

Original articles

# Relaxation response and spirituality: Pathways to improve psychological outcomes in cardiac rehabilitation

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## Abstract

**Objectives:** Studies have shown beneficial effects from practicing the relaxation response (RR). Various pathways for these effects have been investigated. Previous small studies suggest that spirituality might be a pathway for the health effects of the RR. In this study, we tested the hypothesis that increased spiritual well-being by eliciting the RR is one pathway resulting in improved psychological outcomes. **Methods:** This observational study included 845 outpatients who completed a 13-week mind/body Cardiac Rehabilitation Program. Patients self-reported RR practice time in a questionnaire before and after the 13-week program. Similarly, data on spiritual well-being, measured by the subscale of Spiritual Growth of the Health-Promoting Lifestyle Profile II, were collected. The psychological distress levels were measured by the Symptom Checklist-90-Revised. We tested the mediation effect of spiritual well-being using regression analyses. **Results:** Significant increases

in RR practice time (75 min/week, effect size/ES=1.05) and spiritual well-being scores (ES=0.71) were observed after participants completed the program ( $P<.0001$ ). Patients also improved on measures of depression, anxiety, hostility and the global severity index with medium effect sizes (0.25 to 0.48,  $P<.0001$ ). Greater increases in RR practice time were associated with enhanced spiritual well-being ( $\beta=.08$ ,  $P=.01$ ); and enhanced spiritual well-being was associated with improvements in psychological outcomes ( $\beta=-0.14$  to  $-0.22$ ,  $P<.0001$ ). **Conclusion:** Our data demonstrated a possible dose-response relationship among RR practice, spiritual and psychological well-being. Furthermore, the data support the hypothesis that spiritual well-being may serve as a pathway of how RR elicitation improves psychological outcomes. These findings might contribute to improved psychological care of cardiac patients. © 2010 Elsevier Inc. All rights reserved.

**Keywords:** Spirituality; Mind/body medicine; Relaxation response; Cardiac rehabilitation; Psychological distress; Mediation effects

## Introduction

Relaxation response (RR) practice is a well-established mind/body approach for managing stress and has been found to be beneficial for various patient populations including cardiac patients [1–6]. The RR can be elicited by a number of techniques, including mindfulness meditation, prayer, progressive muscle relaxation, imagery and yoga.

Previous studies have investigated pathways for explaining the health effects of the RR. The physiological effects associated with the RR, such as reduced oxygen consumption, heart and respiratory rates, increased exhaled nitric oxide and lowered blood pressure, have been proposed as possible mechanisms for the beneficial effects [7–9]. Our study team has also been exploring the pathway through genomic alterations and recently reported that RR practice elicits specific gene expression changes [10].

Other studies have suggested that the health effects of RR practice may be mediated by spirituality. One study ( $n=83$ ), which focused on the development of a spiritual scale — Core Spiritual Experience, found that outpatients with a longer history of elicitation of the RR through meditation

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reported a higher spiritual score. Furthermore, a higher spiritual score was associated with better health outcomes (e.g., increased life purpose and satisfaction, and decreased frequency of medical symptoms). Taken together, these findings suggest that spiritual experience may mediate between elicitation of the RR and health outcomes [11].

Another recent study ( $n=44$ ) found that participation in a mindfulness-based stress reduction program appeared to be associated with improvement in spiritual well-being (measured by the Functional Assessment of Chronic Illness Therapy-Spiritual Well-Being Scale). Improvement in spiritual well-being, in turn, appeared to be associated with improvement in psychological and medical symptoms. Spiritual well-being may therefore occur as a function of mindfulness meditation, and this aspect of functioning may be an important element in health and well-being [12]. In previous studies, we have also demonstrated that eliciting the RR improved the spiritual quality of life in patients with chronic heart failure [2] and patients infected with HIV [13].

Our study team has recently reported that patients with coronary artery disease who participated in a 13-week mind-body cardiac rehabilitation program showed both clinically and statistically significant improvements in medical and psychological outcomes [14]. In the study, we also examined how the components of the intervention (exercise and RR) were related to these improvements. Specifically, the study found that RR practice, which is a significant component of this program, was associated with a reduction in symptoms of depression.

Building on this prior work, we now test the conceptual model that spiritual well-being is a pathway that might explain some of the improvements in psychological outcomes associated with RR practice observed in patients who completed the mind-body cardiac rehabilitation program.

Although past studies have used spirituality and religiosity interchangeably, recent research has addressed the distinction between the two in studying their effects on health [15]. One well-accepted difference between religiosity and spirituality is that the former is seen as an organizational phenomenon, whereas the latter is usually understood at the level of the person/individual within specific contexts [16]. Spirituality has been defined as a personal quest for answers to questions about life's meaning and its relationship to the sacred or transcendent [17]. The role of religiosity and spirituality in health is increasingly an important area of research with the focus on the relationships between them [18,19]. Many studies have shown positive associations between spirituality and health, particularly mental health [12,20], but the way to develop spirituality, which can then have positive impacts on health, has rarely been explored.

Parallel to the interest in studying the effect of religiosity/spirituality on health, scale development for measuring these two constructs has also become an area of research interest [15]. Instruments for measuring various dimensions of religiosity are available in the literature [21]. However, fewer scales are available for measuring various dimensions

of spirituality [15,21]. A few scales have been developed for measuring spiritual well-being and spiritual quality of life [22–24], including the subscale of Spiritual Growth in the Health-Promoting Lifestyle Profile II, which was used for collecting pre- and post-intervention data in our cardiac rehabilitation program [25,26].

In this study, we employed a statistical procedure to test the mediation effect of spiritual well-being, which to our knowledge has not been done in other studies. The availability of a large database from the program provided the statistical power ( $n>500$ ) required to conduct such an analysis [27]. In addition, the study used data collected from a real-world clinical setting which included self-report data on RR practice time before and after program participation. This unique feature allows us to conduct a dose response study, rather than an “all or none” (intervention vs. control) comparison commonly used in clinical trials.

## Methods

The study used data collected from a large number of outpatients who completed the 13-week cardiac rehabilitation program at the Mind/Body Medical Institute (now called the Benson-Henry Institute for Mind-Body Medicine) over a period of 8 years (1997–2005). We tested the conceptual model that spiritual well-being mediated the observed relationship between RR and psychological improvements. In another words, RR practice was associated with enhancement in spiritual well-being, which in turn was associated with improvements in psychological outcomes. We used a procedure proposed by Baron and Kenny [28] to test this mediation effect of spiritual well-being. We also tested the statistical significance of the mediation effect using the method proposed by Kenny et al. [29]. Testing the mediation effect of spiritual well-being included four steps. First, we determined if there was a significant association between RR practice and psychological outcomes. Second, we assessed whether RR practice was significantly associated with increased spiritual well-being. Third, we evaluated the extent to which spiritual well-being was significantly associated with improved psychological outcomes controlling for RR practice. In this step, the association between RR practice and psychological outcomes controlling for spiritual well-being was also estimated. Finally, we determined if the strength of the association between RR practice and psychological outcomes was significantly reduced after controlling for spiritual well-being; that is, the association estimated in Step 3 was weaker than in Step 1. This final step provided the basis for assessing if spiritual well-being mediated the association between RR and psychological outcomes.

### Study participants

Study subjects were 845 outpatients who were referred to and attended at least 75% of the 13-week program between

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