



Neural correlates of healing prayers, depression and traumatic memories: A preliminary study



Philip R. Baldwin^{a,b}, Kenia Velasquez^{a,b}, Harold G. Koenig^{c,d}, Ramiro Salas^{a,b,**}, Peter A. Boelens^{e,*}

^a Menninger Department of Psychiatry and Behavioral Sciences, Baylor College of Medicine, Houston TX 77030, United States

^b Michael E DeBakey VA Medical Center, 2002 Holcombe, Houston, TX 77030, United States

^c Department of Psychiatry & Behavioral Sciences, Box 3400, Duke University Medical Center, Busse Building, Rm 0505, Durham, NC 27710, United States

^d King Abdulaziz University, Jeddah, Saudi Arabia

^e University of Mississippi Medical Center, 2500 N. State St., Jackson, MS 39216, United States

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ABSTRACT

Depression is a global health concern and when rooted in childhood adversity is particularly difficult to treat. In a previous study, we found that healing prayer was effective in reducing depressive symptoms.

Subjects suffering with depression according to HAM-D scores underwent task-based brain functional MRI (fMRI) prior to and after a 6-week prayer intervention, and depression symptoms were assessed at both time points and at a 12-month follow-up.

Average HAM-D scores decreased from 21.6 ± 3.0 prior to the intervention to 4.0 ± 2.7 immediately afterwards (14 subjects) and remained low (3.7 ± 3.4) at 12-month follow-up (11 subjects). fMRI demonstrated increased activity in the medial prefrontal cortex during focus on the traumatic memory after the prayer intervention. Changes in activity in the left inferior frontal gyrus correlated with improvement in depressive symptoms. Activity in the precuneus region decreased after the prayer intervention when subjects focused on the negative feelings associated with the trauma.

We conclude that increased activity in the prefrontal cortex after healing prayer may be associated with increased cognitive control over emotions. Healing prayer may help to dissociate the memory of the trauma from feelings associated with it, as evidenced by changes in the precuneus region.

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1. Introduction

According to the World Health Organization, depression will become the major health burden world-wide by 2020.¹ The disability caused by depression is greater than that from chronic lung disease, diabetes or arthritis and is surpassed only by heart disease.² Depression adversely affects acute and chronic diseases by interfering with recovery and may increase mortality.³ Depression arising from early childhood adversity is particularly difficult to treat, because it does not respond well to medication, has more frequent recurrences, and often requires a modified form of psychological therapy.⁴ Moreover, brain imaging studies of resting state func-

tional connectivity have indicated that early life stress contributes to the pathophysiology of depression.⁵

The effects of spirituality on the brain have been studied before.⁶ However, to our knowledge, our earlier studies were the first to examine the therapeutic aspects of healing prayer on depression. In those studies, we employed a Christian form of prayer that focused on forgiveness and psycho-spiritual healing (PSFH). In patients with depressive disorder, PSFH significantly decreased depression symptoms,⁷ as measured by the Hamilton Depression Scale.⁸ The effect was larger than typically observed with either antidepressants or cognitive behavioral therapy⁹ and lasted for at least one year without additional treatment.¹⁰ It should be noted that the prayers in this study were direct person-to-person prayers addressing issues that presented themselves in individual sessions. They were not intercessory prayers for the healing of depression or anxiety and in fact, the words 'depression' or 'anxiety' were never mentioned in the prayer sessions.

Our main objective was to study the neural correlates of the effects of PSFH on depression. To do that, fMRI was conducted

* Corresponding author.

** Corresponding author at: Baylor College of Medicine, Psychiatry Department, One Baylor Plaza, Houston, TX 77030, United States.

E-mail addresses: rsalas@bcm.edu, ramiritosalas@gmail.com (R. Salas), Boelens3554@gmail.com (P.A. Boelens).

before and after the PSFH intervention during a trauma-related task. The task involved subjects focusing first on the memories of a past interpersonal trauma and then on the feelings associated with the traumatic event. The primary outcome of the study was brain activity change pre-post intervention. To measure the effects of PSFH on our sample, we assessed depressive symptoms, anxiety symptoms, optimism, and daily spiritual experiences.

2. Methods

2.1. Participants

Participants with a HAM-D score of 10 or higher were recruited from Houston area churches. To qualify for the study, subjects could not have received psychotherapy, anti-depressant medication, or anti-anxiety medication within the past three months, or be incapacitated by their symptoms. Subjects also had to agree to not seek other therapies or ask for intercessory prayer during the 6-week intervention. However, to avoid the possibility that subjects might not seek necessary help because of these instructions, they were told that they could leave the study at any time, for any reason, without consequences. Exclusion criteria were inability to be scanned (claustrophobia, metallic implants, etc.) or confounding psychiatric illness based on self-report. A total of 18 participants (14 females) met these inclusion and exclusion criteria (3 Hispanics, 4 Blacks, and 11 Caucasians). A total of 14 subjects (11 females) completed the intervention, and were successfully scanned before and immediately afterwards. Four participants dropped out during the study period because they failed to keep appointments. The average age of participants was 45.6 ± 13.0 years old. Of those 14, 11 completed follow up questionnaires at 12 months. Average HAM-D scores of the participants completing the intervention were 22 ± 3 . Participants were fully informed about the study procedures and signed informed consent documents prior to beginning. The study was approved by Baylor College of Medicine Institutional Review Board.

2.2. Measures

Four scales were used to assess the psychological state of participants: the Hamilton Depression Scale (HAM-D), Hamilton Anxiety Scale (HAM-A), Daily Spiritual Experiences Scale (DSES), and Life Orientation Test (LOT). The 17-item HAM-D is an observer-rated scale that assesses depressed mood and other depression-related symptoms.¹¹ The observer-rated 14-item HAM-A assesses the severity of anxiety symptoms.⁸ The DSES is a 16-item self-report measure of daily spiritual experience.¹² The LOT is a 10-item scale that measures optimism about future events.¹³

2.3. Prayer intervention

PSFH (Fig. 1a) is a form of healing prayer that focuses on forgiving the person responsible for past hurts/traumas.¹⁴ The subject was guided by one of the two trained prayer ministers in the study (who were not ministers in the church attended by the participant or any church, and did not offer any conscious intercessory distant prayer for participants) who led the subject through three different phases: (1) a prayer of forgiveness for the perpetrator of the hurtful event; (2) a prayer of blessing on the perpetrator; and (3) a prayer to heal the emotional damage caused by the traumatic event.¹⁴ Although participants reported numerous traumas, for the fMRI part of the study, they were asked to identify the most traumatic event and focus on that both pre- and post-prayer. After the healing prayer intervention, there was a discussion with the subject about the effects of the intervention on their memories and feelings related to the event. Two lay prayer ministers administered the healing prayer intervention in this study.

2.4. MRI scanning

Participants were scanned in a 3T Siemens (Erlangen, Germany) Trio MR scanner in the Core for Advanced MR Imaging at Baylor College of Medicine. A 4.5 min structural MPRAGE sequence (TE 2.66 ms, TR 1200 ms, flip angle 12° , yielding a volume of 192 slices separated by 1 mm of 256×256 voxels with dimensions 1.0×1.0 mm) was used to collect structural information. This was followed by an approximately 20 min task with the following scanning parameters: TE 40 ms, TR 2 s, flip angle 90° , yielding a volume every 2 s (for approximately 20 min) of $64 \times 64 \times 34$ voxels with dimensions $3.4 \times 3.4 \times 4$ mm per voxel. Also collected were data for resting state functional connectivity (5 min) and diffusion tensor imaging (12 min), although these data are not included in the present report.

2.5. Prayer Task

The Prayer Task is the name given to the task-based fMRI experiment and is illustrated in Fig. 1b. The task was designed to assess pre-post intervention differences in brain activity during the traumatic memories and during the feelings block (Bad Memory/Feeling), and differences between the traumatic memories (Bad Memory) and traumatic feelings (Bad Feeling) sub-blocks. The task consisted of a series of screens with a short text with the instructions: “enter the memories associated with these words” followed by 3 words, “enter the feeling associated with these words” followed by the same 3 words, and a final screen was presented with the text “exit the feelings...”. The 3 words used were either directly

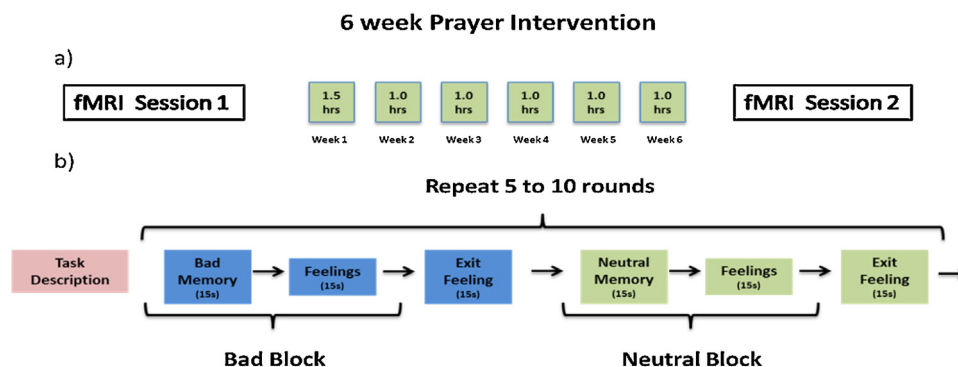


Fig. 1. Experimental Design and Task. Fig. 1(a) Depicts the intervention period, which took place over approximately 6 weeks. fMRI scanning took place before and after the 6 prayer sessions, and included structural (5 min), resting state (5 min), DTI (12 min), and a task (20 min) described below. Fig. 1(b) The task sought to identify differences between Traumatic Memories and Feelings and Neutral Memories and Feelings.

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