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ORIGINAL PAPER

Prayer in Marriage to Improve Wellness: Relationship Quality and Cardiovascular Functioning

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Abstract

This study examined daily partner-focused petitionary prayer (PFPP) on relationship communication and quality as well as novel indices of cardiovascular functioning in a sample of 90 adults. PFPP was compared to waitlist and meditation conditions over a 4-week period. Aortic hemodynamics via pulse wave analysis were assessed before and after the intervention. Factorial repeated measures analyses indicated that for those in the prayer condition, there were significant improvements in coronary perfusion, decreased left ventricular work, and increased coronary blood flow. Additionally, the perceived positive aspects of one's relationship improved for those in the prayer condition. Similar changes did not occur in waitlist and meditation conditions. Findings suggest that daily PFPP improves relationship quality and cardiovascular efficiency via improving protective cardiovascular mechanisms. Practical implications are briefly discussed.

Keywords Blood pressure · Cardiovascular · Hemodynamics · Marriage · Prayer

Introduction

The health benefits of religion have long been recognized (Koenig et al. 2001, 2012). For example, one religious practice, prayer, has been linked to both health (Spilka and Ladd 2012) and relational benefits (Mahoney and Tarakeshwar 2005;

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Pargament 2010). However, few studies have attempted to identify causal mechanisms that might account for the associations between prayer and physical health (see Andrade and Radhakrishnan 2009, regarding the controversial nature of randomized clinical trials evaluating prayer). Therefore, the current study utilizes a novel assessment technology (pulse wave analysis) to test the cardiovascular benefits of a prayer for a relationship partner. It serves to highlight the role that this specific type of prayer can play in improving wellness.

Cardiovascular Health

Cardiovascular diseases (CVD) are the most common cause of death in the USA (Minino et al. 2007) as well as the world (Kearney et al. 2005). Measuring changes in blood pressure is the most popular means of measuring heart health; however, common brachial measures that examine peripheral blood pressure may underestimate central blood pressure. Pulse wave analysis (PWA) provides a window on the mechanisms of central blood pressure, which helps provide a better risk assessment of cardiovascular morbidity and mortality than peripheral (brachial) blood pressure alone (Wilkinson et al. 1998; Vlachopoulos et al. 2010). PWA can be defined as the examination of the aortic pressure wave (O'Rourke et al. 2001).

Intervention-based research utilizing PWA demonstrates cardiovascular changes to first occur via myocardial mechanisms. With time, these myocardial changes then lead to peripheral blood pressure changes. Thus, myocardial mechanisms, such as systolic time integral (STI) and diastolic time integral (DTI), have been shown to more accurately reveal the cardioprotective nature of an intervention. STI refers to left ventricular work which is an indication of the oxygen use of the heart, or how much work the heart is doing. DTI helps assess coronary perfusion, or how much blood the heart is getting. Further, the subendocardial viability index (SVI) is the ratio between STI and DTI that measures subendocardial blood flow and coronary flow reserve.

Regarding indicators of health, SVI tends to be lower in patients with acute depression (van Sloten et al. 2016). Further, elevated anger is associated with lower SVI, whereas increased forgiveness is associated with increased SVI (Sanchez-Gonzalez et al. 2015; May et al. 2014). Overall, decreased ventricular workload (STI), increased coronary perfusion (DTI), and increased coronary flow reserve (SVI) are cardioprotective factors and server as indicators of more optimal cardiovascular function and psychological health. However, these aspects of vascular functioning are underrepresented in physiology research. Accordingly, the current study utilizes pulse wave analysis to provide measurements of central aortic pressures and myocardial mechanisms.

Marriage

Marital conflict or strain is linked to poorer cardiovascular health (Gallo et al. 2003). Some scholars have focused particularly on marital functioning and interaction, noting the possible negative impact marital stress and conflict may have on

health (Kiecolt-Glasier and Newton 2001; Robles and Kiecolt-Glaser 2003). However, marriage is generally more cardioprotective in that married individuals tend to live longer, have a reduced risk for CVD, and are observed to have longer survival times after serious conditions, such as coronary artery disease (Burman and Margolin 1992) despite the negative effects of marital stress. Moreover, researchers have provided evidence to suggest that prayer for the partner may be effective at buffering marital stress (Beach et al. 2008; Lambert et al. 2012a, b).

Prayer

Approximately 71% of Americans report praying at least weekly (Pew Research Center 2014). Prayer is theorized to be a means of combating distress and improving well-being (Levine 2008). However, the act of engaging in petitionary prayer, where one requests God's help or intervention, is what makes prayer an effective means of navigating stress and daily challenges. Colloquial petitionary prayer invokes the deity's help using the individual's own language rather than a memorized prayer. It can be employed in reaction to stressful experiences as a means of enlisting divine aid, acting as a source of support (Capps 1982; Fincham and Beach 2013). Petitionary prayer is important for coping with stress (Ferguson et al. 2010) and can take the form of requests for not only one's own protection or well-being (self-focused), but may also take the form of seeking positive things for one's partner (partner-focused; Fincham and Beach 2014). Partner-focused petitionary prayer (PFPP) has been linked to increased relationship commitment and relationship satisfaction (Fincham and Beach 2014).

In both laboratory- and field-based experiments, Lambert et al. (2012b) found that individuals assigned to petitionary prayer for their partner (or close friend) were more satisfied with sacrifice for their relationship, even in comparison to individuals instructed to engage daily in positive thought about their partner. Such findings support the benefits of PFPP for coping with marital stress, and prayer in general as a potential means of promoting relationship functioning and cardiovascular health. Even though a meta-analysis showed a negative relationship between religion/spirituality and cardiovascular mortality (Chida et al. 2009), very few studies have specifically investigated prayer and cardiovascular health.

Current Study

This study evaluates PFPP in relation to both relationship and cardiovascular functioning before and after 4 weeks of daily prayer for the partner. Pulse wave analysis, an advanced assessment of cardiovascular functioning, was used to produce indices of aortic hemodynamics, including central blood pressures and myocardial mechanisms (i.e., STI, DTI, and SVI). A control group (waitlist) and comparison group (meditation) were also included. Analyses compared changes across conditions in relationship (i.e., prayer for one's partner, constructive communication patterns, and relationship satisfaction) and cardiovascular functioning (i.e., peripheral blood pressures, heart rate, central aortic pressures, and myocardial mechanisms) before and

after the intervention across groups. The aim of the study was to determine whether partner-focused petitionary prayer (prayer for one's partner) improves relationship and cardiovascular functioning. We hypothesized that in contrast to the control and comparison groups, the relationship improves (e.g., greater communication and relationship quality) and cardiovascular functioning of PFPP participants shift toward a more cardioprotective state represented by lowered blood pressures (both peripheral and central blood pressures), decreased ventricular workload (STI), increased coronary perfusion (DTI), and increased coronary flow reserve (SVI).

Methodology

Participants

Participants were recruited from community locations via posted flyers (libraries, grocery stores, shopping malls, churches, etc.) as well as online social media platforms (Facebook, Craigslist) and were paid $250 for participation. Inclusion criteria include married for at least 1 year without a history of or ongoing issues with hypertension, diabetes, or high cholesterol, being comfortable with daily prayer, and monotheistic or polytheistic belief. Ninety individuals ($M_{age} = 35.66$ years, SD = 10.27; 51% Female) underwent randomization and completed every portion of the study, 71% White/Caucasian, 10% Hispanic/Latino, 15% Black/African American, and 4% biracial/more than one race with an average family income of $53,814 (SD = $20,261) and being married an average of 9.57 years (SD = 8.53). Religious denominations included 88% Protestant/Christian, 10% Catholic, 1% Muslim, and 1% Jewish.

Procedure

Before random assignment to treatment conditions ($N = 90$, $n = 30$ participants per condition), volunteering participants were provided study overview information indicating they would be given questionnaires pertaining to their health and interpersonal functioning as well as taking cardiovascular assessments at two time points. Participants were required to provide informed consent before any data collection procedures began as approved by the university's institutional review board. Pre- and posttest measurements of cardiovascular functioning and online health questionnaires were collected in a laboratory 4 weeks apart. Medically trained research assistants conducted all cardiovascular assessments and were blind to group randomization. Female participants were tested in the early follicular phase of the menstrual cycle to avoid potential variations in pressure wave morphology and cardiac reactivity. During the first laboratory visit, participants were randomly assigned to one of three conditions (PFPP, meditation, waitlist). Between laboratory visits, participants were instructed by research staff (who were not affiliated with assessment of the cardiovascular measurements) via email/phone all communication to

complete daily tasks and to complete diary entries online 3 times a week for 4 weeks pertaining to the content of their intervention instructions.

Laboratory visits were conducted at the same time of day (±2 h) with laboratory temperature held at 73 degrees Fahrenheit. Participants refrained from eating 3 h before laboratory visits and abstained from caffeine, alcohol, strenuous physical activity, or hypertensive/blood pressure affecting medications for 24 h prior to the visit. Upon arrival at the pretest laboratory visit, measurements of weight and height were taken then participants completed a brief health questionnaire with demographics and measurement scales followed by a 10-min resting period. Participants then completed a pulse wave assessment while sitting still with their feet flat on the floor. Participants were then given instruction on how to engage in their assigned intervention prior to being dismissed. The posttest laboratory visit followed the same procedure with the exception of debriefing (which included dissemination of their hemodynamic report and study participation payment) occurring after the pulse wave assessment.

Intervention

The treatment being tested, partner-focused petitionary prayer, required partners to pray for good things for their partner daily. During the first laboratory visit, participants assigned to the PFPP condition were instructed to spend 3 min practicing praying for the well-being of their partner. They were instructed to focus on their partner and pray for good things for them and whatever blessings they want for them. The following was given as an example, but participants were instructed to offer their own prayer in their own words: "Dear Lord, thank you for all the things that are going well in my life, in my partner's life, and in my relationship. Please continue to protect and guide my partner, providing strength and direction every day. I know you are the source of all good things for me and my partner. Please bring those good things to my partner and make me a blessing in my partner's life. Amen." Trained researchers answered any questions that arose. Researchers received brief training from the primary investigator, who designed the intervention protocol. During online surveys participants were asked, "Please share with us the prayers you made for your partner," to ensure regular participation in the treatment task.

Meditation and waitlist control conditions were used to compare the effectiveness of the targeted intervention. Partner-focused meditation required participants to meditate on positive thoughts about their partner daily. During the first laboratory visit, participants assigned to the meditation condition were instructed to spend 3 min contemplating and meditating on positive aspects of their partner. They were instructed to focus on their partner and think about the enjoyable, constructive qualities their partners provide their relationship. The following was given as an example, but participants were instructed to offer their own thoughts: "Think about the good qualities of your partner. Bring to mind qualities that you admire, appreciate or bring joy and fulfillment to your partnership. They might be aspects of his or her personality such as openness, conscientiousness, kindness and so on. They might also include everyday behaviors like being courteous, affectionate, considerate, helpful etc. Whatever they are just think of what you appreciate about your partner."

Again, trained researchers answered any questions that arose. During online surveys they were asked, "Please share with us the positive thoughts of your partner that you've meditated on," to ensure regular participation. The final condition was a waitlist control, for which partners were not given instructions but were simply assessed before and after the 4 weeks allotted to the study.

Measures

Anthropometrics

Height was measured using a stadiometer and body weight was measured using a Seca scale (Sunbeam Products Inc., Boca Raton, FL). Body mass index (BMI) was calculated as kg/m^2.

Pulse Wave Analysis

A standard brachial cuff was used to measure heart rate, peripheral blood pressures (systolic, SBP, and diastolic, DBP), and capture a brachial waveform. Pulse wave analysis (PWA), which enables accurate evaluation of central aortic functioning via transfer functions from the brachial waveform (Hashimoto et al. 2007; Nichols and Singh 2002; Safar et al. 2008), was analyzed with the SphygmoCor XCEL PWA system (SphygmoCor, AtCor Medical, Sydney, Australia). The SphygmoCor XCEL PWA system uses brachial pressure cuff inflation to provide a central aortic waveform using a validated generalized transfer function via a 20-s wave epoch. Central aortic blood pressure indices provided by SphygmoCor XCEL PWA include central systolic (CSBP), diastolic blood pressures (CDBP), and myocardial mechanisms including systolic time interval (STI, left ventricle work, and oxygen consumption), diastolic time interval (DTI, coronary perfusion), and subendocardial viability index (SVI, percentage of subendocardial perfusion to myocardial demand, or the ratio between DTI and STI).

Prayer for Partner Self-Report

To evaluate prayer change in individuals within the partner-focused petitionary prayer condition, a 4-item measure was used (PFPP; Fincham et al. 2010). Example items include, "I pray for the well-being of my partner," and "I pray that good things will happen for my partner." Participants reported their frequency of each item on a 5-point scale ranging from 1 (never) to 5 (very frequently). Items were summed so that higher scores indicated greater amount of praying for one's partner. Coefficient alpha for the current sample was .97 at pretest and .96 at posttest.

Partner Communication

Communication with one's partner was measured using the constructive communication subscale (CPQ-CC; 9 items) of the Revised Communication Patterns

Questionnaire (RCPA; Crenshaw et al. 2017). The RCPA is a widely used self-report measure of couple communication behavior with the constructive communication subscale representing mutual constructive communication in which both partners contribute to the discussion and try to solve problems. The CPQ-CC was chosen because it has previously been shown to correlate with problem-solving behavior observed during couple discussions ($r = .70$; Hahlweg et al. 2000). Respondents read descriptions of how conflict might typically be addressed in their relationship and use a 9-point Likert-type scale to indicate the likelihood of that particular pattern occurring ranging from 1 (very unlikely) to 9 (very likely). Example items include "Both my partner and I try to discuss the problem," "Both my partner and I express our feelings to each other," and "Both my partner and I suggest possible solutions and compromises." Coefficient alpha for the current sample was .92 at pretest and .91 at posttest.

Relationship Satisfaction

Relationship satisfaction was measured using the Positive–Negative Relations Quality scale (PN-RQ; Rogge et al. 2017). The PN-RQ represents an item response theory-optimized measure of these two dimensions of perceived relationship quality. The PN-RQ conceptualizes relationship quality as a bidimensional construct where the positive and negative qualities of a relationship are treated as distinct and independent from each other. The PN-RQ includes eight adjectives (4 positive, 4 negative) that participants' rate in regard to their romantic relationship. For the positive subscale, participants are asked "Considering only the positive qualities of your relationship and ignoring the negative ones, please rate your relationship on the following…" whereas the negative subscale asks "Considering only the negative qualities of your relationship and ignoring the positive ones, please rate your relationship on the following…". The adjectives comprising the positive subscale are "enjoyable," "pleasant," "strong," and "alive," and the negative subscale adjectives are "miserable," "bad," "empty," and "lifeless." Responses are given on a 6-point Likert scale (0 = Not at all TRUE to 5 = Completely TRUE). The items of the positive subscale are summed to create a total where higher scores indicate greater positive relationship qualities. The items of the negative subscale are summed separately to create a total where higher scores reflect greater negative relationship qualities. Coefficient alpha for the positive subscale was .95 at both pretest and posttest. Coefficient alpha for the negative subscale was .94 at pretest and .92 at posttest.

Analyses

Univariate ANOVAs were conducted to explore pre-intervention differences in demographics (age, body mass index) and in the cardiovascular outcomes between conditions: heart rate (HR) peripheral blood pressures (SBP, DBP) central blood pressures (CSBP, CDBP), and myocardial mechanisms (DTI, STI, SVI). Two (time change: pretest and posttest) by three (condition: prayer, meditation, control) factorial repeated measures ANCOVAs were utilized to assess the pre- to

post-intervention condition change in prayer for partner, constructive communication, and relationship satisfaction as well as cardiovascular outcomes from the PWA while controlling for age and body mass index. Significant interactions were followed up with univariate contrasts. Potential gender differences were explored with two (gender: male vs female), by two (time change: pre-, posttest) by three (condition: prayer, meditation, control) factorial repeated measures ANOVAs.

Results

Univariate ANOVA analyses indicated no pre-intervention differences in demographics between conditions ($N = 30$ per condition) in age: [Control ($M = 36.52$ years, SD = 10.35), Prayer ($M = 33.01$ years, SD = 9.33), Meditate ($M = 37.11$ years, SD = 10.65), $F(2,87) = 2.92$, $p = .060$, partial $\eta^2 = .030$] or body mass index [Control ($M = 28.84$ kg/m^2, SD = 7.01), Prayer ($M = 27.01$ kg/m^2, SD = 5.50), Meditate ($M = 27.44$ kg/m^2, SD = 6.21), $F(2,87) = 1.38$, $p = .257$, partial $\eta^2 = .016$]. Also, univariate ANOVA analyses indicated no pre-intervention differences in any cardiovascular parameter between conditions (F's < 2 and $p > .05$).

The factorial repeated measures ANCOVAs demonstrated a pre- to posttest by experimental condition interaction regarding scores on the prayer for partner measure, $F(2, 85) = 6.34$, $p = .003$, partial $\eta^2 = .088$. The follow-up contrasts indicated that individuals in the prayer condition significantly increased their prayer for their partner from pre- to posttest (Cohen's $d = .336$, $p < .05$). There were not similar increases in individuals in the control or meditate conditions (p's > .05). This analysis serves as a manipulation check of the effectiveness in the prayer condition demonstrating the intervention's ability to increase prayer for one's partner.

Regarding relationship satisfaction, the factorial repeated measures ANCOVAs demonstrated a pre- to posttest by experimental condition interaction regarding scores from the positive subscale of PN-RQ scores, $F(2, 85) = 4.11$, $p = .020$, partial $\eta^2 = .057$, but not for the scores of the negative subscale ($p > .05$). Follow-up contrasts for the positive PN-RQ scores indicated that positive perceptions of relationship qualities significantly increased from pre- to posttest (Cohen's $d = .245$, $p < .05$) for those in the prayer for partner condition. This change was not statistically significant for either the control or mediation condition participants. No pre- to posttest by experimental condition interactions occurred regarding communication patterns. However, a main effect showed improved constructive communication from pre- to posttest in all conditions, $F(1, 85) = 382.21$, $p < .001$, partial $\eta^2 = .758$. Table 1 shows the pre- to posttest means by experimental conditions for the prayer for partner, constructive communication patterns, and relationship satisfaction measures.

Regarding cardiovascular outcomes, the factorial repeated measures ANCOVAs demonstrated no pre- to posttest by experimental condition interactions for values of heart rate, peripheral blood pressures (SBP, DBP), or central blood pressure (CSBP, CDBP), see Table 2. However, significant pre- to posttest by experimental condition interactions were identified for DTI, $F(2, 85) = 5.11$, $p = .008$, partial $\eta^2 = 1.04$, STI, $F(2, 85) = 3.22$, $p = .044$, partial $\eta^2 = .067$, and SVI, $F(2, 85) = 7.81$, $p < .001$, partial $\eta^2 = .209$. Follow-up contrasts indicated that from pre- to posttest, DTI (Cohen's

Table 1 Pre- to posttest psychosocial measures by intervention condition

	Pretest mean (SD)	Posttest mean (SD)	2×3 interaction	Partial η^2
PFPP				
Control	16.45 (4.44)	16.36 (4.74)	$p = .003$	.088
Prayer	13.53 (6.35)	15.58 (5.83)[a]		
Meditate	15.89 (4.18)	16.85 (3.91)		
CPQ				
Control	50.44 (9.65)	63.64 (12.87)[a]	$p = .798$	.004
Prayer	54.00 (9.35)	66.70 (12.11)[a]		
Meditate	53.50 (9.26)	67.36 (11.50)[a]		
PN-RQ-P				
Control	24.37 (3.22)	23.30 (3.76)	$p = .020$	.057
Prayer	24.50 (3.05)	25.23 (2.90)[a]		
Meditate	24.30 (4.40)	24.83 (4.18)		
PN-RQ-N				
Control	6.84 (4.08)	6.65 (4.15)	$p = .959$	.001
Prayer	6.51 (3.64)	6.49 (4.96)		
Meditate	6.07 (3.86)	5.86 (3.38)		

$N = 90$ participants with $n = 30$ participants per condition. PFPP = partner-focused petitionary prayer. CPQ = Revised Communication Patterns' Questionnaire Constructive Communication Subscale. PN-RQ-P = Positive–Negative Relationship Quality Scale-Positive Subscale. PN-RQ-N = Positive–Negative Relationship Quality Scale-Negative Subscale

[a]Significant difference from pretest

$d = .376$) and SVI (Cohen's $d = .979$) significantly increased, while STI (Cohen's $d = -.640$) significantly decreased for those in the prayer for partner condition but not for those in the control or mediation conditions ($p < .05$). No gender main effects or interactions were found (F's < 2 and $p > .05$), and all repeated measures analysis indicated a Greenhouse–Geisser epsilon of 1.00.

Discussion

The results of the current study suggest that partner-focused petitionary prayer (PFPP) may help improve relationship quality as well as the efficiency of myocardial mechanisms in comparison with control conditions. Specifically, for participants engaging in PFPP, perceived positive qualities increased and their hearts displayed improved oxygen use and blood receipt without having to work as hard. This is a novel extension of the prayer literature as it demonstrates that daily PFPP may help to improve the efficiency of the heart.

This intervention may have potential for decreasing cardiovascular risk for individuals in relationships as evidenced by PFPP's influence on changes of key myocardial mechanisms. However, it is important to note that in the current research, the intervention window was only 4 weeks. Thus, even though this research only identified myocardial mechanism changes, over a longer time

Table 2 Pre- to posttest cardiovascular indices by intervention condition

	Pretest mean (SD)	Posttest mean (SD)	2×3 interaction	Partial η^2
SBP				
Control	125 (17)	123 (8)	$p = .664$	.011
Prayer	119 (12)	117 (13)		
Meditate	127 (15)	121 (15)		
DBP				
Control	77 (10)	74 (10)	$p = .122$	.053
Prayer	72 (9)	74 (8)		
Meditate	76 (10)	74 (10)		
HR				
Control	74 (10)	74 (11)	$p = .47$	.019
Prayer	69 (11)	65 (11)		
Meditate	75 (8)	71 (10)		
CSBP				
Control	113 (16)	110 (12)	$p = .829$	.005
Prayer	106 (10)	105 (11)		
Meditate	113 (14)	110 (12)		
CDBP				
Control	78 (10)	76 (10)	$p = .135$	.051
Prayer	72 (10)	74 (8)		
Meditate	77 (11)	75 (10)		
DTI				
Control	3306 (446)	3193 (351)	$p = .008$	.104
Prayer	3096 (414)	3240 (348)		
Meditate	3269 (354)	3237 (395)		
STI				
Control	2256 (424)	2228 (425)	$p = .044$	.067
Prayer	2032 (361)	1782 (418)		
Meditate	2283 (405)	2143 (392)		
SVI				
Control	150 (23)	147 (25)	$p < .001$	.209
Prayer	156 (30)	189 (37)		
Meditate	146 (32)	149 (19)		

$N = 90$ participants with $n = 30$ participants per condition. SBP = systolic blood pressure. DBP = diastolic blood pressure. HR = heart rate. CSBP = central systolic blood pressure. CDBP = central diastolic blood pressure. DTI = diastolic time interval. STI = systolic time interval. SVI = subendocardial viability index

interval these changes may then lead to changes in blood pressure. Both brachial and aortic blood pressures are "symptoms" or outcomes of myocardial functioning; thus, over a more extended period of time, PFPP may be effective at also influencing blood pressures. Additional research is needed to better identify the temporal relationship between the myocardial mechanisms studied, blood pressures, and PFPP.

Daily prayer in general is thought to be beneficial because it encourages positive reappraisal (Dezutter et al. 2011). Conceptually, the act of praying for one's partner may actually help couples take a break from conflict or daily stressors and regain perspective; similarly, it may help interrupt negative thought cycles and provide a source of support (Beach et al. 2008). As such, it is possible that the cognitive and emotional benefits of petitionary prayer for one's partner help reduce the strain of daily stress on one's cardiovascular system, improving its efficiency. A potentially fruitful line of future research is to examine the joint impact of daily stress and PFPP on cardiovascular functioning.

Petitionary prayer serves as a means of exerting control over one's environment, but it is control delivered through an external force (e.g., a divine power). The belief in this God-mediated control can provide a sense of security and predictability. God-mediated control has been linked to positive social, emotional, and mental health outcomes (Fiori et al. 2004; Krause 2005). Moreover, petitionary prayer is linked to this sense of God-mediated control, which helps explain the link between petitionary prayer and health (Jeppsen et al. 2015). It is plausible that the act of petitioning favor from God for one's partner coincides with a belief that one is actually enacting positive change for one's partner. Both the religious beliefs underlying a sense of control and the act of service for one's partner may help explain the positive benefits of PFPP on cardiovascular functioning. However, the potential of these explanatory factors has yet to be examined, so additional research is still needed.

This research also enriches the findings of Lambert et al. 2012a, b in showing that prayer for one's partner can improve relationship quality, but that the improvement may only pertain to the positive qualities and not the negative qualities of that relationship. This nuanced finding was made possible by using an IRT optimized measure that produced a bidimensional measure of relationship quality that assessed positive and negative dimensions. A more traditional unidimensional measure of relationship quality may have obscured these findings as has been shown in prior work validating the PN-RQ (Rogge et al. 2017). Although positive relationship quality may be more sensitive to minimal interventions such as the one used in this study, it is also possible that this finding results from the use of participants from relatively non-distressed relationships. Further research is needed using a sample that reflects the full spectrum of relationship satisfaction to choose between these two possibilities.

Limitations

Although the current study utilized novel technology to analyze the benefits of PFPP on an aspect of cardiovascular health, it is not without limitations. The benefits of the prayer intervention may be specific to couples that already utilize prayer or religion as a means of coping. Efforts were made to make the instructions general enough to be applied to any realm of spirituality, but conceptually the intervention may be more applicable in certain cultural contexts. In any event, our results do show that the intervention was successful at specifically increasing prayer directed toward one's partner.

Further, findings were specific to myocardial mechanisms for cardiovascular health (DTI, STI, and SVI) derived from PWA. Numerous other physiological processes and biomarkers of health need to be examined to more fully demonstrate the positive influence of PFPP on well-being, including indices of HPA axis functioning (e.g., cortisol), metabolic processes (e.g., cholesterol, glucose, etc.), ANS functioning (e.g., heart rate variability), and immune system functioning. Continued research will be needed to provide further support for the impact of PFPP on health. Finally, as this research utilized laboratory assessments, researchers may also benefit from ambulatory based assessments conducted outside of the laboratory setting to improve the external validity of the health benefits of PFPP.

Conclusions

The current study built on an emerging body of research on prayer and relational health to examine the potential benefits of partner-focused petitionary prayer for relationship and cardiovascular functioning. Further, advanced noninvasive technology was utilized to examine cardiovascular functioning. After a four-week intervention period, it was found that PFPP improved positive relationship qualities, coronary perfusion, decreased left ventricular work, and increased coronary blood flow in contrast to waitlist and meditation conditions in a sample of 90 married individuals. PFPP was significantly better at bolstering myocardial mechanisms suggesting that it is cardioprotective. The potential of PFPP for improving wellness should continue to be explored in future research.

Compliance with Ethical Standards

Conflict of interest All authors have declared that they have no conflict of interest.

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