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The mediator effect of dyadic coping by self and by partner on dyadic and emotional adjustment of infertile couples

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O papel mediador do *coping* diádico do próprio e do parceiro no ajustamento conjugal e emocional de casais inférteis

Introdução: A infertilidade é uma experiência desafiante, afetando o ajustamento conjugal e individual dos casais. No entanto, existe uma grande variabilidade no ajustamento individual e conjugal dos indivíduos inférteis. O presente estudo teve como objetivo analisar o papel mediador do *coping* diádico do próprio e do parceiro, na relação entre o impacto do *stress* associado à infertilidade e o ajustamento individual e conjugal dos casais inférteis. Métodos: Neste estudo transversal, 67 casais inférteis preencheram escalas de auto-resposta que avaliavam o *stress* associado à infertilidade, o *coping* diádico, o ajustamento emocional e o ajustamento conjugal. A análise de trajectórias (*Path analysis*) foi conduzida de modo a avaliar os efeitos diretos e indiretos do impacto do *stress* associado à infertilidade no ajustamento emocional e conjugal. Resultados: O *coping* diádico do próprio, nos homens, e o *coping* diádico do parceiro, nas mulheres, apresentaram um efeito mediador na relação entre o impacto do *stress* associado à infertilidade e o ajustamento conjugal. Os resultados também sugerem que, nos homens, o impacto do *stress* associado à infertilidade se associa a menores níveis de sintomatologia depressiva através da perceção de maiores níveis de *coping* diádico pelo próprio, que por sua vez se associam a níveis mais elevados de ajustamento conjugal. Conclusões: Os resultados enfatizam a importância das estratégias de *coping* diádico dos homens para o ajustamento conjugal de ambos os membros do casal, mas também para os níveis de sintomatologia depressiva dos homens. Mais ainda, os resultados sugerem que os processos diádicos têm um maior impacto no ajustamento emocional dos homens à infertilidade. Os dados salientam a importância de considerar a experiência do homem no tratamento da infertilidade, reforçando a natureza diádica desta experiência.

Palavras chave: *coping* diádico, infertilidade, ajustamento emocional, ajustamento conjugal.

The mediator effect of dyadic coping by self and by partner on dyadic and emotional adjustment of infertile couples

Theoretical background: Infertility is a challenging experience, with impact both at an individual level and in couple's relationship. However, there is great variability in dyadic and individual adjustment of infertile individuals. The current study aimed to investigate the mediating role of dyadic coping by self and by partner in the relation between infertility stress impact and emotional and dyadic adjustment to infertility. Methods: In this cross-sectional study, 67 infertile couples answered self-report questionnaires about their infertility related stress, dyadic coping, emotional and dyadic adjustment. Path analysis were conducted to examine direct and indirect effects between infertility stress impact and dyadic and individual adjustment. Results: Men's dyadic coping by self and women's dyadic coping by partner had a mediator effect on the relation between the impact of infertility stress and dyadic adjustment. Results also showed that men's infertility stress impact was associated with lower levels of depression through higher perceived dyadic coping by self, which was in turn associated with higher dyadic adjustment. Conclusions: The results highlight the importance of men's dyadic coping strategies for couples' dyadic adjustment, as well as for men's depression levels. Moreover, our evidence also suggests that, for men, dyadic processes have a greater impact on his emotional adjustment to infertility. These data emphasize the importance of involving men in the fertility treatment process, reinforcing the dyadic nature of infertility processes.

Key Words: dyadic coping, infertility, emotional adjustment, dyadic adjustment.

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Índice

I – Theoretical background

Infertility is defined as "a disease of the reproductive system defined by the failure to achieve a clinical pregnancy after 12 months or more of regular unprotected sexual intercourse" (Zegers-Hochschild et al., 2009, p. 2686). It is currently considered by the World Health Organization (WHO) as a public health issue, being estimated that there are 72.4 million infertile people and, of these, approximately 40.5 million are seeking treatment (Boivin, Bunting, Collins, & Nygren, 2007).

Infertility is a source of stress in couple's life. For those who desire to achieve parenthood, infertility can be described as an unpredictable event with negative consequences, where the couple has little control on changing the negative outcome because of the uncertainty associated to the likelihood of achieving their goal of being parents (Stanton, & Dunkel-Schetter, 1991). Greil (1997) described infertility as associated with feelings of isolation, social stigma, loss of control over ones' live and defectiveness. Additionally, loss of self-esteem and identity, managing its effects on marital relationship, sexual and social relationships are other challenges faced by infertile couples (Santos & Moura-Ramos, 2010). To achieve pregnancy, many infertile couples look for assisted reproductive technology (ART) procedures, which are invasive and emotionally demanding procedures. Albeit the previous studies have highlighted important factors that contribute to men and women's adjustment to infertility, the dyadic processes that facilitate emotional and marital adjustment during the infertility experience have been scarcely addressed.

Emotional and Dyadic Adjustment to Infertility

Emotional adjustment to infertility has been largely studied, but its results have been inconsistent. Several studies reported higher levels of depression and anxiety on infertile individuals, particularly in women. In a Portuguese sample, Galhardo, Cunha and Pinto-Gouveia (2011) reported statistically significant higher levels of depression in infertile couples undergoing treatment in comparison with normal controls and with couples looking for adoption. Another study (Wischmann, Stammer, Scherg, Gerhard, & Verres, 2001), in Germany, also found a tendency for higher depression and anxiety levels, but just in women. A prevalence of 26,8% for depressive disorders and 28,6% for anxiety disorders was reported by Chen, Chang, Tsai and Juang (2004) in infertile women starting a new ART treatment. When compared to women with cancer, hypertension and myocardial infarction, infertile women showed similar scores of anxiety and depression, which suggest that psychological distress of infertile women is equivalent to the one associated with other chronic diseases (Domar, Zuttermeister, & Friedman, 1993). Nevertheless, despite the findings mentioned above, other researchers claimed that these anxiety

and depression levels were not clinically significant (Connolly, Edelmann, Cooke, & Robson, 1992; Edelmann, Connolly, & Bartlett, 1994; Greil, 1997; Moura-Ramos, Gameiro, Soares, Santos, & Canavarro, 2010; van den Akker, 2005). In a systematic review of literature about women's emotional adjustment to in vitro fertilization (IVF), Verhaak et al. (2007) stated that, before starting treatment, women's depression levels did not differ from general population.

A question that often stands up is if infertile couples' emotional distress reported by some studies arises from an infertility diagnosis or from fertility treatments. ART procedures imply several demanding decisions, such as to pursuit or not another treatment when a cycle fails, that may bring tension to couple's relationship. After receiving a negative pregnancy test result, both men and women depression scores increased significantly (Berghuis & Stanton, 2002). When facing an unsuccessful treatment there is a substantial percentage of women who display significant levels of depression and anxiety in a 6 months follow-up, 20% display subclinically significant levels of anxiety and 25% of depression. Moreover, women who conceived after treatment showed a decrease in their levels of anxiety and depression (Verhaak, Smeenk, van Minnen, Kremer, & Kraaimaat, 2005). These studies suggest that fertility treatment, specially managing unsuccessful results, carry an extra burden to infertile couples. However, other study pointed out that infertile couples in their first assessment at a fertility center showed higher infertility stress levels than infertile couples undergoing ART (Moura-Ramos, Gameiro, Soares, Santos, & Canavarro, 2010), which is contrary to the idea of treatment as an extra source of stress. Another study that examined long-term effects, 10 years after a fertility treatment, showed a general good emotional adjustment, both in couples who were able to conceive and in those who were not (Wischmann, Korge, Scherg, Strowitzki, & Verres, 2012).

As stated, infertility and ART procedures bring several challenges to couples, placing elevated strain on the marital relationship. Even though, empirical data about dyadic adjustment of infertile couples is not conclusive. Some studies pointed a deterioration in infertile couples' marital relationship (Monga, Alexandrescu, Katz, Stein, & Ganiats, 2004; Wang et al., 2007), particularly in respect to sexual satisfaction (Benazon, Wright, & Sabourin, 1992). Nevertheless, contradictory findings were pointed out by other studies, suggesting that infertile couples' dyadic adjustment is not significantly different from fertile controls (Galhardo et al., 2011). One study (Sydsjö, Ekholm, Wadsby, Kjellberg, & Sydsjö, 2005) suggested a stable relationship pattern in infertile couples even after not having achieved pregnancy. Stable marital relationship were also reported between the infertility assessment period and 9-months later when the diagnosis was completed (Connolly et al., 1992). Other study (Benazon et al., 1992) reported no changes in dyadic adjustment 12-months after the beginning of fertility treatment, suggesting no damage on marital

relationship throughout the treatment process.

Infertility, namely pursuing a fertility treatment, was suggested by some studies as having a positive impact on marital relationship. Schmidt, Holstein, Christensen and Boivin (2005b) reported that 25.9% of women and 21.1% of men undergoing fertility treatments experienced marital benefit or thought that infertility brought them closer, independently of the treatment outcome. Even when facing negative treatment outcomes, couples reported some benefits of this experience, in terms of personal growth and relationship strength (Daniluk, 2001). One-third of the couples undertaking unsuccessful fertility treatments over a 5-year period reported high marital benefit (Peterson, Pirritano, Block, & Schmidt, 2011). In Moura-Ramos et al. (2010) study, with a Portuguese sample, infertile couples and couples undergoing ART showed higher levels of marital satisfaction when compared with presumed fertile couples.

Furthermore, marital quality and personal well-being were found to be associated (Proulx, Helms, & Buehler, 2007). Several studies indicated an association between marital adjustment and depressive symptoms (Beach, Katz, Kim, & Brody, 2003; Fincham, Beach, Harold, & Osborne, 1997; Pruchno, Wilson-Genderson, & Cartwright, 2009). In married couples, marital quality seems to predict individual and partner's changes in depressive symptoms one year later (Beach et al., 2003). However, Fincham et al. (1997) found a different causal path according to gender: for men depression predicted later marital satisfaction, whereas for women was marital satisfaction that predicted later depressive symptoms. In sum, it seems that, in married couples in general, marital adjustment and emotional adjustment are associated. Moreover, Andrews, Abbey and Halman (1991) found evidence for a model which suggests that infertility stress affects life quality largely through its indirect effects on marriage factors. Thus, it may be expected that infertile couples' dyadic adjustment can also influence infertile individuals' emotional adjustment.

Coping with Infertility

Due to the variability of infertile couples' emotional experience, as reported before, research has tried to examine which factors promote a better adjustment to this stressful experience. In this line of research, Verhaak et al. (2005) found that personality characteristics, cognitive factors and social support were variables that affect women's emotional adjustment to infertility. Individual coping strategies have also been linked to emotional adjustment in infertile individuals, specifically with their level of depressive symptoms (Berghuis & Stanton, 2002;. Peterson, Newton, Rosen, & Skaggs, 2006b). Avoidance and accepting responsibility coping strategies were related to increased levels of depression, for both men and women. On the other side, seeking social support and planful problem-solving were negatively associated with depression levels (Peterson et al., 2006b). Gender differences in the most used coping strategies have been reported (Jordan & Revenson,

1999; Peterson, Newton, Rosen, & Skaggs, 2006a; Peterson, Newton, Rosen, & Schulman, 2006). Individual coping strategies were also associated to dyadic adjustment of infertile couples, but they seem to explain only around 7% of its variance (Peterson, Newton, Rosen, & Schulman, 2006; Peterson et al., 2006a). Avoidance coping strategies were the strongest predictors of decreased dyadic adjustment (Peterson et al., 2006a). Accepting responsibility, distancing and self-controlling coping strategies were also related to lower levels of dyadic adjustment (Peterson, Newton, Rosen, & Schulman, 2006). Meaning-based coping was positively related to marital benefit 5-years after an unsuccessful fertility treatment (Peterson et al., 2011). Schmidt, Holstein, Christensen and Boivin (2005b) found that, for men, meaning-based coping and a medium use of active-confronting coping were predictors of marital benefit one year after treatment begins.

More recently there was a growing interest in the dyadic nature of coping with infertility, by studying the effect of one partner coping strategies on the other's distress. These studies have shown that partner coping strategies were also associated to individual and marital distress levels (Berghuis & Stanton, 2002; Peterson et al., 2009; Peterson, Pirritano, Christensen, & Schmidt, 2008; Peterson, Newton, Rosen, & Schulman, 2006). Therefore, it can be assumed that dyadic coping can play an important role in couples' adjustment to infertility.

Infertility and Dyadic Coping

The use of a dyadic approach regarding coping with infertility has been scarce. Direct dyadic stress was defined by Bodenmann (2005) as any stressful event that is faced by both partners. Therefore, infertility can be conceptualized as a dyadic stressor. It affects both partners individually, but also impacts couples' relationship. Indeed, we argue that coping with this stressful event should also encompass shared coping strategies. Bodenmann (1995) proposed the systemic-transactional model (STM) of stress and coping in couples which claims that, in intimate relationships, the stress of one partner affects the other and thus stressors need to be managed as a couple's issue. According to this conceptual framework, dyadic coping can be defined as the effort of one partner or both to manage stressful situations that affected one partner or the couple. Dyadic coping is conceptualised as an exchange process, which encompasses the stress signals of one partner (stress communication), the other partner's reaction and their conjoint efforts to cope with it (Bodenmann, 1995). Depending on the appraisal one partner makes of the other's stress communication, different negative or positive dyadic coping strategies will be triggered (Bodenmann, 2005). Dyadic coping is a multidimensional construct that comprehends four dimensions: supportive, delegated, negative and joint (common) dyadic coping. Supportive dyadic coping refers to the emotion or problem-focused support which is given by one partner to the other, it occurs usually when one partner is in need and the other has resources

to help him/her. Delegated dyadic coping comprises the allocation of the coping process just in one partner, as result of a request of the other partner. Negative dyadic coping involves hostile, ambivalent and superficial actions to assist the partner. Common dyadic coping involves all coping efforts that are undertaken by both partners in a coordinated way (Bodenmann, 1995, 2005).

All dyadic coping dimensions, except common dyadic coping, are measured as perceived in the self and in the partner. Nevertheless, dyadic coping can also be conceptualised as the perceived dyadic coping efforts of one individual (dyadic coping by self), the perceived dyadic coping efforts of the partner (dyadic coping by partner) and their conjoint coping efforts. Dyadic coping by self involves what the individual perceive that he/she makes to help her partner to cope with stress and how he/she views is own ability to communicate and ask for help when stressed. Dyadic coping by partner encompasses what the individual perceive the partner to do in order to alleviate his/her stress and how well the partner asks for support and communicates that he/she is in distress (Bodenmann, 1995, 2005).

Dyadic coping is another form of coping with stress, in addition to individual coping strategies, often being used when the latter failed (Bodenmann, 2005). Individual and dyadic coping strategies are related to each other, but dyadic coping seems to be a stronger predictor of relationship quality (Herzberg, 2013; Papp & Witt, 2010). Research showed that dyadic coping accounts for 30% to 40% of marital satisfaction's variance. However, dyadic coping aims not only to increase the relationship quality, but also to reduce individual stress (Bodenmann, 2005).

A meta-analysis conducted by Falconier, Jackson, Hilpert and Bodenmann (2015) showed an association between dyadic coping and relationship satisfaction. Moreover it was also verified that partner dyadic coping and joint dyadic coping were stronger predictors of relationship satisfaction than dyadic coping efforts by oneself (Falconier et al., 2015). Higher levels of stress communication, supportive dyadic coping and joint dyadic coping were related to marital quality in a 2-years period, while negative dyadic coping had the opposite effect (Bodenmann, Pihet, & Kayser, 2006). Dyadic coping also seems to predict relationship quality and stability over 5 years (Bodenmann & Cina, 2005). As stated before, despite the impact of dyadic coping on relationship quality was extensively studied, still its effects on individual emotional adjustment were not equally reported by empirical data. Nonetheless, in patients with chronic health conditions, dyadic coping was related to both their distress levels and dyadic adjustment (Badr, Carmack, Kashy, Cristofanilli, & Revenson, 2010; Meier, Bodenmann, Mörgeli, & Jenewein, 2011). In metastatic breast cancer patients, negative dyadic coping was strongly related to higher cancer-related distress and to lower dyadic adjustment, whereas joint dyadic coping was associated with a better dyadic adjustment

(Badr et al., 2010).

The STM framework was not yet applied in the infertility domain. Nevertheless, some studies already emphasized the important role of communication between infertile couples, with communication problems being associated with lower marital satisfaction levels (Hirsch & Hirsch, 1989) and with infertility related stress (Schmidt, Holstein, Christensen, & Boivin, 2005a). Moreover, low support from partner was related to higher infertility stress levels, in a Portuguese sample (Martins, Peterson, Almeida, Mesquita-Guimarães, & Costa, 2014). It is important to mention that despite dyadic coping encompasses stress communication and support from the partner, it is more than social support: it demands both partners to be involved and committed to guarantee the other's satisfaction and well-being and to participate in common strategies to solve the problem, which in turn will guarantee one's own marital satisfaction and well-being (Bodenmann, 1995, 2005).

II – Objectives

Infertile couples face multiple sources of stress. Empirical data highlighted individual coping strategies as one of the variables that explain individuals' emotional and dyadic adjustment to infertility stress. In the current study, we aimed to analyse another possible mechanism that explain infertile couples' adjustment. We argue that infertile couples respond as a unit when managing infertility-related stress and consequently these dyadic coping efforts influence their individual adjustment and their marital relationship. Therefore, it was hypothesized that dyadic coping can be an intervening factor explaining why some infertile couples adjust better than others. In order to that, we proposed the application of the Systemic-Transactional Model (STM) of coping to infertile couples. To our knowledge, no previous studies have used this framework in the infertility context. We intended to verify if dyadic coping had a mediator effect on the relation between infertility stress impact and emotional and marital adjustment. More specifically, we sought to analyse dyadic coping by self and dyadic coping by partner as possible mediators of the impact of infertility-related stress on both individual emotional adjustment and dyadic adjustment (Figure 1).

Based on the assumption that dyadic adjustment might influence individual general well-being (Proulx et al., 2007) and depressive symptoms' levels (Beach et al., 2003; Fincham et al., 1997; Pruchno et al., 2009), we further proposed an additional mediation model (Figure 2). We considered that the relation between the infertility stress impact and individual emotional adjustment might be explained through the effects of both dyadic coping by self and by partner on dyadic adjustment (Figure 2). Thus, in this model both dyadic coping by self and by partner and dyadic adjustment were tested as mediators of the impact of infertility-related stress on emotional adjustment. We were

also interested in veryfing if the proposed models work differently for women and for their male partners.

It was hypothesized that higher infertility stress impact was associated with lower dyadic coping by self and partner, which would be associated both with lower dyadic adjustment and emotional adjustment. As some studies pointed out a relation between dyadic adjustment and emotional adjustment, we further hypothesized that higher infertility stress impact was associated to lower dyadic coping by self and partner, that would be associated with lower dyadic adjustment, which in turns was related to a decreased emotional adjustment.

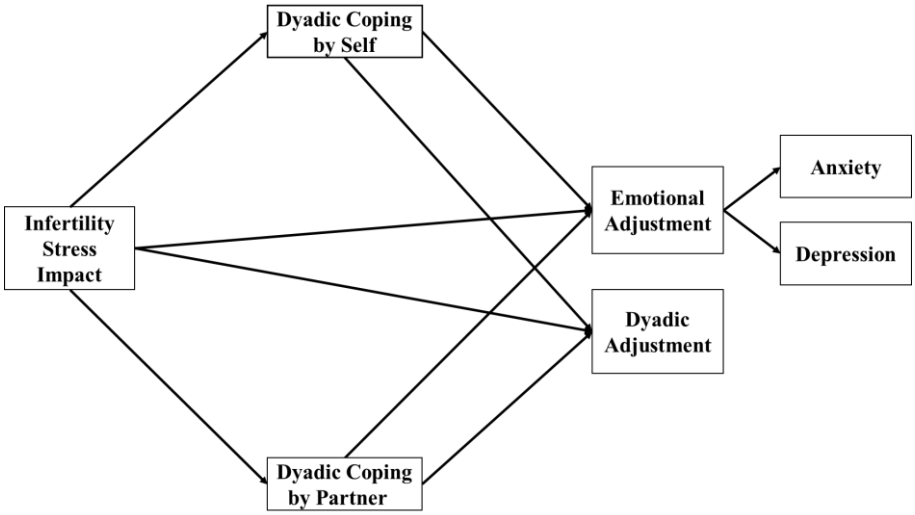

Figure 1. Conceptual Model of the Indirect Effect of Infertility Stress Impact on Emotional and Dyadic Adjustment

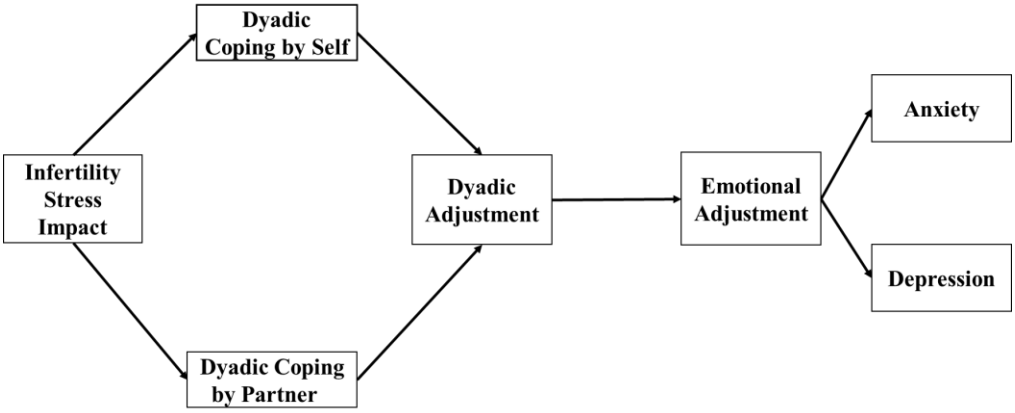

Figure 2. Conceptual Model of the Sequential Indirect Effect of Infertility Stress Impact on Emotional Adjustment through Dyadic Coping and Dyadic Adjustment

III – Methods

Participants

Ninety-two infertile couples attending the Human Reproduction Service in Centro Hospitalar e Universitário de Coimbra (CHUC accepted to participate in this study. Only infertile couples who met the following inclusion criteria were recruited: (1) to be 18 years or older, (2) to be fluent on Portuguese language in order to be able to understand the questionnaires and (3) do not have children. This service offers assisted reproductive technology (ART) treatments to infertile couples according to the Portuguese National Health system policies. In Portugal, the National Health system finance a maximum of 3 ART cycles, the treatments are limited to heterosexual couples, in a relationship for at least 2 years, and women should not be over 40 years old. Because the use of bootstrap procedures does not allow missing data, all the couples that had missing data were excluded. Our final sample was constituted by sixty-seven infertile couples (134 participants).

Couples were on average in a relationship for approximately 6 years (M = 5.98; SD = 3.10). Only 11 couples had already done previous fertility treatments. Infertility factors reported by couples were female, 34.33%; male, 19.40%; mixed, 5.97% and unknown, 31.34%. Sample socio-demographic characteristics are presented in Table 1.

Procedure

The present study was approved by Research Ethics Committees of Faculty of Psychology and Educational Sciences of University of Coimbra and of Centro Hospitalar e Universitário de Coimbra (CHUC). Participants were directly invited to participate in the study after their first appointment with the doctor in the Human Reproduction service or via telephone two weeks before the start of a new ART cycle, where it was asked their consent to send the questionnaires by mail. All participants were informed about the voluntary nature of their participation, that the declination or participation had no effect on their treatment and that all data would be kept confidential. If they agreed to participate, they were asked to fill an informed consent form and to complete a battery of self-report measures. Couples were asked to complete all the measures individually, without consulting their partner, and to return them in their next visit to the Human Reproduction service.

Table 1. *Socio-demographic Characteristics of the Sample*

	Male n=67	**Female** n=67
Age (years)	M (SD); observed range 34.67 (4.13); 26-48	M (SD); observed range 32.73 (3.69); 24-39
	n (%)	n (%)
Education levels		
Basic education	15 (22.4)	3 (4.5)
Secondary education	26 (38.8)	26 (38.8)
Higher education	24 (35.8)	36 (53.7)
Missing information	2 (3)	2 (3)
Professional status		
Employed	62 (92.5)	61 (91)
Unemployed	4 (6)	4 (6)
Domestic/retired	1 (1.5)	1 (1.5)
Missing information	0 (0)	1 (1.5)
Socio-economic status		
Low	5 (7.5)	
Medium	59 (88.1)	
High	0 (0)	
Missing information	3 (4.5)	
Area of residence		
Urban	32 (47.8)	
Semi-Urban	12 (17.9)	
Rural	17 (25.4)	
Missing information	6 (9)	

Measures

Sociodemographic and Clinical Information

A self-report questionnaire about sociodemographic and clinical data was used to gather relevant infertility history, namely infertility factor and the number of years trying to conceive, and couples' social background.

Infertility Stress Impact

Fertility Problem Inventory (FPI) is a 46-item questionnaire, which measures the perceived infertility-related stress (Newton, Sherrard, & Glavac, 1999). Answers are scored in a six-point Likert scale, ranging from *completely disagree* to *completely agree*. The questionnaire presents a global infertility stress score and five subscales: sexual concerns, social concerns, relationship concerns, need for parenthood and rejection of childfree lifestyle. As pointed by Moura-Ramos, Gameiro, Canavarro and Soares (2012), FPI showed to measure infertility stress through two conceptual domains: the impact

of infertility on couples' life and their representations about parenthood. As the present research aimed to examine the strain produced by infertility stress in emotional and dyadic adjustment, the Portuguese version of FPI (Moura-Ramos, Gameiro & Canavarro, 2008) was used to assess social concerns (e.g.: "I find it hard to spend time with friends who have young children", "Family members don't seem to treat us any differently"), sexual concerns (e.g.: "I find I've lost my enjoyment of sex because of the fertility problem", "If we miss a critical day to have sex, I can feel quite angry") and relationship concerns (e.g.: "My partner doesn't understand the way the fertility problem affects me", "I couldn't imagine us ever separating because of this"). We opted for congregating these three subscales in a composite subscale that we named as infertility stress impact. Cronbach's α of this composite subscale on the present sample was .89 and .85 for women and men, respectively.

Dyadic Coping

The Dyadic Coping Inventory (DCI, Vedes, Nussbeck, Bodenmann, Lind & Ferreira, 2013; Original version: Bodenmann, 2008) is a self-report inventory, composed by 37 items, that measures dyadic coping. Answers are given in the Likert-type format ranging from 1 (*very rarely*) to 5 (*very often*). It assesses several dimensions of this construct, namely supportive, delegated, negative, and joint (common) dyadic coping. All dyadic coping dimensions are assessed as perceived by the self (what I do when I am stressed and when my partner is stressed), in the partner (what my partner does when I am stressed and when he/she is stressed) and as a couple (what me and my partner do when we are stressed). Besides, the inventory assesses stress communication and the perceived quality of dyadic coping. This inventory has nine subscales, namely, stress communication, supportive dyadic coping, delegated dyadic coping and negative dyadic coping, each of them measured as perceived by the self and in the partner, and common/joint dyadic coping. However, as our focus was the differential mediating effect of dyadic coping processes perceived in the self and in the partner, only 24 items of the exchange dyadic coping dimensions were used, creating two composite subscales: *Dyadic Coping by Partner* and *Dyadic Coping by Self.* These subscales comprise, respectively, all four subscales about the perception of partner dyadic coping and the four subscales about self-perceptions of dyadic coping. Item examples of Partner Dyadic Coping subscale are: "My partner tells me openly how he/she feels and that he/she would appreciate my support", "My partner expresses that he/she is on my side", "When I am too busy, my partner helps me out" and "My partner blames me for not coping well enough with stress". Dyadic Coping by Self subscale comprises items like "I let my partner know that I appreciate his/her practical support, advice, or help", "I show empathy and understanding to my partner", "I take on things that my partner would normally do in order to help him/her out" and "When my partner

is stressed I tend to withdraw". In the current study, Cronbach's α for Dyadic Coping by Partner subscale was .90 and .83 and for Dyadic Coping by Self subscale was .81 and .84 for women and for men, respectively.

Dyadic Adjustment

The Portuguese version of Dyadic Adjustment Scale – Revised (RDAS, Pereira, Canavarro, & Davide, 2009; Original Version: Busby, Christensen, Crane, & Larson, 1995) was designated to measure dyadic adjustment. This is a 14 item-scale, with four different answering scales. From item 1 to 6 answers range from *always agree* (5) to *always disagree* (0), from item 7 to 10 the answering scale range from *all the time* (0) to *never* (5), in item 11 answers range from *every day (*4) to *never* (0) and from item 12 to 14 answers are score between 0 (*never*) to 5 (*more often*). RDAS comprises three susbscales: cohesion, consensus and satisfaction. However, in the present study we used only its global score for dyadic adjustment. The Cronbach's α of the total scale was .81, for women, and .82, for men.

Emotional Adjustment

The Hospital Anxiety and Depression Scale (HADS, Pais-Ribeiro, Silva, Ferreira, Martins, Meneses, & Baltar, 2006; Original Version: Snaith & Zigmond, 1994) is a screening instrument designed to assess anxiety and depression in patients struggling with physical illnesses. Patients are taught to answer according to how they feel during the last week. This scale is composed by 14 items and comprises two separate 7-item subscales: one measures anxiety ("I feel restless as if I had to be on the move") and the other measures depression ("I still enjoy the things I used to"). Answers are scored in a four-point Likert scale ranging from 0 to 3, therefore the total score of each subscale can range from 0 to 21. The scores for the entire scale range from 0 to 42, with higher scores indicating more emotional distress. In the present study, HADS was used as a measure of individual emotional adjustment to infertility; however we opted to use both subscales to examine if there are different mediator effects on anxiety and on depression, separately. In the current study, Cronbach's α for Depression subscale was .73 for women and .73 for men, and for Anxiety subscale was .79 for women and .83 for men.

Data Analysis

Data analysis was carried in the Statistical Package for Social Sciences (IBM SPSS, version 20.0, IBM Corporation, Armonk, NY, USA) and path analysis, to examine direct and indirect effects, was conducted using with IBM AMOS, version 20.0 (IBM Corporation, Meadville, PA, USA), through the maximum-likelihood estimation method. In preliminary analysis, bivariate correlations for all study variables were calculated to verify direct relationships between variables. To examine gender differences in study variables paired

samples t-test were done. Univariate analysis of variance (ANOVA) was also performed, to analyse possible differences in study variables between subjects in different treatment phases.

In AMOS, five separated models were tested, separating the different outcome variables. The empirical power tables proposed by Fritz and MacKinnon (2007) for mediation models suggest that the sample size of this study is sufficient to find a mediated effect that includes medium-to-large a and b paths with a .80 power. To test indirect effects significance bootstrap procedures were used (with 2000 samples) (MacKinnon, Lockwood, & Williams, 2004). According to Hu and Bentler (1998) guidelines, for a model to have a very good fit, chi-square statistic should be non-significant, the comparative fit index (CFI) should be greater than .95, the standardized root-mean-square residual (SRMR) should be below .08 and the root-mean-square error of approximation (RMSEA) should be below .06. Additionally, specific indirect effects for each mediator were calculated with AMOS user-defined estimands (Amos Development Corporation, 2010).

IV – Results

Descriptive Statistics and Correlations

Descriptive statistics and bivariate correlations were calculated. Means, standard deviations, and Pearson's correlations among study variables are presented in Table 2. Correlations between sociodemographic and study variables were also calculated. According to Cohen's (1988) guidelines about correlation effect sizes, it is established that correlations close to .10 are small, around .30 are medium and above .50 are large. No significant correlations were found between study variables and age or marital relationship years, for both men and women. For men, there was a negative and medium correlation between the number of years trying to have a child and dyadic coping by self (r = -.246, p = .045) and dyadic coping by partner (r = -.298, p = .014). Women's dyadic coping by partner also showed a medium and negative correlation with the number of years trying to have a child (r = -.265, p = .030) and women's self dyadic coping showed a positive and medium correlation with education years (r = .416, p = .001). There was a medium and negative correlation between women's education years and anxiety (r = -.350, p = .004) and depression (r = -.297, p = .016).

Differences between men and women in the study variables were also analysed. Infertility stress impact was significantly higher in women when compared with men (t (66) = -2.92, p = .005). Men and women presented significant differences regarding dyadic coping by self (t (66) = -2.82, p = .006) and dyadic coping by partner (t (66) = 2.18, p = .033). These differences showed different patterns, women revealed significantly higher levels of dyadic by self, whereas men showed significantly higher levels of perceived partner dyadic coping. Concerning dyadic adjustment, no differences were found between men

and women (t (66) = 0.56, p = .576). Men's anxiety was significantly lower than women's (t (66) = -2.56, p = .012). No significant differences were found between men and women's depression levels (t (66) = -1.34, p = .185).

As data collection took place in two different moments of the fertility treatment, a one way anova was performed and no differences were found between the two groups in the study variables.

Table 2. *Descriptive Statistics and Correlations among Study Variables*

	Descriptives (M; SD)		Correlations					
	Women	**Men**	**Infertility Stress Impact**	**Dyadic Coping by Partner**	**Dyadic Coping by Self**	**Anxiety**	**Depression**	**Dyadic Adjustment**
1	20; 6.36	17.75; 5.28	.43***	-.45***	-.52***	.35**	.54***	-.51***
2	3.70; 0.60	3.88; 0.54	-.28*	.26*	.63***	-.22	-.33**	.59***
3	4.02; 0.46	3.80; 0.52	-.30*	.63***	.18	-.23	-.37**	.41**
4	7.64; 3.78	6.18; 3.74	.41**	-.22	-.29*	.25*	.63***	-.34**
5	3.76; 3.10	3.15; 2.75	.37**	-.235	-.37**	.61***	.19	-.36**
6	52.79; 7.02	53.24; 6.64	-.33**	.37**	.52***	-.13	-.39**	.55***

[1] Infertility Stress Impact; [2] Dyadic Coping by Partner; [3] Dyadic Coping by Self; [4] Anxiety; [5] Depression; [6] Dyadic Adjustment
Correlations below the diagonal are for men and above are for women. In the diagonal are presented the correlations between partners. *p < .05; ** p < .01; *** p < .001

Path analysis of the indirect effects of infertility stress impact on dyadic and emotional adjustment

The indirect effect of infertility stress impact on three dependent variables - dyadic adjustment, depression and anxiety - was examined through two dyadic coping dimensions: dyadic coping by partner and dyadic coping by self (model 1). Moreover, a sequential model was tested, where the two dyadic coping dimensions and dyadic adjustment were used as mediators of the effect of infertility stress impact on depression and anxiety (model 2).

In all the models, interdependence of partners' scores was controlled by introducing error covariance between partners' variables. In addition, error covariance between men's partner dyadic coping and women's self dyadic coping and women's partner dyadic coping and men's self dyadic coping were also introduced as these variables' content was highly correlated.

Model 1. Indirect effect of infertility stress impact through dyadic coping by partner and dyadic coping by self

Model 1A (Figure 3) showed a very good fit to the data (χ^2 (10) = 5.54, p = .852; CFI = 1.000, RMSEA = 0.00 (CI: 0.00, 0.07), SRMR = 0.04). The bootstrap confidence intervals of the indirect effects revealed significant indirect effects of infertility stress impact on dyadic adjustment, for both men and women. Women's impact of infertility stress was negatively associated with their perception of dyadic coping by partner, which was then positively associated with women's dyadic adjustment (Estimate: -.236; 90% BCCI -.422, -.126). Regarding men, infertility stress impact was negatively associated with their perception of their own dyadic coping, which was in turn positively associated with their dyadic adjustment (Estimate: .181; 90% BCCI -.356, -.061). This model explained 38% and 30% of dyadic adjustment variance, for women and men, respectively.

The model 1B examined the indirect effect of infertility stress impact on depression through the two tested dyadic coping dimensions. It also showed a very good fit to the data (χ^2 (10) = 4.63, p = .915, CFI = 1.000, RMSEA = 0.00 (CI: 0.00, 0.05), SRMR = 0.03). For women, no significant indirect effects of infertility stress impact on depression were found (Table 3). Nevertheless, for men, a significant indirect effect of infertility stress impact on depression was found through dyadic coping by self (Estimate: .053; 90% BCCI .008, .126). Direct effects of infertility stress impact on depression were significant for women (p = .001), but not for men (p = .052).

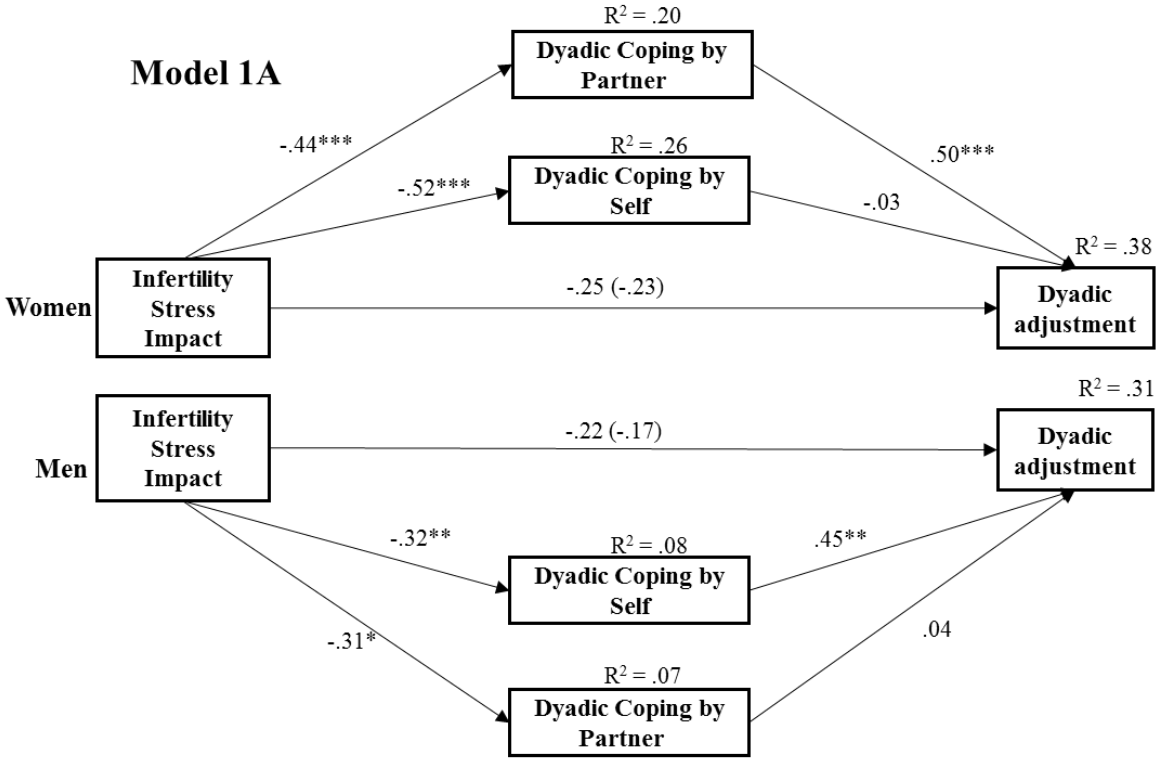

Figure 3. Statistical Diagram of the Parallel Multiple Mediator Model for the Effects of Infertility Stress Impact on Dyadic Adjustment, through Dyadic Coping By Partner and By Self (Model 1A). Path Values represent Standardized Regression Coefficients. Error Covariances between Partner's Scores were included in the Model but are not displayed in the Figure for Simplicity. Note: *$p < .05$; ** $p < .01$; *** $p < .001$

Table 3. *Indirect Effects of Model 1B*

Model fit	χ^2	***df***	***p***	**CFI**	**RMSEA**	**SRMR**
	4.63	10	.915	1.000	0.00 [0.00-0.05]	0.03
Indirect effects						
Women	**Point estimate**		**BCCI Lower**		**BCCI Upper**	***p* value**
DCself	.024		-.033		.113	.441
DCpartner	.009		-.062		.071	.926
Men						
DCself	.053		.008		.126	.040
DCpartner	-.004		-.054		.039	.743

The indirect effect of infertility stress impact on anxiety through dyadic coping by partner and dyadic coping by self was tested by model 1C (Table 4). This model revealed a very good fit to the data (χ^2 (10) = 4.94, p = .895; CFI = 1.000; RMSEA = 0.00 (CI: 0.00, 0.06), SRMR = 0.04). Direct effects between infertility stress impact and anxiety were significant (women: p = .029; 90% BCCI .092, .582; men: p = .011; 90% BCCI .114, .526). However, contrarily to the hypothesized, the bootstrap confidence intervals showed that there were no significant indirect effects of infertility stress impact on anxiety for both women (p = .821; 90% BCCI -.136, .147) and men (p = .068; 90% BCCI .007, .185).

Table 4. *Indirect Effects of Model 1C*

Model fit	χ^2	***df***	***p***	**CFI**	**RMSEA**	**SRMR**
	4.94	10	.895	1.000	0.00 [0.00-0.06]	0.04
Indirect effects						
Women	**Point estimate**		**BCCI Lower**		**BCCI Upper**	***p* value**
DCself	-.001		-.104		.087	.970
DCpartner	.016		-.052		.107	.709
Men						
DCself	.043		-.003		.120	.128
DCpartner	.010		-.038		.084	.647

Model 2. The indirect effect of infertility stress impact through dyadic coping by partner and dyadic coping by self and dyadic adjustment

The indirect effect of infertility stress impact on emotional adjustment was examined through both dyadic coping dimensions and dyadic adjustment (model 2). Emotional adjustment included two different variables: depression (model 2A) and anxiety (model 2B). Both models showed a very god fit to the data, as presented in Table 5 and 6, respectively.

The indirect effect of infertility stress impact on depression was only significant for men (Table 5). Men's infertility stress impact was negatively associated with dyadic coping by self, which in turn was positively associated with dyadic adjustment and then was negatively associated to men's depression levels (Estimate: .133; 90% BCCI .041, .265). This model explained 25% of men's depression levels variance. Regarding to anxiety, there were no significant indirect effects of infertility stress impact, for both women and men (Table 6).

Table 5. *Indirect Effects of Model 2A*

Model fit	χ^2	***df***	***p***	**CFI**	**RMSEA**	**SRMR**
	14.93	18	.667	1.000	0.00 [0.00-0.09]	0.04
Indirect effects						
	Point estimate		**BCCI Lower**		**BCCI Upper**	***p* value**
Women	.072		-.058		.175	.384
Men	.133		.041		.265	.017

Table 6. *Indirect Effects of Model 2B*

Model fit	χ^2	***df***	***p***	**CFI**	**RMSEA**	**SRMR**
	10.76	18	.904	1.000	0.00 [0.00-0.05]	0.05
Indirect effects						
	Point estimate		**BCCI Lower**		**BCCI Upper**	***p* value**
Women	.076		-.099		.248	.454
Men	.056		-.041		.178	.337

V – Discussion

The current study intended to examine the mediator role of two dyadic coping dimensions (dyadic coping by partner and dyadic coping by self) in the relation between infertility stress impact and emotional and dyadic adjustment of infertile couples.

The results confirmed the mediator effect of dyadic coping by self and by partner between infertility stress impact and dyadic adjustment. Nevertheless, a different mediation pattern was found among women and their partners. For men, higher impact of infertility stress was associated with lower dyadic coping by self, which was associated to lower dyadic adjustment. Whereas, for infertile women, a higher impact of infertility stress was associated with a lower dyadic coping by partner, which was in turn associated with a lower dyadic adjustment. These results suggested that, for men, the higher they perceive themselves as able to help their partners to cope with stress and to communicate their own stress, the higher their dyadic adjustment. So, infertile men's perception about their relationship quality seems to be related to their perception of self-efficacy helping their partner to cope and about being able to communicate and ask for support when stressed.

These gender differences might be explained by the differences on men and women's approaches to infertility. Infertile women showed a greater tendency to look for social support (Berghuis & Stanton, 2002; Peterson et al., 2006a), which may place a greater strain on men to help their partners to cope with stress. Men reported that for them the most distressing effect of infertility was on how their wives were affected by it and its subsequent impact on their marital relationship. Besides,

infertile men reported experience role failure through not being the protector and provider of the family (Greil, Leitko, & Porter, 1988). Men's social expected role as protector of the family might trigger his dyadic coping strategies in order to help his partner to cope better with her infertility stress and, in some way, protecting her from the pain. Furthermore, infertile women showed considerably greater psychological distress than men (Newton, Sherrard, & Glavac, 1999). Despite being also a stressful experience for men, infertility seemed not to be as a devastating experience as it is for women. Men see infertility as something unexpected that happened and that should be solved or accepted; whereas women see it as an intolerable situation that affects their self-concept and treatment is considered their only chance (Greil et al., 1988). Therefore, men's may feel overwhelmed by women's stronger emotional responses to infertility and may feel the urge to help his partner coping with stress to maintain the relationship quality.

Pasch, Dunkel-Schetter and Christensen (2002) showed that men's perceived effect of infertility on their marriage was only associated to their own self-esteem. Whereas, for women, despite infertility had a stronger impact on their self-esteem, it was not related to how infertility affects their marriage. Hence, the mediator effect of dyadic coping by self on men's dyadic adjustment can additionally be explained by the importance of men's self-esteem to their marital satisfaction, because helping his wife to cope may enhance men's self-esteem.

Another key point of our results is the importance of men's stress communication. Women often reported to feel frustrated because their partners not seem really affected by infertility and do not communicate about it (Greil et al., 1988). Infertile women are more prone to talk about infertility problems (Abbey, Andrews, & Halman, 1991). Difficult marital communication about infertility problems was a predictor of higher levels of infertility stress (Schmidt et al., 2005a). Men's approach of infertility, namely see having children as important, are involved in trying to have a baby, and want to talk with their wives about trying to have a baby, was related to couples' communication about infertility and with the perceived effect of infertility on their marriage, for women (Pasch et al., 2002). Thus, men's dyadic coping processes, that include their stress communication, may be indicative to their wives of their involvement in the treatment process, which had a beneficial effect on women's dyadic adjustment.

On the opposite side, women strategies to help men cope and their stress communication did not have a significant mediator effect on both men and women's dyadic adjustment. This may be due to the natural tendency of infertile women to communicate their feelings and ask for support, which is so usual that do not make such a difference in couples' dyadic adjustment in comparison to men's stress communication.

These results are in line with previous dyadic coping studies that found that, for women, partner dyadic coping was a predictor of marital

quality and, for men, their own dyadic coping predicted marital quality (Bodenmann et al., 2006; Herzberg, 2013; Papp & Witt, 2010).

Regarding emotional adjustment, contrary to what was expected, for women, the examined dyadic coping dimensions did not show a mediator effect neither on depression nor on anxiety. Nonetheless, for men, dyadic coping by self had a mediator effect between infertility stress impact and depression. The results suggested that men's lower infertility stress impact levels were associated with higher dyadic coping by self, which then was associated with lower depression levels. As pointed by Greil (1997), men experience infertility through their marital relationship. Though, men's ability to help his partner to cope with infertility stress and to communicate his own stress and ask for support, might be a central aspect of their emotional adjustment, reducing the impact of infertility stress. Hjelmstedt et al. (1999) qualitative results also showed that their partner's reactions to infertility was a men's specific concern. Furthermore, the non-significant mediator effect of dyadic coping on women's emotional adjustment may be the result of women's multiple burdens, such as higher social stigma perception (Slade, O'Neill, Simpson, & Lashen, 2007) and higher involvement in treatment procedures (e.g. monitoring their menstrual cycle and ovulation) (Dunkel-Schetter, & Stanton, 1991), for example. These other variables may have such a strong link with women's emotional reactions that may blur the effect of dyadic coping by self and by partner as mediators of the relation between women's infertility stress impact and women's depression and anxiety levels. The lack of indirect effects between women´s infertility stress impact and emotional adjustment through dyadic coping may also be due to the specificity of the adjustment measures. Indeed, the instrument that was used to assess emotional adjustment is highly focused on physical symptoms, and therefore may fail to capture the emotional fluctuations which are more cognitive related.

It was also hypothesized that lower infertility stress impact would be associated with emotional adjustment through affecting, sequentially, dyadic coping by self and by partner, and dyadic adjustment. Nevertheless, as in the previous mediation models, indirect effects were only found for the sequential mediator role of dyadic coping and dyadic adjustment on men's depression levels. Once more, for men, depression seemed to be associated with dyadic processes, more than for women. This model adds to the previous ones the explanation of the association between dyadic coping and depression through dyadic adjustment. These results suggest that men's emotional adjustment to infertility is related to the way they perceive their dyadic adjustment.

Finally, it is important to note that dyadic coping processes and infertility stress impact are mutually related, so it is expected that higher infertility stress levels trigger more dyadic coping resources, but at the same time, as more adequate dyadic coping strategies are used, less

impact of infertility stress is expected. Therefore, it is not possible neither reasonable to assume a causal path between infertility stress and dyadic coping, as they exert multiple influences on each other. The mechanisms that explain emotional and dyadic adjustment to infertility are not completely understood. Our data contributes to clarify these processes by showing that men's elevated perceptions of their dyadic coping strategies and of their stress communication abilities were associated with a reduced impact of infertility stress on both their dyadic adjustment and depression levels. Moreover, women's perception of higher men's dyadic coping was associated with a lower impact of infertility stress on their dyadic adjustment. To summarize, our results emphasize men's dyadic coping strategies as a key factor on the dyadic adjustment of infertile couples.

Strengths and Limitations

One major contribution of this study was to be the first to examine dyadic coping strategies of infertile individuals, applying a recent coping theoretical framework. Despite several previous studies had considered the role of individual coping strategies in infertile couples' adjustment, this study highlights coping as a couple process, stressing the importance of looking the couple as a unit. Besides, we tried to analyse a possible mechanism that explains couples' adjustment through dyadic coping processes.

The identification of different pathways for men and women, in respect to the association between dyadic coping and dyadic adjustment, reinforces the different nature of coping processes in men and women, even at a dyadic level. Moreover, it emphasizes the importance of men's dyadic coping efforts, both to their own and their partner dyadic adjustment.

Nevertheless, these results must be interpreted with caution due to the limitations of the study. First, the sample was small, and only comprised infertile couples who looked for medical treatment, which may not represent the entire population of infertile couples. It is expected that more well-adjusted couples seek for infertility treatment and though it is likely that well-functioning couples are more represented.

As the participation in this study was volunteer, a self selection bias may exist, as in general better adjusted participants tend to accept to participate. In addition, as the statistical procedures that were used require the absence of missing data, we excluded all couples with just one member participating in the study, which may also have induced a bias in data.

Another important limitation refers to the cross-sectional study design, which does not allow the analysis of causal effects between study variables. In the future, longitudinal studies that evaluate dyadic coping strategies along the treatment process can be of extreme value to identify possible differential effects of dyadic coping strategies on

emotional and dyadic adjustment along time. Future studies should also focus on differentiate the several dyadic coping dimensions and verifying which are more related to a better dyadic and emotional adjustment. Also, the use of other measures of emotional adjustment, that capture the emotional disturbance not only at a symptomatic level, may be useful.

Finally, the study was conducted in a Portuguese sample. As pointed by Greil, Slauson-Blevins and McQuillan (2010) infertility have different approaches depending on the sociocultural context where couples live in. Therefore, the generalisation of the present findings to other cultures should take these differences into account.

Implications for Research and Clinical Practice

Our results underline the importance of future research to address the role of dyadic coping processes in both emotional and marital adjustment of infertile couples. Moreover, it is important to explore more specific dimensions of dyadic coping, in order to understand which specific strategies are more adaptive to infertile couples' adjustment. Specifically, we suggest that common dyadic coping strategies should be examined as mediators of infertile couples' adjustment, as they were out of the scope of the present study.

Additionally, our data suggest that men's emotional adjustment, namely their depression levels, rely partially on their dyadic coping and subsequently on their dyadic adjustment. Hence, we extend previous research that claimed that men's adjustment depends on how their partners manage infertility related stress, confirming that men's adjustment seems to be more related to marital issues.

A possible explanatory mechanism of infertile couples' dyadic adjustment was highlighted by our results. Men and women's marital adjustment to infertility seems to be mainly influenced by men's dyadic coping efforts. These results have clinical practice implications. Previous studies had already suggested that improving couple's communication and discussing the impact of infertility on marital relationship were expressed as major goals of infertile couples who desired psychological support (Read et al., 2014). Therefore, our results suggest the importance of infertility to be managed as a couple issue and that psychological interventions involve both partners, because their dyadic processes influence their adjustment. Moreover, men's dyadic coping strategies should be a particular target of infertile couples' interventions.

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