2000), possible errors in the analysis (Karis and Karis 2000), the independence of observations (Hoover and Margolick 2000), the randomization process (Hammerschmidt 2000; Smith and Fisher 2000), and alternative explanations for the findings presented (Van der Does 2000). Overall, these letter writers dismissed the study's conclusions on methodological grounds with comments like, "As the hypothesis tested by this study is an extraordinary one, a high standard of evidence is required for it to be believed. This study did not achieve this standard" (Smith and Fisher 2000).

Commitments to their own beliefs rather than the possible alternatives they saw presented by Harris et al. were also reaffirmed in some letters through comments such as, “Do not their results suggest the need to reassess our statistical methods for judging efficacy rather than the need to reassess the fundamental theories of science?” (Sandweiss 2000). Referring to Harris et al.’s study as “pseudoscientific mischief,” Donald Sandweiss, a physician, situated it outside the bounds of medical science in this comment, though in a more indirect way than Kreisman in his letter to the *Southern Medical Journal* in 1989. Rather than focusing directly on the boundaries of medical science like Kreisman, the majority of these letter writers clarified their expectations for and requirements of medical scientific knowledge methodologically in such a way that showed Harris et al.’s study as not meeting these expectations.

Much like this first group, a second group of letter writers was also skeptical about the study’s conclusions not only on methodological grounds but based on their own beliefs about what is and is not knowable scientifically. Although each letter writer articulated the limits of the scientific method as used in this study differently, they were unified in the claim and self-consciousness about the fact that Harris et al. were trying to use scientific tools to study something that may not be knowable using them. After pointing to issues with construct validity and measurement scales in the study, Richard Sloan and Emilia Bagiella, for example, argued that “religion does not need medical science to validate its rituals. To attempt this trivializes religion” (Sloan and Bagiella 2000). Similarly, physician Fred Rosner asked “Does the efficacy of prayer have to be scientifically proven?” before outlining the many ways he believed prayer may help people when they are ill that are not likely to be evident scientifically (Rosner 2000). Physician Mitchell Galishoff pondered in his letter why God “should allow the patients who received the remote intercessory prayer” to do better than the control group before deciding that the real conclusion from this study is that “God’s grace is greater than our skills and immeasurable by our tools. Like many before them, the investigators may have missed the real message of their ‘study’: that despite our arrogance, God’s omnipotence is beyond our ability to add or detract” (Galishoff 2000). What God is and the way God works, Galishoff explained in other words, at least in this case, is beyond the ability of humans to know using the tools of scientific inquiry.

Only one of the letter writers responded to the study on neither methodological nor substantive grounds but on practical grounds based on his interactions with patients. Rather than questioning how the study was conducted or whether it should have been or was needed, Milton Zimmerman took it at face value, describing it simply as “another, much needed tool for the care of our patients.” Whether the efficacy of prayer can be proven scientifically was basically irrelevant to him, as he wrote

that despite the difficulty of manipulating or proving it, prayer has been “relied on and used by many people, professional and nonprofessional, for many years” and, therefore, “has its place in 21st-century health care” (Zimmerman 2000).

In addition to these specific studies, the *Cochrane Review*, a highly respected organization that conducts meta-analyses to offer specific medical recommendations, conducted its first analysis of intercessory prayer studies by the end of the 1990s (which was updated in subsequent years). In the first review, the authors, members of the Cochrane Schizophrenia Group, first stated that the data available to assess the question were “too inconclusive to guide those wishing to uphold or refute the effect of intercessory prayer on health.” In light of the data that are available, however, they wrote that “there are no grounds to change current practices” that do not include regular intercessory prayer for patients. Despite this conclusion, they also wrote that “there are few completed trials of the value of intercessory prayer, and the evidence presented so far is interesting enough to justify further study.” Although indirectly endorsing further studies, the authors also expressed some skepticism about the ability of medical science to observe and measure prayer’s effects; “if any benefit derives from God’s response to prayer,” they wrote, it may be “beyond any such trials to prove or disprove it” (Roberts, Ahmed, and Hall 2004).

#### EMERGENCE OF A FAD? SCIENTIFIC STUDIES OF INTERCESSORY PRAYER SINCE 2000

Beginning in 2000, double-blind scientific studies of intercessory prayer increased in number, becoming something of a fad with twelve articles published between 2000 and 2006 in *Alternative Therapies in Health and Medicine*, *American Heart Journal*, *Australian Psychiatry*, *British Medical Journal*, *Journal of Alternative and Complementary Medicine*, *Journal of Reproductive Medicine*, *Lancet*, *Mayo Clinical Proceedings*, *Nursing Research*, and *Southern Medical Journal*. Overall, debate has been louder and more contentious when journals publish articles showing that prayer has a positive effect on health than that it does not, which has been the case in less than one-third of these recent studies.

Since 2000, intercessory prayer studies have themselves become more nuanced, and prayer has started to be packaged with other complementary and alternative health care treatments in studies. William Matthews and colleagues, for example, attempted to analytically distinguish between the effect of intercessory prayer and patients’ expectations about whether or not they were receiving it; none could be demonstrated (Matthews, Marlowe, and MacNutt 2000). Further, the Monitoring and Actualization of Noetic Training (MANTRA) study conducted primarily by researchers at Duke University enlarged studies of prayer to focus broadly on noetic treatments

or stress relaxation, imagery, touch therapy, and intercessory prayer. These are treatments that “purport to enable, release, channel, or connect an intellectual, intuitive, or spiritual healing influence without the use of a drug, device, or surgical procedure” (Krucoff et al. 2001), 761). The pilot study published in the *American Heart Journal* in 2001 showed no significant statistical differences among patients undergoing a cardiac procedure who received noetic treatments, including prayer. The larger MANTRA II study was published in July 2005 in the *Lancet* after an editorial calling its subjects “proper . . . for science, even while transcending its known bounds” (Editors 2005). Like in the pilot, this study reported that prayer did not influence the likelihood that patients undergoing a particular cardiac procedure had another major cardiovascular health problem while in the hospital, that they died, or that they were readmitted to the hospital within the next 6 months.

Rather than concluding from the MANTRA studies that either the prayer of unknown intercessors has no effect on patients’ health or that it may or may not but cannot be observed using existing research methods, the authors attempted to keep these questions open and squarely in the realm of medical science, writing that this kind of medicine, called “frontier medicine” in 2001 by the U.S. National Office of Complementary and Alternative Medicine, is at a very early stage (Krucoff 2005, 211). The challenges for future studies, they delineate in the language of biomedicine, include dosing, the timing and duration of prayers, and off-protocol prayer.<sup>8</sup> By following “ethical and scientific” standards of research, this and future studies, the authors conclude, “will support more robust opportunities for pooling of data and meta-analyses across studies important to the progression of understanding novel noetic therapies” (217). Medical researchers will better understand the effects of intercessory prayer, in other words, as they continue to gather data, share their results, and work through the methodological issues in this developing field of medical science.

Since 2000, the largest debates about scientific studies of intercessory prayer have centered on three very different types of studies. The first, conducted by Jennifer Aviles and colleagues at the Mayo Clinic in Rochester and published in 2001, concluded that “intercessory prayer had no significant effect on medical outcomes after hospitalization in a coronary care unit” (Aviles et al. 2001, 1192). Despite this fact, the authors recommended future, better studies to, in their own words, “define the role of intercessory prayer on quantitative and qualitative outcomes and to identify end points that best measure the efficacy of prayer in a variety of patient populations” (1198).

Following its publication in the *Mayo Clinic Proceedings*, letters to the editor directly addressed the need for such studies viewing religion and medical science as distinct spheres and inquiries such as these as

impractical and beyond the boundaries of medical science. Rev. Harry Werner, a hospital chaplain at University Hospitals of Cleveland, described intercessory prayer studies as unnecessary, writing, “I believe that both the religious and the scientific world views are legitimate, and neither needs to justify the other. This type of study is an attempt to justify religion on scientific terms and consequently does a disservice to both” (Werner 2002). A physician in Akron, Ohio, concurred, emphasizing the limits of medical science in his letter: “I seriously question the need for further clinical research in this area because clinical trials based on a scientific framework or paradigm will not help us understand the effects of spiritual interventions on health care outcomes. These interventions are based on faith and by definition require no evidence” (Anaya 2002). Physicians need to understand patients’ religious beliefs and provide for their spiritual care, but the continuation of these studies, he argued, is not the evidence or practice needed to achieve that goal. Rather than arguing about whether this study met the criteria of medical science, as in previous cases, these letter writers (perhaps because of the paper’s null findings) accepted the dichotomy between the spheres to argue that this research is not valuable because it has no practical outcome or application.

The second controversial study, also published in 2001, investigated whether prayer for women undergoing *in vitro* fertilization for embryo transfer made them more likely to get pregnant. Prayers of petition asking God to intervene were offered by members of various Christian denominations (Cha, Wirth, and Lobo 2001). The authors of this study, Cha, Wirth, and Lobo, concluded that a “statistically significant difference was observed for the effect of intercessory prayer on the outcome of *in vitro* fertilization–embryo transfer” (782).

This study was steeped in controversy from the start following allegations that standard consent procedures were not followed, the authors’ roles and responsibilities were not clearly defined, and that the data may have been fabricated, issues that left little time or space to debate the medical scientific merits of the study (Kelly 2002; Hollerman 2005; Howard 2005; McMeeking 2005; Perrin 2005; Siegel 2005). The editor of the *Journal of Reproductive Medicine* that published the article eventually removed it from their web page. Several years after the article’s publication, Kwang Cha, the first author, responded to concerns by reinforcing the scientific yet preliminary nature of his study and findings. Bruce Flamm, a physician in the department of Obstetrics and Gynecology at the University of California Irvine and one of the study’s chief critics, pointed to errors in Cha’s logic and flaws in the study design that pushed it outside the bounds of science. “We should remember,” Flamm argued in an attempt to push this study outside the boundaries of science, “that no alleged paranormal or supernatural phenomenon has ever been replicated under controlled scientific conditions” (Flamm 2004).

A third type of intercessory prayer study published since 2000 was conducted by Leonard Leibovici and published in the *British Medical Journal* in December 2001 (Leibovici 2001). Known for publishing slightly wacky or unusual articles in the final issue of the year, the journal published the article “Effects of Remote, Retroactive Intercessory Prayer on Outcomes in Patients with Bloodstream Infection: Randomized Controlled Trial” following an editorial explaining that this Christmas issue emphasized “the paranormal” and that Leibovici started his experiment by “abandoning the idea that time is linear” (Smith 2001). As we cannot, Leibovici explained, “assume a priori that time is linear, as we perceive it, or that God is limited by a linear time as we are” he conducted an experiment 4 to 10 years after patients were in the hospital with a bloodstream infection (1450). In the study, Leibovici examined all adult patients (N = 3393) who had a bloodstream infection detected at a university hospital in Israel (Rabin Medical Center, Beilinson Campus) between 1990 and 1996 to determine whether prayer offered for patients, even years after they had such infections, could influence how they responded to them at the time. All of the hospitalized patients who had a bloodstream infections between 1990 and 1996 were randomly divided into two groups, and the first names of people in one group were given to someone who said a short prayer for “their wellbeing and full recovery of the group as a whole” (1450). When statistical tests were conducted, Leibovici found that people in the first group who were prayed for tended to stay in the hospital for shorter amounts of time and have fevers for shorter durations than others. Quoting the discussion of scurvy in Harris et al.’s study, he implied that a natural explanation for these findings might be discovered centuries from now, as was the case with scurvy. “Remote retroactive intercessory prayer can improve outcomes in patients with a bloodstream infection,” Leibovici concluded, “This intervention is cost effective, probably has no adverse side effects, and should be considered for clinical practice. Further studies may determine the most effective forms of this intervention and its effects in other severe conditions and may clarify its mechanism” (1451).

Responses and objections to this article poured into the offices of the *British Medical Journal* in letters to the editor and online posts in the “Rapid Response” section, where close to one hundred notes were posted from people around the world. Like when the Harris et al.’s study was published, some commentators took the study seriously as a piece of medical research and responded with suggestions and criticisms as they would regardless of the medical intervention being studied. An early response in the online rapid response section that was later published as a letter to the editor, for example, emphasized that “these results need to be interpreted with caution” because “there were no significant differences between the two groups with regard to the most clinically important outcome (mortality),” among other issues. To a degree not seen in other studies, however, other commentators

refused to take the study seriously, writing things like, “Congratulations Dr. Leibovici—This is a First Evidence of Providence Based Medicine” and “Was this paper by any chance supposed to have appeared at the beginning of April [i.e., April Fools Day]?”

In April of the following year (2002), the journal published eight letters to the editor in its print edition, most of which criticized the author and study on methodological, statistical, and/or ethical grounds. Leibovici responded revealing that whereas he had actually conducted this study and gotten the empirical results described, his point was to raise a broader question central to the conflicts over intercessory prayer studies since they began in 1965. “The purpose of this article was to ask the following question,” Leibovici wrote. “Would you believe in a study that looks methodologically correct but tests something that is completely out of people’s frame (or model) of the physical world—for example, retroactive intervention or badly distilled water for asthma?” He outlined three responses to this question. First, “to answer in the affirmative. But this leads to such paradoxes . . . that it is incompatible with scientific work or even daily life.” Second, one cannot respond to the question but instead look for “methodological and statistical faults.” This may work at the time but, “what if the next study sports perfect methodology and statistics?” he asked. Third, his own belief, one can “deny from the beginning that empirical methods can be applied to questions that are completely outside the scientific model of the physical world. Or in a more formal way, if the pre-trial probability is infinitesimally low, the results of the trial will not really change it, and the trial should not be performed. This, to my mind, turns the article into a non-study, although the details provided in the publication . . . are correct.” He opts for the third, concluding, “This article has nothing to do with religion. I believe that prayer is a real comfort and help to a believer. I do not believe it should be tested in controlled trials” (Leibovici 2002).

Taking the exact opposite position as Joyce and Weldon, Collipp in the 1960s, Byrd in the 1980s, and Harris and colleagues in the 1990s, Leibovici attempted to place scientific investigations of intercessory prayer outside the bounds of medical science for two reasons. First, he makes an empirical argument, that intercessory prayer has an “infinitesimally low” possibility of having an effect. Second, he makes a normative argument that some questions are simply outside of or beyond the tools of medical science. The seriousness with which many responded to this article methodologically, however, is revealing of the extent to which some commentators are not convinced by either or both of these arguments, holding fast to their medical scientific tools and epistemologies in evaluating the study. It is also revealing that Leibovici did not feel that intercessory prayer itself was, in his words, far enough outside of “people’s frame (or model) of the physical world.” Instead, Leibovici had to open up questions about

the linear nature of time by focusing on *retroactive* intercessory prayer, providing a bit more evidence that intercessory prayer studies (posited in linear time) have come to be expected, if not accepted, scientifically by the medical community (see also Bishop and Stenger 2004).

## CONCLUSIONS

Scientific studies of intercessory prayer were first published in the English language medical literature in 1965 and have continued to the present amidst a level of discussion and debate disproportionate to their numbers overall. The issues that have made, and continue to make, these studies so controversial are those being debated between their lines about whether physicians and other medical researchers believe prayer can be studied scientifically using the best tool of medical science: the double-blind clinical trial.

After more than four decades, some physicians and medical researchers participating in these discussions say yes without qualification, holding fast to their epistemologies and tools of medical science. Others say yes more reservedly only if certain methodological and/or ethical criteria are met. Others say no, viewing medical science as more limited and some issues as simply outside medical scientific ways of knowing. Still others do not acknowledge the question directly, emphasizing instead—in the spirit of pragmatic philosophy—the applicability (or lack thereof) study findings might have in their daily lives. Some, like William Wilson quoted in the *Southern Medical Journal* in 1988, see themselves advocating new developments in science in these studies via their holistic rather than mechanistic approaches to life. Others see themselves contributing to increasing dialogues about religion, spirituality, health, and medicine, whereas still others are less concerned about any such broader implications.

Despite these ongoing debates, and participants' efforts to exercise what Thomas Gieryn calls their "epistemic authority," ideological and material factors continued to enable intercessory prayer studies to be conducted over the years. Ideologically, continued high levels of prayer among the American public generally and around health specifically motivate these studies, as does the regularity with which people offer prayers for healing. Gaps in medical knowledge and frequent appeals to prayer by patients and their families as well as testimonies of medical miracles in the popular press also fuel curiosity. The growth of complementary and alternative medicine, and inclusion of prayer as one type of alternative medicine among many, also contributes to curiosity about it in the medical community. The movement toward evidence-based medicine within the medical community in which all treatments and medical interventions are to be scientifically studied and tested has fueled huge numbers of research studies, including those of alternative medicines, such as yoga, tai-chi, meditation, and others that do not seem so different from prayer. In addition, these studies have continued

because of the support of several large foundations and because of the early positive results in the studies by Byrd and Harris, which fueled the development of the field. The relatively large number of studies published since 2000 were started in direct response to these studies with positive findings.

Regardless of their specific findings, most of the researchers conducting these studies made arguments about the need for additional research. Implicit are attempts to write plausible narratives to interpret their empirical results. Although some observers interpret intercessory prayer studies as attempts to test or to prove God's existence, it is interesting, in conclusion, to recognize that most of the study authors do not publicly claim to see it that way. Rather than framing their narratives as about God's existence, for example, Harris and colleagues argued in 1999 that they were looking simply for an association between prayer and healing, like in the case of scurvy, rather than for a mechanism, the understanding of which may be centuries away. Harris appealed to a "natural" rather than "supernatural" mechanism and claimed that they had not proven that "God answers prayer or even that God exists" but simply that "when individuals outside of the hospital speak (or think) the first names of hospitalized patients with an attitude of prayer, the latter appeared to have a 'better' CCU [cardiac care unit] experience" (2277). As Jeffrey Dusek similarly wrote in the pilot study of the STEP project conducted with Herbert Benson, "The goals of the Study of the Therapeutic Effects of Intercessory Prayer (STEP) are to evaluate the effects of receipt of additional study intercessory prayer and awareness of receipt of additional study intercessory prayer on outcomes in patients undergoing coronary artery bypass graft surgery. STEP is not designed to determine whether God exists or whether God does or does not respond to intercessory prayer" (Dusek et al. 2002, 577).

Physician Larry Dossey and other recent apologists for these studies often ignore the idea of God altogether, instead focusing on scientific "knowledge" about vitamins preventing disease, microbes causing disease, and atherosclerosis causing heart attacks that are now taken as truth. "Strongly held convictions are often wrong" Dossey has written in response to criticisms of intercessory prayer studies, and scientists are not even close to understanding laws "governing space, time, intention, and consciousness" relevant to intercessory prayer studies. Rather than ridiculing or ignoring studies of intercessory prayer, Dossey calls physicians and medical researchers to keep them within the bounds of science by studying and making evident the possible mechanisms underlying the relationships (Dossey 1993).

Other researchers studying the intersections between religion and medicine have called for an end to scientific studies of intercessory prayer because they lack a "scientific" mechanism and cast a dark shadow on other research about religion and health (Cohen et al. 2000; Sloan 2005). The question of whether these studies are science and whether it is possible to

understand intercessory prayer using the double-blind clinical trial remain unsettled, however, after more than 40 years. Participants in the debate have constructed their standards of knowledge and epistemic authority in multiple ways, ultimately not agreeing but continuing to debate. These studies represent less a new development in science than another unique chapter in ongoing discussions and debates about the relationship between religion and science. Some participants, mostly study authors, see future rapprochement between religion and science in these efforts, whereas others, especially the critics, see estrangement.

## NOTES

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1. See also Harrington (2011) for a discussion of how the placebo effect has been theorized in these studies.

2. Early pragmatists, such as William James, mentioned “mind cures” as one direction medicine should take (Richardson 2010, 341). Thanks to an anonymous reviewer for making this point.

3. For other empirical examples, see Gieryn (1983) and Gieryn, Bevins, and Zehr (1985). See also Fleck (1979).

4. For examples outside of the sciences, see Fuller (1991), Gal and Irvine (1995), and Small (1999). For previous studies in “fringe science” and challenges to science, see Collins (1983) and Martin (2004). For an interesting parallel in medical science, see writings about complementary and alternative medicine—for example, Ruggie (2004).

5. Patients were not aware that a study was in progress.

6. For a discussion of what counted as “prayer” and how that developed over time, see Cadge (2009).

7. A second central theme in the response to the study by Harris et al., not elaborated here, is the issue of whether rules of informed consent that require all participants in medical studies to be aware of the study and consent to being included apply in the case of intercessory prayer studies. If these studies are “science” and are published in mainstream medical journals then, as a number of critics argue in their letters to the editor, such rules of informed consent do apply and this study was not conducted ethically because Harris et al. did not adhere to these guidelines. Conversation about this topic continued in subsequent debates about intercessory prayer studies.

8. “Dosing” is an issue because it is not clear how much prayer from what religious traditions might have an effect on health. “Timing and duration” of prayer may be influencing the results as might “off-protocol prayer” or prayer offered by patients’ relatives and friends that researchers cannot attempt to prohibit for ethical reasons.

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