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Spirituality, infertility-related stress, and quality of life in Brazilian infertile couples: Analysis using the actor-partner interdependence mediation model

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ABSTRACT
Infertility has a stressful impact on both partners, with adverse effects on the quality of life of infertile couples. Spirituality is a meaning-based strategy that can protect couples against infertility's negative impact on quality of life, but analysis of this mediator relationship in infertile couples has not been reported. We adopted a dyadic approach and used the actor-partner interdependence mediation model to examine whether and how women's and men's spirituality was associated with their own and their partners' infertility-related stress and quality of life. In 2014, 152 infertile couples starting their first fertility treatment at a private clinic in Brazil were recruited and completed selfreports of spirituality, infertility-related stress, and quality of life. Results indicated that women's and men's level of spirituality was positively associated with their own quality of life directly and indirectly, by reducing their own infertility-related stress. Their spirituality was associated with an increase in their partners' quality of life only indirectly, by reducing their partners' infertility-related stress. Findings highlight the importance of assessing and promoting spirituality as a coping resource that infertile women and men might use to deal with the stress of infertility and reduce its adverse effects on quality of life.

K EYWORDS
actor-partner interdependence mediation model, dyad, infertility-related stress, quality of life, spirituality

1 | INTRODUCTION

Infertility has been recognized as an internationally relevant social and public health issue (Inhorn&Patrizio, 2015),with an estimated worldwide prevalence of 9% and similar rates in both developed and less developed countries. About 56% of infertile couples seek medical help to conceive (Boivin, Bunting, Collins, & Nygren, 2007). In Brazil, an infertility rate of 8–15% has been estimated for women (Pantoja & Fernandes, 2015), and there are approximately four million Brazilian couples with infertility (Brazilian Institute of Geography and Statistics [IBGE], 2010).

The inability to conceive produces infertility-related stress in both members of the infertile couple, affecting different domains (Cousineau & Domar, 2007) such as personal (e.g., physical and mental health, and life satisfaction), social (e.g., relationship with family, in-laws, and friends), and marital (e.g., marital satisfaction and sexual pleasure) areas (Schmidt, Holstein, Christensen, & Boivin, 2005). Although women seem to experience infertility as a more stressful condition than their male partners (Kim, Shin, & Yun, 2016; Martins, Peterson, Almeida, Mesquita-Guimarães, & Costa, 2014; Peterson, Pirritano, Christensen, & Schmidt, 2008), infertility-related stress has an adverse effect on couples' quality of life (Galhardo, Cuna, & Pinto-Gouveia, 2013; Kim et al., 2016), and in individual infertile women and men (Luk & Loke, 2015; Mousavi, Masoumi, Keramat, Pooralajal, & Shobeiri, 2013), with infertile individuals reporting lower quality of life than the general population (Herrmann et al., 2011; Onat & Beji, 2012).

To deal with stressful conditions, such as infertility, religious, and spiritual coping strategies are employed in different cultures, with

potentially positive effects on quality of life and adjustment (Koenig, King, & Carson, 2012; Latifnejad Roudsari, Allan, & Smith, 2014). Religiosity and spirituality have been proposed as different, yet related, constructs. Although there is still an ongoing debate on the definitions and differentiation of religiosity and spirituality (Oman, 2013; Weathers, McCarthy, & Coffey, 2016), some authors have identified important distinctions between them (e.g., Hill et al., 2000; Sulmasy, 2006). Religiosity is seen as a system of beliefs and practices related to the sacred or divine, as held by a community or social group, implying participation in institutionally sanctioned activities (Koenig et al., 2012). Spirituality has been conceptualized as a system of beliefs and values that gives meaning and purpose to people's lives and provides a sense of connectedness with the self and the environment (Sessanna, Finnell, Underhill, Chang, & Peng, 2011; Timmins & Caldeira, 2017). In a recent concept analysis, meaning in life (i.e., making sense of and deriving meaning from life events) was one the core attributes of spirituality, together with connectedness (i.e., a sense of relatedness to oneself, others, the world, and a higher power) and transcendence (i.e., the ability to see beyond the boundaries of the self and present suffering) (Weathers et al., 2016).

Spirituality is involved in meaning-based coping, which also includes positive reinterpretation, revised goals, and the infusion of ordinary events with positive meaning (Folkman, 1997). In patients with various chronic medical conditions, spirituality plays a protective role in adjustment to illness and promotes quality of life (Czekierda, Banik, Park, & Luszczynska, 2017; Mishra, Togneri, Tripathi, & Trikamji, 2017; Salmoirago-Blotcher et al., 2012). Spirituality is commonly used by infertile women and couples to deal with the chronic stressor of infertility (Latifnejad Roudsari et al., 2007; Romeiro, Caldeira, Brady, Hall, & Timmins, 2017), and it has been associated, in women, with lower infertility-related stress and depressive symptoms, higher life satisfaction (Domar et al., 2005; Etemadifar, Hosseiny, Ziraki, Omrani, & Alijanpoor, 2016), and improved emotional adjustment to assisted reproductive technology (ART) treatment (Chan et al., 2012).

Our goal was to investigate the mechanisms through which spirituality, as a personal resource to cope with infertility, might protect against the adverse effects of infertility on quality of life. Such an investigation must consider that infertility is a shared stressor, and both members of the infertile couple, in addition to experiencing it independently, confront it jointly as an interdependent dyadic unit (Martins et al., 2014). The shared nature of the infertility experience and the interdependence that characterizes close relationships calls for a dyadic rather than an individual perspective in analysis, to take into consideration intra-couple effects (e.g., Chachamovich et al., 2009; Kim et al., 2016; Peterson et al., 2008). Such a perspective takes into account the interactional and interdependent nature of data from members of a dyad (Laursen, 2005). Indeed, because interdependent variables are correlated, ignoring such correlations can produce biased estimates (Kenny, Kashy, & Cook, 2006).

Spirituality has been associatedwith quality of life in several chronic conditions (Czekierda et al., 2017; Mishra et al., 2017; Salmoirago-Blotcher et al., 2012). Meaning-based coping processes, including spirituality, affect infertility-related stress (Domar et al., 2005; Peterson et al., 2008; Volmer, Rösner, Toth, Strowitzki, & Wischmann, 2017), and

infertility-related stress has a negativeimpacton quality of life (Galhardo et al., 2013; Kim et al., 2016). Nevertheless, the relationship among spirituality, infertility-related stress, and quality of life has not yet been investigated in infertile couples from a dyadic perspective. Putting together the findings from the literature, a potential relationship could be hypothesized where spirituality affects quality of life directly and indirectly, through the mediating role of infertility-related stress.

1.1 | Actor-partner interdependence model

TheActor-Partner Q2InterdependenceModel (APIM;Kenny et al.,2006) offers an appealing approach to analyze dyadic data using the couple as the unit of analysis. This model suggests that the attributes and behaviors of one dyadmember affect both her or his own outcomes and the outcomes of the other member. Using the APIM provides the advantage of modeling the mutual influence between members of the infertile couple, elucidating how each member's outcomes may be also influenced by her or his partner (Rayens & Svavarsdottir, 2003).

In studies using a dyadic approach, the relationship between meaning-based coping strategies and infertility-related stress seemed to vary according to gender. Indeed, the use of meaning-based coping helped infertile women reducing their own and their partners' infertility-related stress and risk for developing anxiety and depression (Peterson et al., 2008; Volmer et al., 2017). On the opposite, men's use of meaning-based coping increased their own and their partners' infertility-related stress in the social domain (Peterson et al., 2008). On the other hand, previous dyadic studies found that, for both women and men, infertility-related stress had direct negative effects on their own and their partners' quality of life (Kim et al., 2016).

The purpose of the present study was to investigate whether and how women's and men's spirituality was associated with their own and their partners' quality of life directly and indirectly, through the mediation of their own and their partners' infertility-related stress, by adopting a dyadic approach using the Actor-Partner Interdependence Mediation Model (APIMeM; Ledermann, Macho, & Kenny, 2011).

2 | METHODS

2.1 | Design and target population

The study had a cross-sectional design, and we followed the STROBE statement for reporting observational studies (von Elm et al., 2007). The study complied with the Declaration of Helsinki and was approved by the University Research Ethics Committee prior to data collection. Participants were infertile couples seeking ART treatment for the first time at a private fertility clinic in San Paulo, Brazil. Inclusion criteria were being 18 years or older, reporting an inability to conceive after at least one year of regular unprotected sexual intercourse, and starting a first ART treatment.

2.2 | Data collection

Between January and December 2014, two psychologists approached together the couples scheduled for their first ART treatment in the waiting room and briefly explained the scope of the study. Participation was voluntary, and each participant signed an informed consent form. Each participant completed the study questionnaire separately from the partner. During questionnaire completion, the psychologists remained in the waiting room and were available to answer any questions. The two psychologists emphasized the importance of

completing the questionnaire in all its parts, and they remained in the room to clarify any doubts. All self-reports, which took about 10 min to complete, were returned complete with no missing data.

2.3 | Measures

2.3.1 | Demographic and clinical characteristics

Participants completed a short demographic questionnaire that included questions on gender, age, educational level, and monthly family income as multiples of the Brazilian monthly minimum wage (723 BRL, equivalent to 306 USD, based on the exchange rate on January 1, 2014). Type of infertility (primary or secondary) and cause of infertility were drawn from medical records. (Primary infertility is a situation in which a woman has never conceived, or a man has never impregnated a woman, despite 12 months of attempting conception. Secondary infertility refers to women who have achieved a previous pregnancy or to men who have previously impregnated a woman but are subsequently unable to conceive despite 12 months of attempting conception). Cause of infertility was categorized as diagnosed or undiagnosed. Diagnosed causes of infertility were grouped into four major categories: female, male, mixed, or unexplained factors. Infertility was considered undiagnosed in the case of an incomplete diagnostic work-up.

2.3.2 | Spirituality

The Meaning/Peace scale was used to assess spirituality. This scale is part of the Functional Assessment of Chronic Illness Therapy-Spiritual Well-Being Scale (FACIT-Sp-12; Peterman, Fitchett, Brady, Hernandez, & Cella, 2002). This 8-item scale refers to spirituality as distinct and independent from religiosity and based on aspects such as meaning and purpose in life (e.g., “I feel a sense of purpose in my life”) and sense of peace and connectedness (e.g., “I feel a sense of harmony within myself”). The Meaning/Peace scale has been tested and used separately from the other factor of the FACIT-Sp, namely Faith, by Peterman et al. (2014) because they considered the four faith-specific items unsuitable for use with respondents who identify themselves as spiritual but not religious.

Items were rated on a 5-point scale from 0 (*not at all*) to 4 (*very much*) and were summed to obtain a total score ranging between 0 and 32, with higher scores indicating higher levels of spirituality. The Meaning/Peace scale provided internal consistency (Cronbach's α) values between 0.64 and 0.86 in previous samples. As evidence of validity, it was correlated positively with measures of functional, social, and emotional well-being, and with quality of life and life satisfaction and negatively with measures of negative affect, worries, and medical concerns (Peterman et al., 2014).

In this study, the Meaning/Peace scale was taken from the Portuguese version of the FACIT-Sp-12 (Lucchetti, Lucchetti, de Bernardin Gonçalves, & Vallada, 2015), which had a Cronbach's α between 0.66 and 0.74, and correlated weakly with measures of organizational and non-organizational religiosity and moderately with intrinsic religiosity, supporting both reliability and validity. Cronbach's α in the present study was 0.79 for women and 0.68 for men.

2.3.3 | Infertility-related stress

Infertility-related stress was measured with the Infertility-Related Stress Scale (IRSS; Casu & Gremigni, 2016). This 12-item self-report

measures the impact of infertility in the intrapersonal (e.g., how much stress the infertility problem places on physical well-being) and interpersonal (e.g., how much stress the fertility problem places on relationships with friends) domains of life. For each item, respondents are asked to rate their perceived amount of stress on a 5-point scale from 1 (*none at all*) to 5 (*a great deal*). For the present study, items were summed up to obtain a total score ranging from 12 to 60, with higher scores representing higher levels of infertility-related stress. In the original validation study conducted on a sample of 597 Italian infertile women and men, the total IRSS had a Cronbach's α reliability coefficient of 0.91, and positively correlated with measures of emotional distress, supporting construct validity (Casu & Gremigni, 2016). The IRSS was translated from Italian into Portuguese and then back-translated by two independent bilingual psychologists for the present study, according to standard procedures (van de Vijver & Hambleton, 1996). Cronbach's α in this study was 0.93 for women and 0.94 for men.

2.3.4 | Quality of life

Quality of life was assessed using the WHO Brief Quality of Life Assessment Scale (WHOQOL-BREF; WHOQOL Group, 1998), which has been extensively used with infertile patients (e.g., Keramat et al., 2014; Mousavi et al., 2013). The WHOQOL-BREF is a 26-item selfreport that provides an assessment of physical (e.g., “Do you have enough energy for your daily life?”), psychological (e.g., “To what extent do you feel your life to be meaningful?”), social (e.g., “How satisfied are you with your personal relationships?”), and environmental (e.g., “How satisfied are you with your access to health service?”) quality of life. Respondents are asked to rate their agreement with each statement using a 5-point scale from 1 (*not at all*) to 5 (*extremely*). For the present study, a global 0–100 quality of life score was computed, with higher scores indicating higher quality of life (Skevington, Lotfy, & O'Connell, 2004).

Weused the Brazilian version of the WHOQOL-BREF (Fleck et al., 1999), which was validated on a sample of 250 patients from different medical areas and 50 controls. In the Brazilian validation study, Cronbach's α reliability coefficients were between 0.71 and 0.84, and construct validity was supported by negative correlations with measures of depression and hopelessness, and expected differences in mean scores between patients and healthy controls (Fleck et al., 1999). Cronbach's α in this study was 0.86 for women and 0.79 for men.

2.4 | Data analysis

Univariate two-way analysis of variance (ANOVA) was used to compare mean scores in the study variables based on both type (i.e., primary or secondary) and cause (i.e., diagnosed or undiagnosed) of infertility, separately in women and men. Preliminary bivariate correlations between study variables were computed separately for women and men, and within couples to test for interdependence within dyads. Mixed repeated measures ANOVA with one betweensubjects factor (i.e., cause of infertility) and one within-subjects factor (i.e., gender of spouse) was used to compare dyad members’ mean scores, controlling for cause of infertility.

To investigate whether women's and men's spirituality influenced

their own and their partners' quality of life directly and indirectly, through the mediation of their own and their partners' infertilityrelated stress, the actor-partner independence mediation model (APIMeM; Ledermann et al., 2011) was used. This model includes two independent, two outcome, and two mediator variables (i.e., one for each dyad member), and enables estimation of the direct effects of the dyad members' independent variable on their own and their partners' outcome, as well as the indirect effects via their own and their partners' mediators.

Prior to the analysis, study variables were standardized using the means and standard deviations computed across both dyad members (Kenny et al., 2006). The saturated distinguishable APIMeM (Ledermann et al., 2011) was first estimated to test all the effects. Empirical distinguishability was then tested by constraining each effect as equal among dyad members, and testing each constraint individually. Based on empirical distinguishability among female and male effects, the goodness of fit of a dyadic model including both the direct and indirect effects was thus tested. A bootstrapping procedure was used to estimate and test the indirect effects (Preacher & Hayes, 2008). Contrast analyses (Preacher & Hayes, 2008) were conducted to test the difference in magnitude between individual and partner effects in the case they were both significant.

A sample size of at least 150 couples was established a priori as needed to meet the recommended ratio of at least five observations per estimated parameter in structural modeling (Bentler & Chou, 1987), and to reach enough power (0.80) to detect a mediated effect, assuming small-to-medium size of the paths (Fritz & MacKinnon, 2007).

Interpretation of results was based on both statistical significance (significance level set at $p < .05$) and measures of effect size, with Pearson's r of .10 considered small, .30 medium, and .50 large, and Cohen's d of 0.20, 0.50, and 0.80 considered small, medium and large, respectively (Cohen, 1988). The APIMeM was estimated using path analysis in Mplus 6.1 (Muthén & Muthén, 1998–2010). All other analyses were conducted with IBM SPSS 22.

3 | RESULTS

3.1 | Participants' characteristics

A total of 214 couples meeting the inclusion criteria were consecutively recruited and invited to participate in the study. Sixty-two couples declined participation for lack of time or no interest; thus, the study sample consisted of 152 couples for a total of 304 participants (71% participation rate), 152 women and 152 men. Women's mean age was 35.13 (SD 4.99, range 20–47), and men's mean age was 38.21 (SD 6.27, range 25–58). Other participants' characteristics are shown in Table 1. Most were highly educated and most couples had a medium or high income. Men were moderately older than women, $F(1, 151) = 38.18$, $p < 0.001$, $d = 0.54$. Most women and about one-third of men had secondary infertility. About 43% of couples had a diagnosed cause of infertility, which for the majority was female factor infertility.

As shown in Table 2, ANOVA analyses conducted separately in women and men indicated no significant two-way interactions or main effects of type and cause of infertility on spirituality, infertility-related

stress, and quality of life. In both women and men, spirituality was significantly, positively and strongly correlated with quality of life, and correlations between spirituality and infertility-related stress and between infertility-related stress and quality of life were significant, negative, and low to moderate. With respect to interdependence within dyads, low to moderate correlations were found between dyad members' scores. Mixed repeated measures ANOVA showed that women reported slightly lower spirituality, and slightly higher infertility-related stress than men, regardless of the cause of infertility.

3.2 | Mediation analysis with APIMeM

Testing for empirical distinguishability indicated that there were no significant differences among dyad members in any of the paths. Female and male effects were thus all constrained to be equal in the APIMeM, and the goodness of fit of such dyadic model to the data was tested. The model showed an excellent fit, $\chi_2(6) = 5.84$, $p = .44$, CFI = 1.00, RMSEA = 0.00.

Path estimates are shown inQ3 Figure 1. There was a significant positive direct effect of women and men' spirituality on their own quality of life, while the direct effect of their spirituality on their partners' quality of life was nonsignificant. There were significant negative effects of women's and men's spirituality on their own as well as on their partners' infertility-related stress, with nonsignificant contrast analysis indicating that these effects had the same strength (*Estimate* = −0.11, *SE* =0.08, 95%CI: −0.27, 0.05). Finally, there was a significant negative effect of women's and men's infertility-related stress on their own quality of life, but not on that of their partners.

In indirect effects, reported in Table 3,women's andmen's spirituality was associated with their own quality of life throughthepartialmediating effect of their own infertility-related stress, and also was associated with theirpartners' qualityof life throughthe completemediating effect of their partners' infertility-related stress. For both women and men, their spirituality was associated with an increase in their own quality of life by reducing their own infertility-related stress, but their spirituality was associated with an increase in their partners' quality of life only through a reduction in their partners' infertility-related stress.

4 | DISCUSSION

In the present study, we aimed to investigate the mechanisms through which spirituality might protect infertile couples against the adverse effects of infertility on their quality of life, adopting a dyadic perspective. In particular, we examined whether and how women's and men's spirituality was associated with their own and their partners' quality of life directly and indirectly, by mediating their own and their partners' infertility-related stress.

Womenshowed slightly lower spirituality than their male partners, in line with previous evidence that the life meaning component of spirituality was higher in men than in women with involuntarily childlessness (Cserepes, Kollár, Sápy, Wischmann, & Bugán, 2013). This might reflect a gender difference in the willingness to give meaning to the couple's infertility experience, due to societal genderspecific expectations on the importance of parenthood, with women with infertility considering motherhood as their most important life role and thus experiencing reduced life meaning (e.g., Abbey, Andrews, & Halman, 1991; Reitzes & Mutran, 2002).

Infertility-related stress also was higher in women than in men, consistent with findings from previous dyadic studies (e.g., Kim et al., 2016; Peterson et al., 2008).Wefound no gender differences in quality of life, in line with the dyadic studies by Keramat et al. (2014) and Chachamovich et al. (2009), although the latter found in a Brazilian sample a small significant discrepancy between partners in only two out of the four quality of life domains. In another dyadic study, women reported lower quality of life than did men (Kim et al., 2016). This difference in findings across studies might reflect cultural aspects, as one's perceived quality of life depends on cultural perspectives and values (WHOQOL Group, 1995).

In dyadic analysis of spirituality, infertility-related stress, and quality of life, preliminary tests of empirical distinguishability indicated no gender-specific associations. Women's and men's spirituality had both direct and indirect positive effects on their own quality of life. The direct positive effect found in this study was consistent with a growing body of evidence that spirituality is associated with higher quality of life in women and men with chronic conditions (Czekierda et al., 2017; Mishra et al., 2017), and in infertility, also a chronic condition (Gourounti, Anagnostopoulos, & Vaslamatzis, 2010). In a recent study of infertile couples (Volmer et al., 2017), a similar beneficial effect of meaning-based coping strategies on quality of life in women was found, although the same effect was not found in men. In the present study, the relationship between spirituality and quality of life was also partially mediated by individual infertility-related stress. Specifically, the higher the women's and men's spirituality, the lower their infertility-related stress, and the lower their infertility-related stress, the higher their quality of life. Previous couple-based findings (Peterson et al., 2008) also indicated that women's use of meaningbased coping strategies was associated with a decrease in their own infertility-related stress; however, men's use of meaning-based coping was unrelated to or associated with an increase in their own

FIGURE 1 Estimated dyadic Model. Standardized path estimates are reported. Standard errors are in parentheses. Dotted lines represent nonsignificant paths. $^{*}p < .05$, $^{**}p \leq .01$, $^{***}p < .001$

Specific IE via the partner's infertility-related stress .02 .01 (.01, .05)

APIMeM = actor-partner interdependence mediation model; IE = indirect effect; *B* = standardized estimate; *SE* = standard error; CI = confidence interval.

infertility-related stress. A recent dyadic study (Kim et al., 2016) found the same aversive effect of women's and men's infertility-related stress on their own quality of life. The present study was the first known to test the mediating role of infertility-related stress in the relationship between spirituality and quality of life.

In the present study, women's and men's spirituality was not directly related to their partners' quality of life, partly in contrast with previous couple-based findings indicating that women's use of meaning-based coping strategies had a protective effect against their partners' risk for anxiety and depression (Volmer et al., 2017). However, we found that this relationship was completely mediated by one's partner's infertility-related stress. Specifically, for both women and men, higher spirituality was associated with lower

infertility-related stress in their partners, which in turn was associated with their partners' lower quality of life. Previous couple-based findings (Peterson et al., 2008) also indicated that women's meaningbased coping was associated with a lower infertility-related stress in their partners, yet suggested that men's use of meaning-based coping strategies was unrelated to or associated with higher infertility-related stress in their partners. We found that women's and men's infertilityrelated stress negatively affected their own quality of life but not that of their partners. This was in contrast with findings from a recent dyadic study (Kim et al., 2016) reporting negative effects of women's and men's infertility-related stress also on their partners' quality of life. Differences in findings between this study and previous studies might be due to cultural differences and the use of different measures. For example, the large importance of spirituality for the Brazilian population (Moreira-Almeida, Pinsky, Zaleski, & Laranjeira, 2010) might contribute to the finding of an effect of each dyad member's spirituality on both individual and partner infertility-related stress regardless of gender, contrary to previous findings (Peterson et al., 2008). Inconsistencies with previous dyadic studies could be also partly attributed to the use of different measures ofmeaning-based coping. In this study,we focused on spirituality as one of the meaning-based strategies people use to cope with stressful life events (Folkman, 1997). Previous dyadic studies (Peterson et al., 2008; Volmer et al., 2017) instead considered meaning-based infertility-specific coping as a broader set of strategies, which included, in addition to spiritual beliefs (e.g., believing there is a meaning in difficulties in having children), positive reinterpretation of the infertility experience (e.g., thinking about infertility in a positive light), revised goals (e.g., finding other life goals), and the infusion of ordinary events with positive meaning (e.g., find the partnership even more valuable now; Schmidt et al., 2005).

In summary, the main finding of this study was that dyad members' spirituality might promote both their own and their partners' quality of life by decreasing their own and their partners' infertility-related stress. Of note, contrast analyses indicated that the partner's spirituality was as strong a protective factor against one's own infertility-related stress as one's own spirituality. In general, these findings are in line with previous evidence that in infertile couples, one member's adjustment is influenced not only by her/his own coping strategies but also by those of her/his partner (Benyamini, Gozlan, & Kokia, 2009; Peterson et al., 2008, 2009; Volmer et al., 2017). However, to our knowledge, this is the first study to show that spirituality might be a protective factor associated with increased quality of life at the dyadic level in infertile couples seeking ART treatment for the first time. The present study adds to the growing body of literature that examines the dyadic impact of a partner's response to infertility (e.g., Kim et al., 2016; Martins et al., 2014; Peterson et al., 2009), and reinforces the importance of conceptualizing infertility as a shared stressor in clinical settings (Greil et al., 2017; Martins et al., 2016; Peterson et al., 2008).

4.1 | Limitations

This study has some limitations. First, the cross-sectional nature of the data did not allow conclusions about directionality or cause of the identified relationships. Replication studies using longitudinal data are needed to confirm directions of effect proposed here. Due to the lack

of prospective data, possible reverse mediation (i.e., spirituality as a mediator in the relationship between infertility-related stress and quality of life) cannot be excluded. Indeed, although increased use of spirituality as a coping strategy might reduce infertility-related stress, increased stress might lead to a greater use of this coping strategy. Therefore, future testing of alternative hypotheses is also encouraged to rule out possible reverse effects.

Second, due to the influence of socio-cultural factors on spirituality, infertility-related stress, and quality of life (Greil, Slauson-Blevins, & McQuillan, 2010; Weathers et al., 2016; WHOQOL Group, 1995), cross-cultural studies are needed to elucidate to what extent the dyadic associations found in this study represent a common pattern across countries/cultures.

Third, because all couples in this study were starting their first ART treatment, this may limit the generalizability of the findings to couples who are at other stages of the fertility treatment. Finally, the sample-size requirements for mediation analysis with structural equation modeling (Bentler & Chou, 1987; Fritz & MacKinnon, 2007) did not allow us to distinguish between domains of infertility-related stress and quality of life. Therefore, larger samples should be recruited to allow for testing of more complex multiple mediation models within a dyadic approach.

5 | CONCLUSION

This study contributes to the understanding of how spirituality is linked to adjustment to infertility as a shared experience within the couple. Findings from the present study show that spirituality may represent a shared coping resource to promote the quality of life of infertile couples turning to ART treatment. Therefore, professionals working with infertile couples are encouraged to assess and promote spiritual coping strategies in their clients as part of holistic health care (Chidarikire, 2012; Hodge & Horvath, 2011; Romeiro, Caldeira, Brady, Timmins, & Hall, 2017). Indeed, a baseline assessment of spiritual beliefs and values and interventions to encourage their use as a resource to deal with the stress of infertility could assist professionals in promoting couples' adjustment and quality of life. Interventions aimed to improve spirituality may have the potential not only to enhance both partners' quality of life by decreasing infertility-related stress in both dyad members, but also to prepare them to deal with the possibility of childlessness in case of treatment failure. Future research could investigate the effects of spiritual behaviors, expressions, and languages within the couples and identify the type of intervention that might be most effective.

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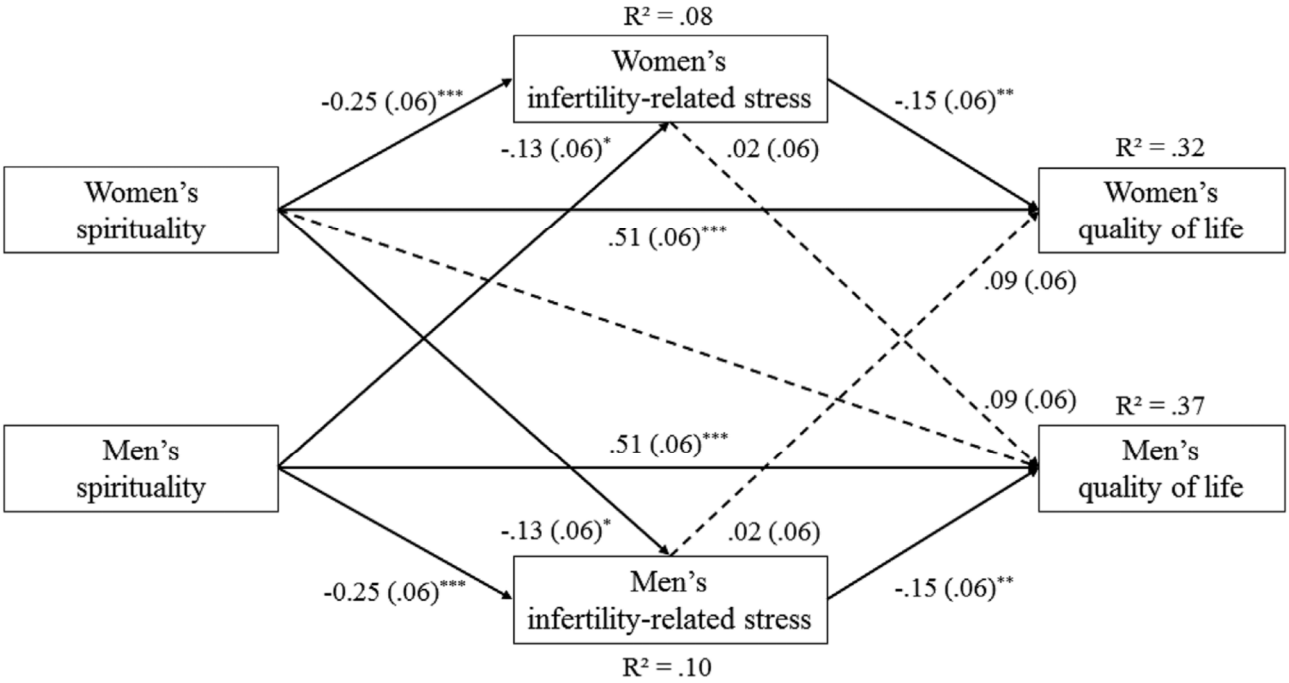

FIGURE 1 Estimated dyadic Model. Standardized path estimates are reported. Standard errors are in parentheses. Dotted lines represent nonsignificant paths. $^{*}p < .05$, $^{**}p \leq .01$, $^{***}p < .001$

TABLE 1 Participants' characteristics

	Women (*n* = 152)	Men (*n* = 152)	Couples (n = 152)
	n (%)	*n* (%)	*n* (%)
Education			
Lower/higher secondary	45 (29.61)	75 (49.34)	
Tertiary	107 (70.39)	77 (50.66)	
Monthly family income[a]			
Low (≤3 wages)			59 (38.82)
Medium (3–6 wages)			53 (34.87)
High (≥6 wages)			40 (26.32)
Type of infertility			
Primary	61 (40.13)	102 (67.11)	
Secondary	91 (59.87)	50 (32.89)	
Cause of infertility			
Undiagnosed			87 (57.24)
Diagnosed			65 (42.76)
Female factor[b]			39 (60)
Male factor[b]			18 (27.69)
Mixed[b]			4 (6.15)
Unexplained[b]			4 (6.15)

[a]Number of Brazilian minimum wages per month.
[b]Percentage refers to the total of couples with a diagnosed cause of infertility.

TABLE 2 Pearson's correlations, descriptive statistics, and ANOVA results for study variables

Variable	1	2	3	4	5	6
1. Spirituality (women)	–					
2. Spirituality (men)	.17*	–				
3. Infertility-related stress (women)	−.29***	−.10	–			
4. Infertility-related stress (men)	−.24**	−.25**	.40***	–		
5. Quality of life (women)	.63***	.19*	−.28***	−.22**	–	
6. Quality of life (men)	.20**	.47***	−.07	−.31***	.31***	–
Actual score range	8–32	8–32	12–60	12–57	38.69–79.33	42.38–79.33
M (*SD*)	23.68 (4.92)	24.84 (4.22)	26.88 (11.67)	24.14 (12.02)	59.70 (6.83)	60.50 (6.02)
Univariate two way ANOVA[a]						
Type of infertility × Cause of infertility	.37	.01	2.35	1.63	.33	2.02
Type of infertility	.71, *d* = .14	.49, *d* = .11	.27, *d* = .06	.57, *d* = .21	.85, *d* = .18	.83, *d* = .07
Cause of infertility	1.34, *d* = .19	.13, *d* = .03	.25, *d* = .04	.15, *d* = .01	.38, *d* = .13	1.18, *d* = .07
Mixed repeated measures ANOVA[b]						
Cause of infertility × Gender	.63		.09		1.16	
Gender	5.24*, *d* = .25		6.37**, *d* = .23		1.28, *d* = .12	

Type of infertility = primary versus secondary infertility; cause of infertility = diagnosed versus undiagnosed; *d* = Cohen's *d*.

[a]*F*(1, 148).

[b]*F*(1, 150).

*$p < .05$.

**$p \leq .01$.

***$p \leq .001$.

TABLE 3 Total, direct, and indirect effects in the APIMeM

	B	*SE*	95%CI
Individual spirituality→Individual quality of life			
Total effect	.55	.05	(.44, .65)
Direct effect	.51	.06	(.41, .63)
Total IE	.03	.02	(.00, .08)
Specific IE via individual infertility-related stress	.04	.02	(.01, .07)
Specific IE via the partner's infertility-related stress	−.01	.01	(−.02, .01)
Individual spirituality→The partner's quality of life			
Total effect	.10	.05	(−.01, .20)
Direct effect	.09	.06	(−.03, .20)
Total IE	.01	.02	(−.02, .05)
Specific IE via individual infertility-related stress	−.01	.01	(−.03, .02)
Specific IE via the partner's infertility-related stress	.02	.01	(.01, .05)

APIMeM = actor-partner interdependence mediation model; IE = indirect effect; *B* = standardized estimate; *SE* = standard error; CI = confidence interval.