



Published in final edited form as:

Scand J Pain. 2018 July 26; 18(3): 545–553. doi:10.1515/sjpain-2018-0040.

An experimental investigation of the relationships among race, prayer, and pain

Samantha M. Meints, Ph.D., Catherine Mosher, Ph.D., Kevin L. Rand, Ph.D., Leslie Ashburn-Nardo, Ph.D., and Adam T. Hirsh, Ph.D.

Indiana University-Purdue University Indianapolis, 402 N. Blackford Street, LD 126, Indianapolis, Indiana 46202

Abstract

Background: Compared to White individuals, Black individuals demonstrate a lower pain tolerance. Research suggests that differences in pain coping strategies, such as prayer, may mediate this race difference. However, previous research has been cross-sectional and has not determined whether prayer in and of itself or rather the passive nature of prayer is driving the effects on pain tolerance. The aim of this study was to clarify the relationships among race, prayer (both active and passive), and pain tolerance.

Methods: We randomly assigned 208 pain-free participants (47% Black, 53% White) to one of three groups: active prayer (“God, help me endure the pain”), passive prayer (“God, take the pain away”), or no prayer (“The sky is blue”). Participants first completed a series of questionnaires including the Duke University Religion Index, the Coping Strategies Questionnaire-Revised (CSQ-R), and the Pain Catastrophizing Scale. Participants were then instructed to repeat a specified prayer or distractor coping statement while undergoing a cold pressor task. Cold pain tolerance was measured by the number of seconds that had elapsed while the participant’s hand remained in the cold water bath (maximum 180 seconds).

Results: Results of independent samples t-tests indicated that Black participants scored higher on the CSQ-R prayer/hoping subscale. However, there were no race differences among other coping strategies, religiosity, or catastrophizing. Results of a 2 (Race: White vs. Black) × 3 (Prayer: active vs. passive vs. no prayer) ANCOVA controlling for a general tendency to pray and catastrophizing in response to prayer indicated a main effect of prayer that approached significance [$p=.06$]. Pairwise comparisons indicated that those in the active prayer condition demonstrated greater pain tolerance than those in the passive ($p=.06$) and no prayer ($p=.03$) conditions. Those in the passive and no prayer distractor conditions did not significantly differ ($p=.70$). There was also a trending

Corresponding Author: Samantha M. Meints, 60 Fenwood Road, BTM Ste. 5016, Boston, MA 02152, Phone: (857) 307-5405, Fax: (617) 525-7900, smeints@bwh.harvard.edu.

Research Funding: The authors declare that there is no conflict of interest regarding the publication of this article.

Informed Consent: All participants provided written informed consent prior to participation in the research study.

Ethical Approval: This study was approved by the Institutional Review Board at Indiana University-Purdue University Indianapolis

Disclosures: All authors have made substantial contributions to the conception and design of this study, have assisted in drafting and revising the manuscript, and have read and approved the final manuscript. This manuscript has been presented as Dr. Meints’ doctoral dissertation. Further, preliminary results from this study were presented in a poster session at the 2017 meeting of the American Pain Society.

main effect of race [$p=.08$], with White participants demonstrating greater pain tolerance than Black participants.

Conclusions: Taken together, these results indicate that Black participants demonstrated a lower pain tolerance than White participants, and those in the active prayer condition demonstrated greater tolerance than those in the passive and no prayer conditions. Furthermore, Black participants in the passive prayer group demonstrated the lowest pain tolerance, while White participants in the active prayer group exhibited the greatest tolerance.

Results of this study suggest that passive prayer, like other passive coping strategies, may be related to lower pain tolerance and thus poorer pain outcomes, perhaps especially for Black individuals. On the other hand, results suggest active prayer is associated with greater pain tolerance, especially for White individuals.

Implications: These results suggest that understanding the influence of prayer on pain may require differentiation between active versus passive prayer strategies. Like other active coping strategies for pain, active prayer may facilitate self-management of pain and thus enhance pain outcomes independent of race. Psychosocial interventions may help religiously-oriented individuals, regardless of race, cultivate a more active style of prayer to improve their quality of life.

Keywords

Pain; prayer; race; ethnicity; QST; coping

1. Introduction

The pain experience varies across race and ethnicity. Compared to White individuals, Black individuals report higher levels of pain associated with a number of chronic health conditions.(1–6) Likewise, Black individuals demonstrate a lower pain tolerance and report higher pain intensity and unpleasantness during experimental pain tasks than do non-Hispanic Whites.(7–15)

The race differences in pain sensitivity may be due, in part, to differences in pain-related coping. Indeed, pain-related coping has been associated with pain intensity, adjustment to chronic pain, and psychological and physical function.(16–19) For example, the coping strategy of ignoring pain is associated with less pain and better psychological functioning, whereas strategies that involve catastrophizing and diverting attention are associated with more pain and depression and poorer psychological functioning.(17,18,20–22) Despite some evidence suggesting that praying/hoping as a pain coping strategy is associated with increased pain and poorer functioning,(17,23–25) the evidence is mixed, with recent studies reporting prayer is associated with improved pain and functional outcomes. Specifically, intercessory prayer has been shown to improve migraine pain.(26) Further, Jegindo and colleagues found that for religious pain-free individuals, prayer was associated with decreased pain intensity and unpleasantness during an electrical stimulation task.(27,28)

Furthermore, there are well-documented race differences in pain-related coping. A recent meta-analysis found race differences in the use of pain-related coping strategies, with Black

individuals engaging in praying/hoping more than White individuals.(29) The differential use of prayer as a coping strategy may mediate the race differences in pain sensitivity. However, little is known about the relationships among praying, race, and pain sensitivity. Although several studies have examined relationships between two of these variables,(30–33) we are aware of only one study(15) that has examined the relationships among all three. Results of that study suggest that strategies involving praying and hoping mediated the race differences in cold pain tolerance among healthy adults. Specifically, Black individuals used praying/hoping strategies more than White individuals, and this difference partially accounted for the relatively lower pain tolerance times of Black individuals.(15) However, because that study was correlational in nature, it could not answer questions about causality or directionality.

Another important limitation of the current pain coping literature is related to the conceptualization and measurement of praying as a coping strategy. Although there are several types of prayer and prayer coping strategies,(34) many studies examining praying in the context of coping with pain have used the Coping Strategies Questionnaire, which conceptualizes praying as a passive strategy (eg, “I pray for the pain to stop”). Previous research suggests that passive coping, including passive prayer, is related to worse pain and functioning and to higher rates of disability.(36–41) There is scant literature, however, on the impact of active prayer on pain-related outcomes. Further, the differential role of active versus passive prayer in explaining race differences in pain has not been explored. An experimental study in which praying is manipulated would allow for stronger conclusions about the directionality of this relationship.

To address these gaps in the literature, we examined the influence of prayer – as an active versus passive coping strategy – on the relationship between participant race and experimental pain tolerance. We hypothesized that (1) Black participants would demonstrate a lower pain tolerance than White participants, (2) participants (of both races) engaging in passive prayer would have a lower pain tolerance than those engaging in active or no prayer, and (3) Black participants engaging in passive prayer would have the lowest pain tolerance while White participants engaging in active prayer would have the highest pain tolerance.

2. Methods

2.1 Participants

Participants were 208 healthy, pain-free undergraduate students from the Psychology Department at Indiana University-Purdue University Indianapolis (IUPUI). An a priori statistical power analysis (G*Power 3.1.9.2) was performed to estimate the sample size needed for this study. These estimates were based on data from the Meints & Hirsh(15) study examining race differences in pain tolerance, as it provided the most relevant data for the proposed study. The mean effect size for the main effect of race on pain tolerance in that study was large ($d=0.69$). With an alpha of 0.01 and power at 0.80, the projected sample size needed to test the main hypotheses is approximately 102. We also performed a second power analysis using a more conservative effect size ($d=0.50$) and found a projected sample size of 191. Thus, the sample of 208 participants should provide adequate power for the primary analyses.

2.2 Measures

2.2.1 PAIN COPING—The Coping Strategies Questionnaire-Revised (CSQ-R) is a 27-item self-report measure of pain-related coping.(42) It comprises 6 cognitive coping strategies (diverting attention, reinterpreting pain sensations, coping self-statements, ignoring pain sensations, praying/hoping, and catastrophizing). Participants rated the frequency with which they used each strategy when experiencing pain from 0 (never do that) to 6 (always do that). The CSQ-R has been shown to valid and reliable among both healthy, pain-free individuals and those with chronic pain, and has demonstrated subscale reliability ranging from 0.72–0.86.(42,43) The 6-factor structure was retained in this sample with good overall ($\alpha=0.87$) and subscale (range of $\alpha=0.78$ to 0.84) reliability.

2.2.2 PAIN CATASTROPHIZING—The Pain Catastrophizing Scale (PCS) is a 13-item self-report measure of pain catastrophizing.(44) The PCS comprises three dimensions: rumination, magnification, and helplessness.(45) Participants use a 5-point scale ranging from 0 (not at all) to 4 (all the time) to rate how frequently they experience catastrophic cognitions when in pain. The PCS has strong criterion-related, concurrent, and discriminant validity.(45–47) It has been validated in healthy, pain-free individuals and has an invariant factor structure across clinical and non-clinical populations.(48) There was good overall reliability within this sample ($\alpha=.93$).

2.2.3 RELIGIOSITY—The Duke University Religion Index (DUREL) is a 5-item self-report measure of religious involvement.(49) The measure assesses three dimensions of religiosity: organized religious activity (eg, attending church services), non-organizational religious activity (eg, prayer), and intrinsic religiosity (“In my life, I experience the presence of the Divine”). Participants first use a 6-point scale to rate the frequency with which they engage in organized and non-organized religious activities. They then use a 5-point scale ranging from 1 (definitely not true) to 5 (definitely true of me) to rate the extent to which 3 statements describing their intrinsic religiosity are true. The scale has good overall reliability ($\alpha=0.80$).

2.2.4 PAIN TOLERANCE—Pain tolerance was measured as the total number of seconds elapsed at the time of withdrawal from the cold pressor. Cold pain tolerance has strong reliability and validity and demonstrated relevance to clinical pain.(7,50–53)

2.3 Procedure

Interested individuals were screened for eligibility via telephone. Participants were excluded if they had chronic pain, circulatory problems, hypertension, diabetes, heart or vascular disease, a history of fainting spells, a seizure disorder, Raynaud’s Disease, Sickle Cell Anemia, were pregnant, under psychiatric care, have had an allergic skin reaction or excessive bruising, had participated in a cold pressor pain experiment before, have had frostbite on their non-dominant hand, or had recently sprained or fractured their wrist or hand. Participants were also excluded if they did not endorse belief in the power of prayer (eg, “Do you believe in the power of prayer to God?”). Eligible participants were then invited to the laboratory to complete the study. Upon arrival, participants provided informed consent. Participants who had used analgesic medications within the past 24 hours,

consumed caffeine or alcohol within the last 2 hours, or used tobacco products within the last 2 hours were rescheduled. Using a block size of 4, participants were then randomly assigned to one of three groups: active prayer, passive prayer, or no prayer. During the testing session, participants completed questionnaires using the Qualtrics online platform that included a demographic questionnaire, CSQ-R,(42) DUREL,(49) and PCS.(44) Participants also completed a cold pressor task (CPT) in which they submerged their non-dominant hand in a circulating cold water bath (2°C; Thermo Scientific Arctic Series Refrigerated Bath Circulator; Thermo Scientific, Waltham, MA). Researchers instructed participants to keep their hand in the water until the sensation became intolerable, at which point the participants removed their hand from the water. After three minutes elapsed, participants who had not removed their hand were asked to do so. While participants' hands were submerged, they were asked to repeat one of three statements over and over again aloud. The order of completion of the questionnaires and pain task was counterbalanced to prevent order effects. At the end of the study, participants were debriefed and compensated with class credit. This study was approved by the IUPUI Institutional Review Board and all procedures were in accordance with the Helsinki Declaration of 1975, as revised in 1983.

2.3.1 PRAYER MANIPULATION—Participants in the passive prayer group repeated the phrase, “God, take the pain away.” This statement was based on the wording of items from the praying/hoping subscale of the CSQ-R, which conceptualizes prayer as a passive coping strategy. Participants in the active prayer group repeated the phrase, “God, help me endure the pain.” This statement was derived from the Religious Coping Scale and adapted to be active in nature [RCOPE(54)]. For the current study, we chose coping statements that were consistent with passive and active prayer and that were relatively brief and equal in length, as well as relevant to the CPT procedure. Participants in the no prayer group repeated the phrase, “The sky is blue,” during the CPT. This phrase was used for the control condition in a similar previous study that manipulated catastrophizing during an experimental CPT procedure.(55)

2.4 Data Analysis

An examination of the raw data revealed that pain tolerance was positively skewed (skew=2.15, SE=0.17) and leptokurtic (kurtosis=0.97, SE=0.34), thus not meeting assumptions of normality. Therefore, data were transformed using a Log10 transformation prior to completing any subsequent analyses. The below results include back-transformed values for ease of interpretation.

Independent samples t-tests were used to examine race differences in psychosocial variables. We used a more stringent alpha of 0.01 for all t-tests to reduce the possibility of Type I error given the multitude of analyses. We then conducted a 2 (race: Black vs. White) × 3 (praying: active vs. passive vs. no prayer) ANCOVA examining the main and interaction effects of race and praying on pain tolerance while controlling for the general tendency to use prayer as a pain coping strategy (CSQ-R Praying/Hoping subscale) and the general tendency to engage in pain catastrophizing (PCS). These variables were included as covariates as they have been shown to differ by race and be related to experimental pain outcomes.(15,56,57) For this primary ANCOVA analysis, alpha was set to 0.05.

3. Results

3.1 Participant Characteristics

The sample consisted of 208 participants (80% female, 47% Black, 96% Christian, see Table 1). The distribution of sex did not differ significantly between races [$\chi^2_{1, N=208}=0.06$, $p=0.81$], nor did the distribution of religious affiliation [$\chi^2_{3, N=208}=4.72$, $p=0.19$]. The mean age for Black (20.41 years, $SD=4.74$) and White (19.89 years, $SD=3.61$) participants did not significantly differ ($t_{192}=0.88$, $p=0.38$).

3.2 Race Differences in Psychosocial Variables

The results of independent samples t-tests (see Table 2) indicated that, compared to White participants, Black participants scored significantly higher on the CSQ-R Praying/Hoping subscale ($p<0.01$), thus, endorsing that they use prayer more frequently in response to pain. There were no other significant race differences in pain coping strategies ($ps>0.01$), nor were there significant race differences in catastrophizing or religiosity.

3.3 Analysis of Covariance

Results of a 2 (race) \times 3 (prayer) analysis of covariance (ANCOVA) controlling for baseline CSQ-R and PCS scores indicated a nearly significant main effect of prayer ($F_{2,200}=2.82$, $p=0.06$, $\eta^2=0.03$; see Table 3). Pairwise comparisons indicated that participants in the active prayer group (estimated marginal mean [EMM]=38.90, $SE=1.10$) demonstrated a greater cold pain tolerance than those in the passive prayer group (EMM=30.90, $SE=1.10$; $p=0.06$) and those in the no prayer group (EMM=29.51, $SE=1.10$; $p=0.03$; see Table 4). The passive and no prayer groups did not significantly differ in pain tolerance ($p=0.70$). The main effect of race also trended toward significance [$F_{1,200}=3.02$; $p=0.08$; $\eta^2=0.02$] such that White participants (EMM=36.31; $SE=1.07$) demonstrated greater pain tolerance than Black participants (EMM=30.20; $SE=1.07$). The race \times prayer interaction was not significant (see Tables 3 & 5).

4. Discussion

The purpose of this study was to examine the influence of prayer on the relationship between race and experimental pain tolerance. Although the main effects of prayer and race did not quite reach statistical significance, these differences were in the hypothesized directions. That is, Black participants demonstrated a lower pain tolerance than White participants, and those in the active prayer condition demonstrated greater tolerance than those in the passive and no prayer conditions. Furthermore, Black participants in the passive prayer group demonstrated the lowest pain tolerance, while White participants in the active prayer group exhibited the greatest tolerance.

As expected, participants in the active prayer condition demonstrated a greater pain tolerance than those in the passive prayer condition. Passive coping is associated with avoidance and is related to worse pain and functioning in healthy and clinical populations. (2,29,38,40,41,58,59) As proposed in the Fear-Avoidance Model, a fearful appraisal of and emotional reaction to pain can lead to cognitive and behavioral avoidance (ie, praying for

pain to stop as well as avoiding activities that might cause pain).(60) The passive nature of certain types of prayer may perpetuate this cognitive and behavioral avoidance, thus contributing to poor pain outcomes and in this case, a lower pain tolerance.

In addition to passive prayer being related to poorer outcomes, active prayer may lead to improved pain and related outcomes. Indeed, participants in the active prayer condition kept their hands in the water for 12 seconds or approximately 30% longer than those in the passive prayer condition, and 8 seconds or approximately 26% longer than those in the no prayer condition. By contrast, tolerance times for the passive and no prayer groups hardly differed at all – less than 1 second – suggesting that, rather than passive prayer leading to poorer pain tolerance, active prayer actually resulted in *greater* tolerance, especially for White participants. Although at odds with Geisser and colleagues’(61) findings suggesting that “maladaptive” coping has a greater impact on pain outcomes than does “adaptive” coping, the pattern observed herein is consistent with literature suggesting that prayer is perceived as helpful among people with chronic pain(62,63) and that, among religious pain-free persons, prayer is associated with lower pain intensity and unpleasantness ratings for experimental pain.(27,28)

Engaging in active prayer may facilitate self-management of pain (ie, asking God for support in managing one’s own pain). Self-management is considered a key aspect of chronic pain care and is associated with better outcomes, including higher patient satisfaction and lower health care costs.(64–66) Indeed, many evidence-based psychosocial treatments, such as Cognitive Behavioral Therapy and acceptance-based approaches, specifically focus on enhancing patients’ self-management efficacy and skills. Active prayer that solicits God’s support in managing one’s pain fits nicely in this context.

Practitioners may also consider adapting psychosocial interventions for individuals who use religion and prayer to cope with pain. Cognitive Behavioral Therapy (CBT) employs cognitive restructuring and behavioral techniques (eg, behavioral activation, activity pacing) to reduce pain, enhance function, and improve quality of life.(67) Consistent with a client-centered approach to care, tailoring CBT to patients with a predilection or preference to cope using prayer would allow providers to incorporate patients’ religious beliefs and preferences, and to draw on their faith and relationship with God to promote active, self-management of pain.

Active prayer may also include meditative practice. Although techniques and definitions vary, meditation typically involves focused non-judgmental attention to the present moment. (68) Meditation has been shown to improve pain across various chronic pain conditions.(69) In this vein, active prayer may help individuals to focus their attention on living with pain (eg, “God, help me make it to my son’s game despite this pain”) rather than praying for it to be taken away. Similarly, active prayer may be incorporated into an acceptance-based treatment approach. Acceptance and Commitment Therapy (ACT) helps patients to embrace their situation, alter their relationship with private events such as pain, remain focused on the present moment, and engage in committed action that aligns with their values. ACT is effective in improving pain, depression, anxiety, physical function, and quality of life in those with chronic pain.(70) Providers may utilize prayer within an ACT framework to help

patients clarify their values and live a meaningful life in accord with those values. For example, patients may seek God's help in being more active in their children's lives rather than asking for pain elimination.

In contrast to the expected results of prayer, we were surprised that the main effect of participant race only trended toward significance. Previous studies have found that Black individuals demonstrate lower tolerance for experimental pain than do White individuals. (15,56,57,71) Although a similar pattern was observed in the current study, the race difference was less pronounced. This finding may be due to the exclusion of potential participants who did not believe in the power of prayer. As Black individuals tend to be more religious than White individuals,(72) it is likely that more White than Black non-believers were excluded from the study. Excluding White non-believers may have impacted the mean tolerance time for the White sample. Indeed, mean tolerance times for this study differ from previous studies. For example, using similar experimental methods, Meints & Hirsh(15) found that the mean tolerance time for Black individuals was approximately 49 seconds and for White individuals it was 80 seconds. In the current study, Black participants showed a similar mean tolerance time ($m = 42$ seconds), whereas White participants demonstrated a much lower tolerance ($m = 49$ seconds). Thus, the difference in pain tolerance between White participants in the current study compared with those in a previous study may be accounted for by differences in religious coping between White believers and non-believers.

It is also important to consider race differences in religious affiliation and how this may moderate the relationship between race and prayer as a pain coping strategy. Although there were no race differences in religious affiliation in the current sample – most participants endorsed Christianity – there may have been denominational differences. Indeed, a survey of religion in the United States indicated that while 78% of White and 85% of Black individuals endorse Christianity, 78% of Blacks are Protestant while only 53% of Whites endorse a Protestant denomination.(73) On the other hand, 22% of Whites identify as Catholic compared to only 5% of Blacks. Given the differences in denomination, future studies should consider not only religious affiliation but also denominational differences when examining the relationship between religious coping, race, and pain.

This study is not without limitations. First, because participants were pain-free, these results may not generalize to individuals with chronic pain. Additionally, although we observed differences in pain tolerance between prayer conditions, these differences did not reach statistical significance. Because a robust estimated effect size was used in a priori power analyses (ie $d=0.50$), it is possible the study was underpowered to identify true differences across prayer conditions. Further, the prayer manipulation may not have been salient enough to produce a meaningful effect. For example, in the passive prayer condition, participants repeated a statement asking God to take away the pain. Because participants understood that the pain would end upon them removing their hand from the water, prayer may have lacked the potency and been less relevant than if it was used during painful experiences of unknown duration (eg, chronic pain). It is also possible that participants did not consider the coping statement to be a prayer. Furthermore, these statements were not individually tailored and thus may have been less meaningful. In future studies, researchers could generate a list of

prayer statements and ask participants to choose the statement(s) that most resonates with them. Alternatively, participants may generate a list of meaningful prayers that can then be adapted for the pain task.

5. Conclusions

Results of this study suggest that passive prayer, like other passive coping strategies, may be related to lower pain tolerance and thus poorer pain outcomes, perhaps especially for Black individuals. This lends support to the notion that the passive nature of prayer, rather than prayer per se, may contribute to the race differences observed in experimental pain tolerance. That is, Black individuals more frequently endorse the use of passive prayer to cope with pain (15,29) and this passive prayer is associated with lower pain tolerance, particularly for Black individuals. On the other hand, results suggest active prayer is associated with greater pain tolerance, especially for White individuals.

6. Implications

Taken together, these results indicate the need for a more nuanced understanding of prayer and its use and effectiveness as a pain coping strategy. Compared to passive prayer, active prayer is associated with greater pain tolerance and thus may facilitate self-management of pain. Consistent with this notion, psychosocial interventions may help religiously-oriented individuals, regardless of race, cultivate a more active style of prayer to improve their quality of life.

Acknowledgements:

Thanks to Madison Stout, Samuel Abplanalp, David Wuest, and Kayla Jackson for their assistance with data collection.

Funding: This work was funded by a graduate student research award from the Department of Psychology at Indiana University-Purdue University Indianapolis.

References

1. Faucett J , Gordon N , Levine J . Differences in postoperative pain severity among four ethnic groups. *J Pain Symptom Manage*. 1994;9(6):383–9.7963791
2. Breitbart W , McDonald MV , Rosenfeld B , Passik SD , Hewitt D , Thaler HPR . Pain in ambulatory AIDS patients. I:Pain characteristics and medical correlates. *Pain*. 1996;68:315–21.9121820
3. Sherwood M , Garcia-Siekavizza A , Meltzer M , Hebert A , Burns A , McGorray S . Glaucoma's impact on quality of life and its relation to clinical indicators: A pilot study 11 The authors have no proprietary interest in the development or marketing of this or a competing instrument. *Ophthalmology*. 1998;105(3):561–6.9499791
4. White S , Asher MA , Lai SM , Burton DC . Patients' perceptions of overall function, pain, and appearance after primary posterior instrumentation and fusion for idiopathic scoliosis. *Spine (Phila Pa 1976)*. 1999;24(16):1693–9–700.10472104
5. Creamer P , Lethbridge-Cejku M , Hochberg MC . Determinants of pain severity in knee osteoarthritis: effect of demographic and psychosocial variables using 3 pain measures. *J Rheumatol* 1999 8;26(8):1785–92.10451078

6. Selim A , Fincke G , Ren X , Deyo R , Lee A , Skinner K , Kazis L . Racial differences in the use of lumbar spine radiographs: Results from the veterans health study. *Spine (Phila Pa 1976)*. 2001;26(12):1364–9.11426153
7. Chapman WP , Jones CM . Variations in cutaneous and visceral pain sensitivity in normal subjects. *J Clin Invest* 1944;23(1):81–91.16695086
8. Woodrow K , Friedman GD , Siegelab AB , Collen M . Pain tolerance: differences according to age, sex and race. *Psychosom Med* 1972;34:548–56.4644663
9. Walsh NE , Schoenfeld L , Ramamurthy S , Hoffman J . Normative model for cold pressor test. *Am J Phys Med Rehabil* 1989;68(1):6–11.2917058
10. Fillingim R , Edwards RR , Powell T . The relationship of sex and clinical pain to experimental pain responses. *Pain*. 1999 12;83(3):419–25.10568849
11. Sheffield D , Biles PL , Orom H , Maixner W , Sheps DS . Race and Sex Differences in Cutaneous Pain Perception. *Psychosom Med* 2000;62(4):517–23.10949097
12. Edwards C , Fillingim RB , Keefe F . Race, ethnicity and pain. *Pain*. 2001 11;94(2):133–7.11690726
13. Campbell C , Edwards R , Fillingim R . Ethnic differences in responses to multiple experimental pain stimuli. *Pain*. 2005 1;113(1):20–6.15621360
14. Rahim-Williams FB , Riley JL , Herrera D , Campbell CM , Hastie BA , Fillingim RB . Ethnic identity predicts experimental pain sensitivity in African Americans and Hispanics. *Pain*. 2007 5;129(1–2):177–84.17296267
15. Meints SM , Hirsh AT . In vivo praying and catastrophizing mediate the race differences in experimental pain sensitivity. *J Pain*. 2015;16(5):491–7.25725173
16. Turner J , Chapman C . Psychological interventions for chronic pain: a critical review. II Operant conditioning, hypnosis, and cognitive-behavioral therapy. *Pain*. 1982;
17. Keefe F , Crisson J , Urban B , Williams D . Analyzing chronic low back pain: the relative contribution of pain coping strategies. *Pain*. 1990;
18. Jensen M , Karoly P . Control beliefs, coping efforts, and adjustment to chronic pain. *J Consult Clin Psychol* 1991;59(3):431–8.2071728
19. Jensen MP , Turner J , Romano J . Self-efficacy and outcome expectancies: relationship to chronic pain coping strategies and adjustment. *Pain*. 1991;44:263–9.2052395
20. Rosenstiel AK , Keefe FJ . The use of coping strategies in chronic low back pain patients: Relationship to patient characteristics and current adjustment. *Pain*. 1983 9;17(1):33–44.6226916
21. Jordan M , Lumley M , Leisen C . The relationships of cognitive coping and pain control beliefs to pain and adjustment among African-American and Caucasian women with rheumatoid arthritis. *Arthritis Rheumatol* 1998;11(2):80–8.
22. Edwards RR , Campbell CM , Fillingim RB . Catastrophizing and Experimental Pain Sensitivity: Only In Vivo Reports of Catastrophic Cognitions Correlate With Pain Responses. Vol. 6, *The Journal of Pain*. 2005 p. 338–9.15890636
23. Andersson G Chronic pain and praying to a higher power: Useful or useless? *J Relig Health*. 2008 6 15;47(2):176–87.19105010
24. Tuttle DH , Shutty MS , DeGood DE . Empirical dimensions of coping in chronic pain patients: A factorial analysis. *Rehabil Psychol* 1991;36(3):179–88.
25. Rippentrop EA , Altmaier EM , Chen JJ , Found EM , Keffala VJ . The relationship between religion/spirituality and physical health, mental health, and pain in a chronic pain population. *Pain*. 2005 8;116(3):311–21.15979795
26. Tajadini H , Zangiabadi N , Divsalar K , Safizadeh H , Esmaili Z , Rafiei H . Effect of Prayer on Intensity of Migraine Headache. *J Evid Based Complementary Altern Med* 2017 1 8;22(1):37–40.26865602
27. Elmhøldt Jegindø EM , Vase L , Skewes JC , Terkelsen AJ , Hansen J , Geertz AW , Roepstorff A , Jensen TS . Expectations contribute to reduced pain levels during prayer in highly religious participants. *J Behav Med* 2013 8 7;36(4):413–26.22772583
28. Elmhøldt Jegindø E-M , Skewes J , Dietz M , Møller A , Jensen MS , Roepstorff A , Wiech K , Jensen TS , Okamoto H , Rainville P . Reduced Pain Sensation and Reduced BOLD Signal in

Parietofrontal Networks during Religious Prayer. *Front Hum Neurosci* 2017 6
28;11:337.28701940

29. Meints SM , Miller MM , Hirsh AT . Differences in Pain Coping between Black and White Americans: A Meta-Analysis. Vol. 17, *Journal of Pain*. 2016 p. 642–53.26804583
30. Dozois DJ , Dobson KS , Wong M , Hughes D , Long A . Predictive utility of the CSQ in low back pain: individual vs. composite measures. *Pain*. 1996 8;66(2–3):171–80.8880838
31. Edwards R , Doleys D , Fillingim R . Ethnic differences in pain tolerance: clinical implications in a chronic pain population. *Psychosom Med* 2001;63(2):316–23.11292281
32. Andersson G Chronic pain and praying to a higher power: Useful or useless? *J Relig Health*. 2008;47(2):176–87.19105010
33. Jones A , Kwok CK , Groeneveld PW , Mor M , Geng M , Ibrahim SA . Investigating Racial Differences in Coping with Chronic. *J Cross Cult Gerontol* 2011;23(4):339–47.
34. Banziger S , van Uden M , Janssen J . Praying and coping: The relation between varieties of praying and religious coping styles. *Ment Heal Relig Cult* 2008;11(1):101–18.
35. Ashby J , Lenhart RS . Prayer as a coping strategy for chronic pain patients. *Rehabil Psychol* 1994;39(3):205–9.
36. Keefe F , Dolan E . Pain behavior and pain coping strategies in low back pain and myofascial pain dysfunction syndrome patients. *Pain*. 1986;24(1):49–56.2937006
37. Brown GK , Nicassio PM . Development of a questionnaire for the assessment of active and passive coping strategies in chronic pain patients. *Pain*. 1987;31:53–64.3696743
38. Parker J , Smarr KL , Buescher KL , Phillips LR , Frank RG , Beck NC , Anderson SK , Walker SE . Pain control and rational thinking. implications for rheumatoid arthritis. *Arthritis Rheumatol* 1989;32(8):984–90.
39. Beckham J , Keefe FJ , Caldwell DS , Roodman AA . Pain coping strategies in rheumatoid arthritis: Relationships to pain, disability, depression and daily hassles. *Behav Ther* 1991;22(1): 113–24.
40. Vlaeyen J , Linton SJ . Fear-avoidance and its consequences in chronic musculoskeletal pain: A state of the art. *Pain*. 2000;85(3):317–32.10781906
41. Mercado A , Carroll LJ , Cassidy JD , Côté P . Passive coping is a risk factor for disabling neck or low back pain. *Pain*. 2005;117(1–2):51–7.16043291
42. Riley J , Robinson ME . CSQ: Five Factors or Fiction? *Clin J Pain*. 1997;13(2):156–62.9186023
43. Hastie B , Riley JL , Fillingim RB . Ethnic differences in pain coping: factor structure of the coping strategies questionnaire and coping strategies questionnaire-revised. *J Pain*. 2004;5(6):304–16.15336635
44. Sullivan M , Bishop S , Pivik J . The pain catastrophizing scale: development and validation. *Psychol Assess* 1995;7(4):524–32.
45. Osman A , Barrios FX , Gutierrez PM , Kopper BA , Merrifield T , Grittmann L . The Pain Catastrophizing Scale: Further Psychometric Evaluation with Adult Samples. *J Behav Med* 2000;23(4):351–65.10984864
46. Osman A , Barrios FX , Kopper BA , Hauptmann W , Jones J , O'Neill E . Factor Structure, Reliability, and Validity of the Pain Catastrophizing Scale. *J Behav Med* 1997;20(6):589–605.9429990
47. D'Eon JL , Harris CA , Ellis JA . Testing Factorial Validity and Gender Invariance of the Pain Catastrophizing Scale. *J Behav Med* 2004;27(4):361–72.15559733
48. Van Damme S , Crombez G , Bijttebier P , Goubert L , Van Houdenhove B . A confirmatory factor analysis of the Pain Catastrophizing Scale: invariant factor structure across clinical and non-clinical populations. *Pain*. 2002 4;96(3):319–24.11973004
49. Koenig H , Büssing A . The Duke University Religion Index (DUREL): A Five-Item Measure for Use in Epidemiological Studies. *Religions*. 2010;1(1):78–85.
50. Gelfand S The relationship of experimental pain tolerance to pain threshold. *Can J Psychol* 1964;18(1):36–42.14129480
51. Wolff B Methods of testing pain mechanisms in normal man. In: *Textbook of Pain*. 1984 p. 186–94.

52. Rainville P , Feine JS , Bushnell MC , Duncan GH . A Psychophysical Comparison of Sensory and Affective Responses to Four Modalities of Experimental Pain. *Somatosens Mot Res* 1992 10;9(4):265–77.1492527
53. Edens JL , Gil KM . Experimental induction of pain: Utility in the study of clinical pain. *Behav Ther* 1995;26(2):197–216.
54. Pargament K , Koenig HG , Perez LM . The many methods of religious coping: Development and initial validation of the RCOPE. *J Clin Psychol* 2000;56(4):519–43.10775045
55. Bialosky JE , Hirsh A , Robinson M , George S . Manipulation of pain catastrophizing: An experimental study of healthy participants. *J Pain Res* 2008;1:35–41.21197286
56. Edwards RR , Moric M , Husfeldt B , Buvanendran A , Ivankovich O . Ethnic similarities and differences in the chronic pain experience: A comparison of African American, Hispanic, and white patients. *Pain Med* 2005 1 1;6(1):88–98.15669954
57. Meints SM , Stout M , Abplanalp S , Hirsh AT . Pain-Related Rumination, But Not Magnification or Helplessness, Mediates Race and Sex Differences in Experimental Pain. *J Pain*. 2017;18(3):332–9.27908838
58. Brown G , Nicassio PM , Wallston KA . Pain coping strategies and depression in rheumatoid arthritis. *J Consult Clin Psychol* 1989;57(5):652–7.2794186
59. Bade M , Cook SW . Functions of christian prayer in the coping process. *J Sci Study Relig* 2008;47(1):123–33.
60. Melzack R , Dennis S . *Neurophysiological Foundations of Pain In: The Psychology of Pain*. New York: Raven Press; 1978 p. 1–28.
61. Geisser M , Robinson ME , Riley JL . Pain beliefs, coping, and adjustment to chronic pain. Let´s focus more on the negative. *Pain Forum* 1999;8(4):161–8.
62. McCaffrey AM , Eisenberg DM , Legedza ATR , Davis RB , Phillips RS . Prayer for health concerns: results of a national survey on prevalence and patterns of use. *Arch Intern Med* 2004 4 26;164(8):858–62.15111371
63. Dezutter J , Wachholtz A , Corveleyn J . Prayer and pain: the mediating role of positive reappraisal. *J Behav Med* 2011 12 23;34(6):542–9.21516338
64. Lorig K , Mazonson PD , Holman HR . Evidence suggesting that health education for self-management in patients with chronic arthritis has sustained health benefits while reducing health care costs. *Arthritis Rheumatol* 1993;36(4):439–46.
65. Von Korff M , Barlow W , Cherkin D , Deyo RA . Effects of practice style in managing back pain. *Ann Intern Med* 1994;121(3):187–95.8017745
66. Cedraschi C , Desmeules J , Rapiti E , Baumgartner E , Cohen P , Finckh A , Allaz A , Vischer TL . Fibromyalgia: a randomised, controlled trial of a treatment programme based on self management. *Ann Rheum Dis* 2004;63(3):290–6.14962965
67. Morley S , Eccleston C , Williams A . Systematic review and meta-analysis of randomized controlled trials of cognitive behaviour therapy and behaviour therapy for chronic pain in adults, excluding. *Pain*. 1999;58(7):1299–310.
68. Shapiro D Examining The Content and Context of Meditation A Challenge for Psychology in the Areas of Stress Management, Psychotherapy, and Religion/Values. *J Humanist Psychol* 1994;34(4):101–35.
69. Hilton L , Hempel S , Ewing BA , Apaydin E , Xenakis L , Newberry S , Colaiaco B , Maher AR , Shanman RM , Sobero ME , Maglione MA . Mindfulness Meditation for Chronic Pain: Systematic Review and Meta-analysis. *Ann Behav Med* 2017;51(2):199–213.27658913
70. Veehof MM , Trompeter HR , Bohlmeijer ET , Schreurs KMG . Acceptance- and mindfulness-based interventions for the treatment of chronic pain: a meta-analytic review. *Cogn Behav Ther* 2016 1 2;45(1):5–31.26818413
71. Tan G , Jensen MP , Thornby J , Anderson KO . Ethnicity, Control Appraisal, Coping, and Adjustment to Chronic Pain Among Black and White Americans. *Pain Med* 2005 1 1;6(1):18–28.15669947
72. Chatters L , Taylor R , Jackson J . Religious coping among African Americans, Caribbean Blacks and Non-Hispanic Whites. *J community*. 2008;

73. Lugo L , Stencil S , Green J , Smith G , Cox D , Pong A . U.S. Religious Landscape Survey: Religious Affiliation. US Religious Landscape Survey Washington, D.C.; 2008.

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Highlights

- We examined the impact of race and prayer on experimental cold pain tolerance.
- Passive prayer was related to lower pain tolerance, especially for Black subjects.
- Active prayer was associated with greater tolerance, especially for White subjects.
- A more nuanced understanding of prayer as a pain coping strategy is warranted.

Table 1.

Sample Characteristics

	Black	White	p-value
Female [N(%)]	79 (81)	88 (79)	0.06
Age [M(SD)]	20.4 (4.7)	19.9 (3.6)	0.38
Religion			0.19
Christian	90 (93)	108 (97)	
Muslim	2 (2)	0 (0)	
Agnostic	2 (2)	0 (0)	
Other	3 (3)	3 (3)	
Religious Denomination			0.01
Anglican	2 (2)	0 (0)	
Apostolic	1 (1)	1 (1)	
Baptist	19 (19)	9 (8)	
Catholic	3 (3)	21 (19)	
Church of Christ	0 (0)	1 (1)	
Ethiopian Orthodox	1 (1)	0 (0)	
Jehovah's Witness	2 (2)	0 (0)	
Lutheran	0 (0)	5 (5)	
Methodist	1 (1)	7 (6)	
Nazarene	0 (0)	1 (1)	
Non-denominational Christian	12 (12)	18 (16)	
Orthodox	1 (1)	1 (1)	
Pentecostal	1 (1)	0 (0)	
Protestant	2 (2)	2 (2)	
Seventh-Day Adventist	1 (1)	0 (0)	
Spiritual	1 (1)	0 (0)	
Did Not Report	47 (48)	66 (59)	

Table 2.

Race Differences in Psychosocial Variables

Variable	Black (N=97)	White (N=110)	T Value	Cohen's <i>d</i>
CSQ-R ^b				
Distraction	14.61(7.64)	14.31(6.37)	0.31	0.04
Catastrophizing	9.33(7.30)	7.56(5.86)	1.91	0.26
Ignoring	11.67(6.16)	13.13(5.94)	-1.74	0.24
Distancing	6.10(5.62)	5.80(5.51)	0.39	0.05
Coping Self Statements	16.94(6.12)	15.37(4.39)	2.11	0.28
Praying/Hoping	11.95(6.02)	9.76(4.95)	2.85 ^a	0.40
PCS ^c				
Catastrophizing	16.76(11.15)	14.00(9.32)	1.93	0.27
DUREL ^d				
Intrinsic Religiosity	15.36(2.45)	14.89(2.72)	1.29	0.18
Organized Religious Activity	3.86(1.46)	4.10(1.27)	-1.28	0.17
Private Religious Activity	3.45(1.75)	3.34(1.64)	0.47	0.06

^ap<.01^bCoping Strategies Questionnaire-Revised^cPain Catastrophizing Scale^dDuke University Religion Index

Table 3.

Results of ANCOVA for effects of race and prayer on pain tolerance controlling for Coping Strategy Questionnaire-Revised Praying/Hoping and Pain Catastrophizing Scale Catastrophizing

	df	F	η^2	p
Praying/Hoping	1	2.33	0.01	0.13
Catastrophizing	1	7.98	0.04	<.01
Race	1	3.02	0.02	0.08
Prayer	2	2.82	0.03	0.06
RaceXPrayer	2	0.37	<.01	0.69
Error	200			

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Table 4.

Pairwise Comparisons for Prayer Groups

	EMM ^a	SE	<i>p</i>
Active vs. Passive			
Active	38.90	1.10	0.06
Passive	30.90	1.10	
Active vs. None			
Active	38.90	1.10	0.03
None	29.51	1.10	
Passive vs. None			
Passive	30.90	1.10	0.70
None	29.51	1.10	

^aEstimated Marginal Mean

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Table 5.

Mean Pain Tolerance by Race and Prayer Group

	EMM ^a	SE
Black		
Active	36.31	1.15
Passive	26.92	1.15
None	28.18	1.15
White		
Active	42.66	1.12
Passive	36.31	1.12
None	30.90	1.15

^aEstimated Marginal Mean

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript