

Efficacy of Prayer

A Critical Examination of Claims

The “landmark study” of Byrd and the recent confirmation attempt by Harris et al., both claiming therapeutic benefits of intercessory prayer, are shown to be invalid. One was improperly designed, the other fallaciously analyzed—and the two contradict each other.

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The therapeutic power of prayer is a recurring theme among many proponents of alternative medicine. One can imagine a natural explanation for the alleged benefits: a psychological boost from the belief that a supernatural power is on your side. But what if you are unaware that people are praying for you? Such intercessory prayers could only work through a supernatural agency.

Investigating the efficacy of intercessory prayer was given scientific legitimacy by Francis Galton, the father of biometry and a central figure in the founding of modern statistical analysis. In classic memoirs, Galton (1872, 1883) argued that regardless of how the prayers “may be supposed to operate,” the “efficacy of prayer . . . is a perfectly appropriate and

legitimate subject of scientific inquiry" because it can be tested statistically, as he then demonstrated.¹

A Landmark Study

A celebrated study performed at San Francisco General Hospital by Randolph C. Byrd reported that patients in a cardiac care unit received statistically significant benefits from intercessory prayers (Byrd 1988). That study has attained special status within the alternative medicine community and has been reprinted as a "landmark study" (Byrd 1997).

In the same skeptical spirit

determined the answer to the key question of which did better, the intercessory prayer group or the control group (Byrd, personal communication).

Because the table was apparently constructed from computer-stored data using objectively stated criteria that did not involve

Byrd in any personal evaluation of individual cases, the lack of blinding might have had no effect. Although blind evaluation is clearly preferable, the use of an unblinded analy-

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ORIGINAL INVESTIGATION

A Randomized, Controlled Trial of the Effects of Remote, Intercessory Prayer on Outcomes in Patients Admitted to the Coronary Care Unit

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Prayed-for patients fare better in study

Positive Therapeutic Effects of Intercessory Prayer in a Coronary Care Unit Population

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that motivates one to seek the flaw in the design of a perpetual motion machine, we have examined Byrd's study, as others have done (Posner 1990; Sloan et al. 1999; Witmer and Zimmerman 1991), to seek a natural explanation to rival the supernatural one.

We believe a serious flaw exists in his critical Table 3, a flaw that raises doubts about the table's validity. That table reports the overall outcome for patients admitted to the cardiac care unit. Upon admission, they were entered randomly into one of two groups: an intercessory prayer group or a control group (192 and 201 patients). The outcome was recorded as *good*, *intermediate*, or *bad*.² Byrd found that compared to the control group, the prayer group had an excess of good outcomes and a deficit of bad outcomes, a significant difference in favor of the prayer group with $P < 0.01$ (Byrd's Table 3). The study was necessarily intended to be double blind. Byrd writes: "The patients, the staff and doctors in the unit, and I remained 'blinded' throughout the study."

Unfortunately, that was not the case at a critical point. Byrd's Table 3, which might best have been constructed by a panel of "blinded" doctors, was constructed by Byrd alone. But it was done in response to criticism of an earlier version of his manuscript, the writing of which had already required that the code be broken. Thus Byrd was no longer blinded when he

sis could be defended were it completely computer generated. However, the criteria he chose for evaluating the patients' outcomes were formulated after the data were collected and when Byrd was unblinded. That is an unreliable approach. The criteria should have been selected before the start of the study.

The claim of blindedness is erroneous in yet another respect (one aspect of which has already been mentioned [Witmer and Zimmerman 1991]). In his acknowledgments, Byrd thanks "Mrs. Janet Greene for her dedication to this study," but without any elaboration of her role. In a later publication (Byrd with Sherrill 1995) we learn that Janet Greene was hired "... to be our coordinator. ... Janet entered names of all the volunteer patients into a computer that randomly divided them into two groups. ... half of the patients—only Janet knew who they were—were prayed for daily by our intercessors. ... She kept detailed records of all patients in both groups." Thus the very coordinator of the study was completely unblinded. Once patients were assigned to one of the two groups, Greene should have had no further contact with the hospital.³

Byrd's evidence for supernatural intervention, if true, would arguably be one of the most remarkable scientific demonstrations of the last millennium. To be credible, however, it requires, among other things (Posner 1990; Sloan et al. 1999; Witmer and Zimmerman 1991), considerably more attention to strict blindedness. In the absence of that credibility, its status, not to mention the "landmark" label, is highly dubious.

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A Confirmation Attempt

Recently, another prayer study, broadly based on Byrd's (and the subject of numerous news reports in October and November 1999), examined 990 patients admitted to a coro-

nary care unit (Harris et al. 1999).⁴ The authors scored the effects of intercessory prayer on the occurrence of thirty-four adverse conditions (Harris's Table 3).⁵ These are similar to the twenty-six conditions scored by Byrd (his Table 2).

Their general approach to scoring the efficacy of intercessory prayer is summarized as follows. "Since prayer was offered for a *speedy recovery with no complications* [our italics], it was anticipated that the effect of prayer was unlikely to be evident in any specific clinical outcome category (e.g., the need for antibiotics, the development of pneumonia, or the extension of infarction), but would only be seen in some type of global score."

Let us therefore look first at the speed of recovery. The length of stay in the coronary care unit decreased 9 percent in the prayer group, but with $P = 0.28$;⁶ the length of hospital stay increased by 9 percent in the prayer group, but with $P = 0.41$ (their Table 4). Thus, by either measure the large P values indicate that the results are quite consistent with a null effect; thus there is no evidence that intercessory prayer confers any benefit (or harm) in speed of recovery.

Next we examine the results for two types of global scores. One is the Mid America Heart Institute-Cardiac Care Unit (MAHI-CCU) weighted score (their Table 4)⁷ for the thirty-four adverse conditions. They call this score the "primary pre-defined end point" of their study. It shows an 11 percent advantage to the intercessory prayer group with $P = 0.04$.

Another type of global score arises from an evaluation of overall outcomes judged by a blinded panel to be either good, intermediate, or bad, each based on Byrd's criteria.² Whereas Byrd found a significant difference ($P < 0.01$) in *good* and *bad* outcomes in favor of the prayer group, Harris et al., using the same criteria, find no significant difference ($P = 0.29$, Harris's Table 5). Thus, not only do these results of Harris et al. fail to confirm the significant differences found by Byrd, they constitute a second set of results (the first being on speed of recovery) that shows no significant effects of intercessory prayer.

Thus Harris et al. make three major tests of the efficacy of intercessory prayer: speed of recovery scores (Table 4), MAHI-CCU global scores (Table 4), and outcome scores (Table 5). On the basis of just the MAHI-CCU scores taken alone with its barely significant $P = 0.04$ value, Harris et al. conclude there is a beneficial effect of intercessory prayer.

This argument is simply fallacious: where there are multiple tests it is incorrect to single out just one, ignoring others with large P values that indicate no significant differences between the groups tested. For example, if the three tests were completely independent, the probability that at least one of the three would show $P = 0.04$ purely by chance would be $1 - 0.96^3 \approx 0.12$, which is well above the conventional maximum value of 0.05 for significance. Though the tests are not independent, it is clear that the overall probability of observing that just one of these three tests favors intercessory prayer with P as low as 0.04 is well explained by pure chance.⁸

Conclusions

The tests of Harris et al., taken in their entirety, fail to show

any significant benefit of intercessory prayer, and one of the tests directly contradicts Byrd's primary evidence for efficacy (his Table 3) that is the cornerstone of his "landmark study."

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Notes

1. Galton's retrospective analysis revealed no beneficial effect.
2. Here is how *good* and *bad* scores were achieved. The outcome was scored as *good* if only one of the following occurred: "left heart catheterization; mild unstable angina pectoris of less than six hours' duration; self-limiting ventricular tachycardia within the first seventy-two hours of myocardial infarction; supraventricular tachyarrhythmia; uncomplicated third-degree heart block requiring temporary pacemaker; mild congestive heart failure without pulmonary edema; no complications at all." The outcome was scored as *bad* if there occurred "nonelective cardiac surgery, readmission to the coronary care unit after a myocardial infarction with unstable angina, extension of initial infarction, cerebrovascular accident, cardiopulmonary arrest, need for artificial ventilator, severe congestive heart failure with pulmonary edema and pneumonia, hemodynamic shock due to sepsis or left ventricular failure, death."
3. Byrd might have gone further and designed his study so that no human would know, until the appointed time for breaking the code, which patients were in the test group and which in the control group. If the intercessors needed names for their assigned patients, pseudonyms could have been used without any human knowing to whom the pseudonyms referred. This should present no difficulty to the Judeo-Christian God to whom the intercessors were praying.
4. To help assure blindness, not even the patients knew they were being studied. The requirement of informed consent was waived, in part, because it was felt that the study posed no known risk to either patient group.
5. The conditions include, for example, the need for antianginal agents, antibiotics, arterial monitor, vasodilation, antiarrhythmics, catheterization, diuretics, a permanent pacemaker, an interventional coronary procedure, intubation/ventilation, major surgery, and twenty-two others.
6. We calculate $P = 0.36$. Reminder: P is the probability of this result occurring purely by chance. Conventionally, a value of P greater than 0.05 attributes no statistical significance to the result.
7. An example of their scoring system: if "a patient developed unstable angina (1 point), was treated with antianginal agents (1 point), was sent for heart catheterization (1 point), underwent unsuccessful revascularization by percutaneous transluminal coronary angioplasty (3 points), and went on to coronary artery bypass graft surgery (4 points), his weighted MAHI-CCU score would be 10."
8. It is the responsibility of Harris et al. to calculate the overall P value.

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