



The specific psychosocial modulator factors of emotional adjustment in infertile individuals compared to fertile people

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Abstract

Certain psychological and social factors modulate emotional adjustment in infertility. The aims of this study were: analyse whether there are sex and group differences (infertile vs. fertile) in emotional adjustment, and personality, dispositional optimism, coping strategies, personal and interpersonal resources; observe the modulating role of these psychosocial variables in the emotional adjustment of infertile individuals compared to fertile ones; and determine if the modulator variables associated with emotional adjustment are specific to infertile people. Method: A cross-sectional study design was used with a sample of 139 heterosexual Spanish participants (84 infertile, 55 fertile). For the data analysis we performed correlations, multiple regression analysis, MANOVAS and ANOVAS. Results: The multivariate and univariate analyses showed that the infertile group exhibited greater emotional maladjustment, more personal resources, lesser degree of confrontive coping, social support seeking, positive reappraisal, and lower marital satisfaction than the fertile group. In addition, women (infertile and fertile) sought more social support seeking and the infertile ones made more use of self-controlling strategies. Multiple regression analyses showed that for all subjects the emotional adjustment was modulated by dispositional optimism and escape/avoidance. For infertile participants, the remaining significant modulating factors were personal resources and marital satisfaction, whereas, for the fertile group, they were openness and interpersonal resources. Conclusion: Infertile women and men showed no differences in emotional maladjustment, but levels were higher than in the fertile group. We found differences between infertile and fertile subjects in terms of modulating variables of emotional adjustment. For infertile participants, the development of personal resources and increased marital satisfaction are particularly important.

Keywords Infertility · Emotional adjustment · Modulator factors · Coping · Personal resources · Marital satisfaction

Introduction

The infertility is a stressful live event which cause a high impact on the different areas of life: personal, work, family, social, physical, as well as sexual and relationships with a

partner (Greil et al., 2010; Vioreanu, 2021). Infertile couples are subject to greater stress and have a greater risk of developing psychological disorders compared with healthy couples (Simionescu et al., 2021). The most common emotions were ‘sadness’ at diagnosis and ‘anxiety’ during treatment (Boivin et al., 2022). The meta-analysis undertaken by Fallahzadeh et al. (2019) on 11 selected articles between 2005 and 2017 concludes that the infertile subjects undergo more anxiety and depression than the fertile ones. However, no consensus of results was found in studies about fertility and psychopathological disorders (Greil et al., 2010). Huppelchoten et al. (2013) showed that both members of the infertile couple are vulnerable to different sources of psychological stress and develop distinct resources to cope with them. Patients may either have or lack the resources that allow them to adapt to or better affront chronic illnesses like infertility. Psychosocial factors define one’s capacity to adjust to infertility and they were classified by Mahajan et al. (2009)

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in intrapersonal and interpersonal factors which helps people cope with infertility. The research about infertility in the last decades have redirected attention to the study of psychosocial variables associated to the adjustment of this illness (Peterson et al., 2006; Shen et al., 2004; Thompson et al., 2012). Reviewing the literature, risk and protective psychosocial factors that had been found associated to emotional adjustment in infertility are the characteristics of personality, coping strategies, followed by social support and marital satisfaction (Darolia & Ghosh, 2022; Gourounti et al., 2010; Maroufizadeh et al., 2019; Rockliff et al., 2014). The most common personality subscale explored was neuroticism which is positively associated with anxiety and depression in different moments of the IVF treatment. To the contrary, trait optimism was the only personality factor found to be associated with lower levels of distress, specifically with lower depression following a negative pregnancy test (Rockliff et al., 2014). The most evaluated coping strategy was avoidance and escape (Cunha et al., 2016; Galhardo et al., 2019). The couples who use disproportionately maladaptive coping strategies, such as escape/avoidance, are predisposed to anxiety and depression symptoms (Faramarzi et al., 2013). Others negative associations coping strategies with distress were problem focused/solving and perceived social support (Mohammadi et al., 2018). Accordingly, infertile women were more likely to recur to seeking social support and escape/avoidance when compared with men, whereas men used greater amounts of self-control and problem-solving (Zurlo et al., 2020).

There is evidence that infertility has a negative effect on the psychological well-being and sexual relationships of couples (Luk & Loke, 2019). The review by Kiani et al. (2020) revealed that most studies show that marital quality of infertile couples decreases, and this can be related to the couple's anxiety symptoms. However, other studies that exploring marital satisfaction reported no significant relationships between this psychosocial factor and emotional adjustment (Rockliff et al., 2014).

There is a growing interest in possible gender differences in associations between psychosocial variables and emotional adjustment in infertility (Ying et al., 2015). There are discrepancies in the results when analysing the influence of gender on the impact of infertility. Although, in general, it has been shown that women present more emotional maladjustment after an infertility diagnosis, these differences may be mitigated and may even disappear depending on the areas considered. There is greater consensus that women score higher in the area of emotional maladjustment (Chamorro et al., 2021; Ramírez-Uclés et al., 2015), but this difference has not been found in other areas like complying with treatment (Lopes et al., 2014). Women and men have also been found to differentiate in their willingness to achieve parenthood

(Chachamovich et al., 2009). However, the differences that may exist compared to fertile people are less studied. Therefore, in the present study we explore a) whether there are sex and group differences (infertile vs fertile) in emotional adjustment and personality, dispositional optimism, coping strategies, personal and interpersonal resources, and marital satisfaction; b) as a main objective, the modulator role of the set of psychosocial variables associated with emotional maladjustment grouped into internal factors (personality, dispositional optimism, coping strategies, and personal resources) and external factors (marital satisfaction and interpersonal resources), and c) whether these modulator factors are exclusive to infertile people. For this reason, a comparison group of fertile couples has been selected. The information on the specific modulator factors of emotional adjustment will provide the opportunity to offer a preventive and specific guide to psychological support, which contributes to promoting the well-being of infertile people.

Method

Participants and procedure

This cross-sectional study was carried out in a private gynecological and reproductive medical center in Spain. Participants were selected consecutively as they arrived at the clinic and met the inclusion criteria. The total sample used was 174 heterosexual participants. The infertile group consisted of 99 individuals. The comparison fertile group included 75 routine-care gynecological patients who were not undergoing any form of fertility treatment and were not pregnant at the time the survey and had no history of assisted reproduction treatment. The final sample was made up of 139 participants, because 35 of them dropped out (13 refused to participate, 7 did not fill out the questionnaires, 11 were not in a stable relationship and 4 suffered a serious chronic illness). No significant statistical differences in sociodemographic and medical variables were found between them and the rest of the sample. Inclusion criteria were: a) all participants were legally married or living with a partner in a heterosexual relationship; b) over 18 years older; c) they were able to understand the questionnaires and; d) they had no major medical or psychopathological disorders, e) the whole sample lived in a capital city or its surrounding area.

The psychological assessment was performed in each group by the same researchers on days with appointments for assisted reproduction patients and selected only the first two cases. On the same day, other two first cases attending routine gynecological examination were selected. After the gynecologic visit, the psychologist explained the aims of the study (including issues of confidentiality, the right to refuse participation at any

time without any loss of optimal treatment) and got informed consent from all individual participants. The participants were interviewed individually and answered the questionnaires in the presence of one of the researchers, who made sure that they understood the instructions, the items, the questions and, if necessary, answered any questions or doubts raised by the subjects. The study was approved by the Research Ethics Committee of the National Distance Education University (UNED).

Measures and instruments

A constellation of psychological instruments created or adapted and validated in Spain were selected:

Assessment of Emotional Adjustment to Infertility

The Emotional Maladjustment and Adaptive Resources in Infertility Questionnaire (DERA) (Moreno-Rosset et al., 2008) was applied as it is an infertility specific questionnaire created and validated in Spain, with different formats for men and women. It has 48 items covering four factors: emotional maladjustment, personal resources, interpersonal resources, and adaptive resources. The Cronbach alpha coefficient of the global scale is 0.85 and for each of the subscales is 0.90, 0.57, 0.78 and 0.74, respectively. In the present study the ordinal Alpha coefficient was 0.77. Other characteristics and psychometric data can be consulted in Jenaro et al. (2008) and Moreno-Rosset et al. (2009) respectively.

Assessment of internal factors

The short version of The Big-Five Questionnaire (BFQ) (Caprara et al., 1995; Spanish adaptation by Bermúdez et al., 1990a), was used and consisted of 30 items, 6 for each of the dimensions: energy, conscientiousness, emotional stability, agreeableness, and openness. The internal consistency factors of the Spanish short version are 0.75, 0.79, 0.87, 0.73 and 0.76, respectively. For the sample of the present study the ordinal Alpha coefficient was 0.74.

The Life Orientation Test-Revised (LOT-R) (Scheier et al., 1994; Spanish adaptation by Otero-López et al., 1998) that measures the generalized disposition for the expectation of positive results was administered. The LOT-R includes 10 items, three statements about optimism, three on pessimism and four distractor items. The internal consistency using Cronbach's alpha coefficient was 0.73, and the average discrimination index was 0.48 (Cano-García et al., 2015). In the present study the ordinal Alpha coefficient was 0.42.

The Ways of Coping Revised (WOC-R) (Lazarus & Folkman, 1984; the short Spanish version of Bermúdez et al., 1990b) was applied to assess coping strategies. It is made up of 22 items to evaluate confrontation, distancing,

self-control, seeking social support, positive reappraisal, planful problem solving and escape/ avoidance. The internal consistency coefficients range between 0.61 and 0.79. In the present study the ordinal Alpha coefficient was 0.63.

The Personal Resources subscale of DERA was used and includes 11 items to evaluate individual resources to cope with stressful situations related to maintaining a favorable state of health.

Assessment of external factors

Psychological Wellbeing in the Couple Scale (EBP) (Sánchez-Cánovas, 2007). Created and validated in Spain with different formats for men and women, assess marital satisfaction. It consists of 15 items which describe personal attitude in relation to sexuality and other relations in the couple. The internal consistency coefficient is 0.88. For the sample of the present study the ordinal Alpha coefficient was 0.51.

The Interpersonal Resources subscale of DERA was used. It consists of 11 items related to the perception of support from significant beings (friends and family) and, in addition, loving and sexual relationships with the couple as another element that can be understood as evidence of support between couples.

Statistical analysis

We carried out multivariate inferential analysis (MANOVAS) and univariate analysis (ANOVAS). In all cases, the partial “eta square index (η^2_p)” was used to calculate the effects size and to evaluate the magnitudes of the obtained differences (Cohen, 1998). We also take into consideration Pearson correlation analysis with the aim to determine the variables that have more significant correlations with the emotional adjustment variable in the infertile group. Finally, we performed two regression analysis to determine the estimators of emotional maladjustment in both infertile and fertile people. The software used was IBM SPSS Statistics Version 25.

Results

Sample characteristics

The infertile group consisted of 84 participants, 46 women and 38 men. The average age of women was 33.36 (SD = 4.06), and that of men was 33.81 (SD = 3.28). The educational level was 33.3% with primary studies, 27.3% with secondary studies and 39.4% had received higher education. Female infertility was 25%, male infertility 28.57%, mixed was 7.14%, idiopathic was 7.14%, and 32.14% had

not been diagnosed. Primary infertility was 94%, secondary 6%, and the average duration of the infertility period was 34.56 months. Some 76.2% of participants that had been diagnosed had undergone one assisted reproduction treatment. The fertile group was 55 participants taken from the general population, 30 women and 25 men. The women's average age was 31.63 (SD=7.45) and the men's was 35.44 (SD=8.23). Sample homogeneity has been shown in the age, educational level, and gender variables through the T test for independent samples.

Multivariate and univariate analyses

Initially, an inferential study has been carried out to find out if there are sex differences (women vs men) and group (infertile vs fertile) in emotional adjustment, and the other variables selected. The MANOVA carried out on the DERA showed a significant effect on the Group variable (*Wilks' Lambda* = 0.827; $F(4, 132) = 6.907$; $p = 0.000$; $\eta^2_p = 0.173$). The independent ANOVAs also indicated a significant effect on the variables Emotional maladjustment ($F(1, 135) = 4.446$; $MC_e = 193.779$; $p = 0.037$; $\eta^2_p = 0.032$) and Personal resources ($F(1, 135) = 10.036$; $MC_e = 18.678$; $p = 0.002$; $\eta^2_p = 0.069$). People with infertility reported higher levels in both dimensions.

Considering the variables Group and Sex as independent variables and the scales of the short version of BFQ as the dependent variables, the MANOVA results draws to confirm that no significant effect in either main effects or in interaction. In LOT-R, a bifactorial ANOVA was carried out. Significant effects were not found in the case of dispositional optimism.

The MANOVA carried out on the different scales of the WOC-R questionnaire showed that there is a significant effect for the group variable (*Wilks' Lambda* = 0.918; $F(7, 129) = 2.640$; $p = 0.035$; $\eta^2_p = 0.211$), for the sex variable (*Wilks' Lambda* = 0.934; $F(7, 129) = 2.309$; $p = 0.041$; $\eta^2_p = 0.114$) and for the interaction Group x Sex (*Wilks' Lambda* = 0.947; $F(7, 129) = 2.025$; $p = 0.047$; $\eta^2_p = 0.121$). The independent ANOVAs carried out on the subscales indicate significant effects of the Group variable, with infertile participants showing lesser degrees of Confrontive coping ($F(1, 135) = 6.342$; $MC_e = 3.065$; $p = 0.013$; $\eta^2_p = 0.045$), Seeking social support ($F(1, 135) = 3.834$; $MC_e = 4.482$; $p = 0.035$; $\eta^2_p = 0.048$) and Positive reappraisal ($F(1, 135) = 3.768$; $MC_e = 2.670$; $p = 0.049$; $\eta^2_p = 0.043$) than the fertile group. This analysis revealed a significant effect of Sex on the Seeking social support variable ($F(1, 135) = 4.240$; $MC_e = 4.482$; $p = 0.041$; $\eta^2_p = 0.030$), hence all the women show higher levels of support seeking than the men. An interaction of Group x Sex on the Self-control variable ($F(1, 135) = 4.896$; $MC_e = 5.825$; $p = 0.029$; $\eta^2_p = 0.035$), was also encountered. The analysis of the

interaction through the T test for independent samples confirm that women in the infertility group show higher levels of Self-control than men ($T(82) = -1.90$; $p = 0.042$; $\eta^2_p = 0.040$).

Finally, to measure the effect of wellbeing in the couple (EBP), a bifactorial ANOVA was carried out. The results indicated that infertility does significantly affect psychological wellbeing in the couple, demonstrating that infertile people having lower levels $F(1, 134) = 6.639$; $MC_e = 98.813$; $p = 0.011$; $\eta^2_p = 0.047$ than the fertile participants (Table 1).

Correlation and regression analyses

The correlations analyses indicated that the Emotional maladjustment in infertile individuals correlates significantly in a positive way with Escape/avoidance ($r = 0.357$; $p = 0.001$), and in a negative way with Emotional stability ($r = -0.236$; $p = 0.030$), Openness ($r = -0.219$; $p = 0.046$), Confrontive coping ($r = -0.268$; $p = 0.014$), Planful problem solving ($r = -0.346$; $p = 0.001$), Personal resources ($r = -0.303$; $p = 0.005$), Interpersonal resources ($r = -0.350$; $p = 0.001$), Adaptive resources ($r = -0.400$; $p = 0.000$), Psychological wellbeing in the couple ($r = -0.473$; $p = 0.000$) and Dispositional optimism ($r = -0.604$; $p = 0.000$).

In order to determine the predictive value on emotional maladjustment, after the correlations were obtained, multiple linear regression analyses (stepwise) were carried out for each one of the sample groups, considering the predictive variables which make up the internal and external factors.

With respect to the internal variables, the ANOVAs obtained showed the global statistical significance of the emotional maladjustment variable and the internal estimators combined in the infertile group ($F(3, 80) = 29.142$; $MC_e = 105.74$; $p = 0.000$), explaining these variables as 52.2% of the variance ($R^2 = 0.522$), and in the fertile group ($F(3, 51) = 18.637$; $MC_e = 79.153$; $p = 0.000$), in this case 52.3% of the variance ($R^2 = 0.523$).

As seen in Table 2, in the infertile group, the significant internal variables are: Dispositional optimism ($T = -7.299$; $p = 0.000$), Escape/avoidance ($T = 3.253$; $p = 0.002$) and Personal resources ($T = -2.179$; $p = 0.032$). In the fertile group, the variables Dispositional optimism ($T = -2.500$; $p = 0.015$), Escape/avoidance ($T = 4.094$; $p = 0.000$) and Openness ($T = -3.729$; $p = 0.000$) are significant.

Regarding external variables, the ANOVAs obtained show a statistical significance in the relation of the variable emotional maladjustment for both the infertile group ($F(1, 81) = 18.505$; $MC_e = 176.822$; $p = 0.000$) and the fertile group ($F(1, 53) = 20.073$; $MC_e = 115.80$; $p = 0.000$). In the infertile group, the significant variable is Psychological wellbeing in the couple ($T = -4.302$; $p = 0.000$) explaining 18.6% of the variance ($R^2 = 0.186$), while in the fertile group, it is the Interpersonal resources variable ($T = -4.480$; $p = 0.000$) that explains 27.5% of the total variance ($R^2 = 0.275$) (Table 2).

Table 1 Descriptive statistics for all scales by genders and groups

Scales	Infertile group (n = 84)				Fertile group (n = 55)			
	Men		Women		Men		Women	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
DERA								
Emotional maladjustment	56.52	2.25	56.26	2.05	51.04	2.78	51.60	2.54
Personal resources	40.90	.70	40.60	.63	37.90	.86	38.83	.78
Interpersonal resources	48.16	1.12	48.83	1.02	48.16	1.21	48.83	1.02
Adaptive resources	87.71	1.31	89.44	1.19	85.95	1.61	86.62	1.47
BFQ-30								
Energy	20.25	.55	19.38	.50	20.58	.68	20.70	.62
Conscientiousness	21.34	.46	22.52	.41	22.40	.56	22.85	.51
Emotional stability	18.80	.64	18.58	.58	20.08	.79	18.57	.72
Agreeableness	22.09	.45	22.74	.41	22.03	.56	21.79	.51
Openness	22.07	.49	21.91	.44	22.60	.60	21.56	.55
LOT-R								
Dispositional optimism	21.21	.57	21.78	.52	21.52	.71	22.61	.64
WOC-R								
Confrontive coping	10.19	.28	10.44	.25	10.80	.35	11.37	.32
Distancing	8.08	.34	8.33	.31	9.12	.42	8.2	.39
Self-controlling	16.02	.39	16.99	.35	17.12	.48	16.22	.44
Seeking social support	10.85	.34	11.65	.31	11.52	.42	12.23	.38
Positive reappraisal	10.25	.26	10.70	.41	10.76	.32	11.30	.29
Escape/avoidance	6.23	.32	6.57	.29	6.24	.39	6.24	.36
Planful problem solving	7.28	.23	7.57	.20	7.84	.28	7.53	.25
EBP								
Wellbeing in the couple	55.80	1.61	58.60	1.48	61.60	1.98	61.75	1.81

Table 2 Correlation and regression analyses

	Infertile group (n = 84)			Fertile group (n = 55)		
	<i>Beta</i>	<i>T</i>	<i>p</i>	<i>Beta</i>	<i>T</i>	<i>p</i>
Internal factors						
Constant	117.459	9.429	.000**	84.691	6.296	.000**
Predictive variables						
Dispositional optimism	-2.283	-7.299	.000**	-1.019	-2.500	.015*
Escape/avoidance	1.748	3.252	.002**	3.194	4.094	.000**
Personal resources	-0.567	-2.179	.032*			
Openness				-1.395	-3.729	.000**
External factors						
Constant	92.524	10.897	.000**	111.284	8.270	.000**
Predictive variables						
Wellbeing in the couple	-.628	-4.302	.000**			
Interpersonal resources				-1.235	-4.480	.000**

* $p < .05$ ** $p < .01$

Discussion and conclusion

The current study found that infertile individuals differ to fertile couples and shows higher levels of emotional maladjustment and more personal resources than the fertile

group, although differences with respect to gender have not been found. Therefore we, like other authors (Casu & Gremigni, 2016), cannot conclude that the infertility problem affects women more than men. In line with other studies (Peterson et al., 2014; Yazdani et al., 2016) we

found less use of confrontive coping strategies, social support seeking and positive reappraisal in the infertile group. Infertility is a chronic illness which affects one's sense of coherence and one's life goals. This makes infertility difficult to reinterpret and endow it with a positive meaning. Furthermore, the infertile group presents lower levels of marital satisfaction, as highlighted by Kiani et al. (2020). In line with the results obtained by Gourounti et al. (2012), infertile women report a higher employment of the self-controlling strategy. These results contradicted those of Zurlo et al. (2020), who encountered that the group that used this strategy was the men's. This may reveal the capacity of men and women to perceive the maladjustment in their emotional state and the necessity to control them in order to concentrate their efforts on strategies which are more focused on the problem itself. Both infertile and fertile women utilize social support more frequently than men. Consequently, it seems that the seeking of social support is a strategy generically used by women and, not specific by infertile women (Babore et al., 2017; Mohammedi et al., 2018).

The results of the present study also indicate that internal factors explain the major variance on emotional maladjustment. The external factors, however, just reach an acceptable level. Therefore, vulnerability of the participants to emotional maladjustment is invariably linked to their personal way of understanding and responding to the infertility situation, although the interpersonal aspects may help to increase the perception of wellbeing. Mahajan et al. (2009) find results tending in that same direction. However, this does not seem to be found exclusively in infertile individuals, since fertile respondents report similar results in this study. Therefore, internal factors are not the only moderator role of emotional maladjustment in infertile people, and this result is a relevant contribution in our research.

Concerning internal variables, coping strategies prove themselves to be an important estimator of emotional maladjustment in the samples analyzed, because the escape strategy increases the vulnerability in the infertile participants (Galhardo et al., 2019). However, it is also associated with the emotional maladjustment in fertile individuals.

We found similar results in relation to optimism. There was an inverse relationship between the scores for dispositional optimism and emotional maladjustment in infertile people (Rockliff et al., 2014), and also in the fertile individuals at the present research.

The internal factors that appear independently associated with the infertile or the fertile group are personal resources and openness, respectively. We believe that this difference can be attributed to the personal resources subscale of the DERA that indicate an active attitude, such as keeping up the effort to achieve objectives and solving problems, characteristics which acquire special importance in patients

who must undergo assisted reproduction treatment to get that desired child. However, for fertile participants, accommodating oneself to vital circumstances seems to depend more on flexibility and aptitude for analysis from a creative and novel perspective (openness). In this manner, it may be confirmed that the resources put into practice depend on the characteristics of the situation and how they are interpreted and assessed (Lazarus & Folkman, 1984).

External factors prove that the quality of the couple's relationship is associated with emotional adjustment in infertility. Other studies highlighted similar results (Gana & Jakubowska, 2016; Luk & Loke, 2019). In infertile couples, well-being in the relationship explained an additional part of the variance in emotional maladjustment, while in fertile participants, interpersonal resources acquire greater relevance. This denotes the special importance that the relationship itself acquires for the well-being of the infertile couple (Benyamini et al., 2009; Holley et al., 2015; Ying et al., 2015). However, other studies exploring marital quality did not report a significant relationship between this external factor and emotional adjustment (Rockliff et al., 2014).

A large body of research has studied the moderating roles between psychosocial factors and emotional maladjustment in infertile patients, but few studies have compared them with fertile individuals. In this preliminary study we found that, both fertile and infertile people develop similar resources to maintain their emotional balance in stressful situations. In addition, the specific psychosocial risk and protective factors in infertile people are found. The findings of this study add to the literature the need, in future studies, for the inclusion of a comparison group of fertile people to study the moderating factors of emotional adjustment, which would avoid an erroneous interpretation of the results for the infertile situation.

From a therapeutic perspective, our study identifies factors that may be incorporated into psychosocial prevention programs and programs design for psychological intervention in infertility (Martínez-Borba et al., 2022). Prevention detects "high risk" couples and, therefore, decreases psychopathology (which means less therapeutic effort and personal suffering). The psychological intervention should focus specifically on internal and external aspects that can provide effective coping strategies to both the participants individually and as couple. Consequently, and as in the case of fertile people, the therapeutic effort in infertile couples should focus on replacing or modifying the use of avoidance strategies and the promotion of dispositional optimism, and it will be essential to promote the personal resources and the increase of the marital satisfaction on the couple.

The main limitation of this study is its transversal nature in researching couples. Emotional adjustment and its relation to personality, dispositional optimism, coping strategies, personal resources, interpersonal resources and marital satisfaction may change according to the different stages of the

assisted reproductive treatment. Secondly, the relatively small size of the sample, may reduce the statistical power to detect relationships among variables that could appear with the use of a larger sample. It also prevented analyzing the influence of variables related to medical aspects and the duration of illness and its subsequent treatment. A third limitation is that the sample is from a single private gynecological clinic, which limits the generalisability of the results to the universe of couples with infertility problems. Despite these limitations, we want to highlight the importance of having included a comparison group, that the research was carried out with standardized and validated self-report instruments and that the psychological evaluation was applied individually and independently to each of the participants, controlling the social desirability. In addition, our findings provide modulators of emotional adjustment that are used by both infertile and fertile people and identify key psychosocial modulators that could be used specifically for psychological support in infertile people.

Author contributions All authors contributed to the study conception and design. Material preparation and data collection were performed by Rosario Antequera-Jurado and Carmen Moreno-Rosset. Isabel Ramírez-Uclés performed the data analysis. All authors contributed to interpret the data and to write the paper and did a critical revision of the paper and approved the final manuscript.

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Data availability The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethical approval The study was reviewed and approved by the Research Ethics Committee of the National Distance Education University (UNED).

Human and animal rights All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent Informed consent was obtained from all individual participants included in the study.

Conflict of interest None.

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References

- Babore, A., Stuppia, L., Trumello, C., Candelori, C., & Antonucci, I. (2017). Male factor infertility and lack of openness about infertility as risk factors for depressive symptoms in males undergoing assisted reproductive technology treatment in Italy. *Fertility and Sterility*, *107*, 1041–1047. <https://doi.org/10.1016/j.fertnstert.2016.12.031>
- Benyamini, Y., Gozlan, M., & Kokia, E. (2009). Women's and men's perceptions of infertility and their associations with psychological adjustment: A dyadic approach. *British Journal of Health Psychology*, *14*, 1–16. <https://doi.org/10.1348/135910708X279288>
- Bermúdez, J., Pérez-García, A., & Sánchez-Elvira, M. A. (1990a). *Big-Five Questionnaire (BFQ-30). The short Spanish version*. UNED.
- Bermúdez, J., Pérez-García, A., & Sánchez-Elvira, M. A. (1990b). *Ways of Coping Revised (WOC-R). The short Spanish version*. UNED.
- Boivin, J., Vassena, R., Costa, M., Vegni, E., Dixon, M., Collura, B., Markert, M., Samuelsen, C., & Guiglotto, J. (2022). Tailored support may reduce mental and relational impact of infertility on infertile patients and partners. *Reproductive Biomedicine Online*, *44*(6), 1045–1054. <https://doi.org/10.1016/j.rbmo.2022.01.015>
- Cano-García, F. J., Sanduvete-Chaves, S., Chacón-Moscoso, S., Rodríguez-Franco, L., García-Martínez, J., Antuña-Bellerín, M. A., & Pérez-Gil, J. A. (2015). Factor structure of the Spanish version of the Life Orientation Test-Revised (LOT-R): Testing several models. *International Journal of Clinical and Health Psychology*, *15*, 139–148. <https://doi.org/10.1016/j.ijchp.2015.01.003>
- Caprara, G. V., Barbaranelli, C., & Borgogni, L. (1995). *Cuestionario "Big Five" (BFQ)*. Versión española de J. Bermúdez. TEA Ediciones.
- Casu, G., & Gremigni, P. (2016). Screening for infertility-related stress at the time of initial infertility consultation: Psychometric properties of a brief measure. *Journal of Advanced Nursing*, *72*, 693–706. <https://doi.org/10.1111/jan.12830>
- Chachamovich, J., Chachamovich, E., Fleck, M. P., Cordova, F. P., Knauth, D., & Passos, E. (2009). Congruence of quality of life among infertile men and women: Findings from a couple-based study. *Human Reproduction*, *24*(9), 2151–2157. <https://doi.org/10.1093/humrep/dep177>
- Chamorro, P., Herruzo, J., & Pino, M. (2021). Study on the interdependent relationship between marital satisfaction variable and the psychosocial impact of infertility and anxiety disposition, according to gender. *Journal of Sex & Marital Therapy*, *47*, 124–135. <https://doi.org/10.1080/0092623X.2021.2008074>
- Cohen, J. (1998). *Statistical power analysis for the behavioral sciences* (2nd ed.). Erlbaum.
- Cunha, M., Galhardo, A., & Pinto-Gouveia, J. (2016). Experiential avoidance, self-compassion, self-judgment and coping styles in infertility. *Sexual & Reproductive Healthcare*, *10*, 41–47. <https://doi.org/10.1016/j.srhc.2016.04.001>
- Darolia, S., & Ghosh, D. (2022). Importance of personality factors in determining the psychological consequences of infertility: A systematic review. *Health Education & Behavior*, *49*(4), 708–723. <https://doi.org/10.1177/10901981211057109>
- Fallahzadeh, H., Zareei Mahmood Abadi, H., Momayyezi, M., Malaki Moghadam, H., & Keyghobadi, N. (2019). The comparison of depression and anxiety between fertile and infertile couples: A

- meta-analysis study. *International Journal of Reproductive Bio-Medicine (IJRM)*, 17(3), 153–162. <https://doi.org/10.18502/ijrm.v17i3.4514>
- Faramarzi, M., Pasha, H., Esmaelzadeh, S., Jorsarai, G., Mir, M., & Abedi, S. (2013). Is coping strategies predictor of anxiety and depression in couple infertile? *Health*, 5, 643–649. <https://doi.org/10.4236/health.2013.53A085>
- Galhardo, A., Alves, J., Moura-Ramos, M., & Cunha, M. (2019). Infertility-related stress and depressive symptoms – the role of experiential avoidance: A cross sectional study. *Journal of Reproductive and Infant Psychology*, 38(2), 139–150. <https://doi.org/10.1080/02646838.2019.1612046>
- Gana, K., & Jakubowska, S. (2016). Relationship between infertility-related stress and emotional distress and marital satisfaction. *Journal of Health Psychology*, 21(6), 1043–1054. <https://doi.org/10.1177/1359105314544990>
- Gourounti, K., Anagnostopoulos, F., & Vaslamatzis, G. (2010). Psychosocial predictors of infertility related stress: A review. *Current Women's Health Reviews*, 6, 318–331. <https://doi.org/10.2174/157340410793362159>
- Gourounti, K., Anagnostopoulos, F., Potamianos, G., Lykeridou, K., Schmidt, L., & Vaslamatzis, G. (2012). Perception of control, coping and psychosocial stress of infertile women undergoing IVF. *Reproductive BioMedicine Online*, 24(6), 670–679. <https://doi.org/10.1016/j.rbmo.2012.03.002>
- Greil, A. L., Slauson-Blevins, K., & McQuillan, J. (2010). The experience of infertility: A review of recent literature. *Sociology of Health & Illness*, 32(1), 140–162. <https://doi.org/10.1111/j.1467-9566.2009.01213.x>
- Holley, S. R., Pasch, L. A., Bleil, M. E., Gregorich, S., Katz, P. K., & Adler, N. E. (2015). Prevalence and predictors of major depressive disorder for fertility treatment patients and their partners. *Fertility and Sterility*, 103, 1332–1339. <https://doi.org/10.1016/j.fertnstert.2015.02.018>
- Huppelschoten, A. G., van Dongen, A. J. C. M., Verhaak, C. M., Smeenk, J. M. J., Kremer, J. A. M., & Nelen, W. L. D. M. (2013). Differences in quality of life and emotional status between infertile women and their partners. *Human Reproduction*, 28, 2168–2176. <https://doi.org/10.1093/humrep/det239>
- Jenaro, C., Moreno-Rosset, C., Antequera-Jurado, R., & Flores, N. (2008). Psychological assessment in infertility: The DERA, a measure developed in Spain. *Papeles del Psicólogo*, 29(2), 176–185. <https://www.papelesdelpsicologo.es/English/1584.pdf>
- Kiani, Z., Simbar, M., Hajian, S., Zayeri, F., Shahidi, M., Naz, S. G., & Ghasemi, V. (2020). The prevalence of anxiety symptoms in infertile women: A systematic review and meta-analysis. *Fertility Research and Practice*, 6, 7. <https://doi.org/10.1186/s40738-020-00076-1>
- Lazarus, R. S., & Folkman, S. (1984). *Stress*. Springer.
- Lopes, V., Canavarro, M. C., Verhaak, C. M., Boivinand, J., & Gameiro, S. (2014). Are patients at risk for psychological maladjustment during fertility treatment less willing to comply with treatment? Results from the Portuguese validation of the SCREENIVF. *Human Reproduction*, 29, 293–302. <https://doi.org/10.1093/humrep/det418>
- Luk, B. H., & Loke, A. Y. (2019). Sexual satisfaction, intimacy and relationship of couples undergoing infertility treatment. *Journal of Reproductive and Infant Psychology*, 37(2), 108–122. <https://doi.org/10.1080/02646838.2018.1529407>
- Mahajan, N. N., Turnbull, D. A., Davies, M. J., Jindal, U. N., Briggs, N. E., & Taplin, J. E. (2009). Adjustment to infertility: The role of intrapersonal and interpersonal resources/vulnerabilities. *Human Reproduction*, 24, 906–912. <https://doi.org/10.1093/humrep/den462>
- Maroufzadeh, S., Almasi-Hashiani, A., Amini, P., Sepidarkish, M., & Omani-Samani, R. (2019). The Quality of Marriage Index (QMI): A validation study in infertile patients. *BMC Research Notes*, 12, 507. <https://doi.org/10.1186/s13104-019-4438-2>
- Martínez-Borba, V., Osma, J., Crespo-Delgado, E., Andreu-Pejo, L., & Monferrer-Serrano, A. (2022). Prevención de trastornos y síntomas emocionales en condiciones de salud: Estudio piloto aplicando el Protocolo Unificado en una unidad de reproducción humana. *Anales de Psicología / Annals of Psychology*, 38(1), 25–35. <https://doi.org/10.6018/analesps.462331>
- Mohammadi, M., Samani, R. O., Navid, B., Maroufzadeh, S., & Sabeti, S. (2018). Coping strategy in infertile couples undergoing assisted reproduction treatment. *Middle East Fertility Society Journal*, 23, 482–485. <https://doi.org/10.1016/j.mefs.2018.07.004>
- Moreno-Rosset, C., Antequera-Jurado, R., & Jenaro, C. (2008). *DERA. Cuestionario de Desajuste Emocional y Recursos Adaptativos en infertilidad*. TEA Ediciones.
- Moreno-Rosset, C., Antequera-Jurado, R., & Jenaro, C. (2009). Validation of the Questionnaire of Emotional Maladjustment and Adaptive Resources in infertility (DERA). *Psicothema*, 21, 118–123.
- Otero-López, J. M., Luengo, A., Romero, E., Gómez, J. A., & Otero-López, C. (1998). *Psicología de personalidad. Manual de prácticas*. Ariel Practicum.
- Peterson, B. D., Newton, C. R., Rosen, K. H., & Schulman, R. S. (2006). Coping processes of couples experiencing infertility. *Family Relations: An Interdisciplinary Journal of Applied Family Studies*, 55(2), 227–239. <https://doi.org/10.1111/j.1741-3729.2006.00372.x>
- Peterson, B. D., Sejbaek, C. S., Pirritano, M., & Schmid, L. (2014). Are severe depressive symptoms associated with infertility-related distress in individuals and their partners? *Human Reproduction*, 29, 76–82. <https://doi.org/10.1093/humrep/det412>
- Ramírez-Uclés, I., Del Castillo, M., & Moreno-Rosset, C. (2015). Psychological predictor variables of emotional maladjustment in infertility: Analysis of the moderating role of gender. *Clínica y Salud*, 26(1), 57–63. <https://doi.org/10.1016/j.clysa.2015.01.002>
- Rockliff, H. E., Lightman, S. L., Rhidian, E., Buchanan, H., Gordon, U., & Vedhara, K. (2014). A systematic review of psychosocial factors associated with emotional adjustment in *in vitro* fertilization patients. *Human Reproduction Update*, 20(4), 594–613. <https://doi.org/10.1093/humupd/dmu010>
- Sánchez-Cánovas, J. (2007). *EBP. Escala de Bienestar Psicológico* (2nd ed.). TEA Ediciones.
- Scheier, M., Carver, C., & Bridges, M. (1994). Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and self-esteem): A reevaluation of the Life Orientation Test. *Journal of Personality and Social Psychology*, 67, 1063–1078. <https://doi.org/10.1037/0022-3514.67.6.1063>
- Shen, B. J., McCreary, C. P., & Myers, H. F. (2004). Independent and mediated contributions of personality, coping, social support, and depressive symptoms to physical functioning outcome among patients in cardiac rehabilitation. *Journal of Behavioral Medicine*, 27, 39–62. <https://doi.org/10.1023/B:JOBM.0000013643.36767.22>
- Simionescu, G., Doroftei, B., Maftai, R., Obreja, B.-E., Anton, E., Grab, D., Ilea, C., & Anton, C. (2021). The complex relationship between infertility and psychological distress (Review). *Experimental and Therapeutic Medicine*, 21(4), 306. <https://doi.org/10.3892/etm.2021.9737>
- Thompson, E. H., Woodward, J. T., & Stanton, A. L. (2012). Dyadic goal appraisal during treatment for infertility: How do different perspectives relate to partners' adjustment?. *International Journal of Behavioral Medicine*, 19(3), 252–259. <https://doi.org/10.1007/s12529-011-9172-7>
- Vioreanu, A.-M. (2021). The psychological impact of infertility. directions for the development of interventions. *Mental Health: Global Challenges Journal*, 4(1). <https://doi.org/10.32437/mhgcj.v4i1.113>
- Yazdani, F., Kazemi, A., Fooladi, M. M., & Samani, H. R. O. (2016). The relations between marital quality, social acceptance and coping strategies among the infertile Iranian couples. *European*

Journal of Obstetrics & Gynecology and Reproductive Biology, 200, 58–62. <https://doi.org/10.1016/j.ejogrb.2016.02.034>

Ying, L. Y., Wu, L. H., & Loke, A. Y. (2015). Gender differences in experiences with and adjustments to infertility: A literature review. *International Journal of Nursing Studies*, 52(10), 1640–1652. <https://doi.org/10.1016/j.ijnurstu.2015.05.004>

Zurlo, M. C., Cattaneo Della Volta, M. F., & Vallone, F. (2020). Re-examining the role of coping strategies in the associations

between infertility-related stress dimensions and state-anxiety: implications for clinical interventions with infertile couples. *Frontiers in Psychology*, 11, 614887. <https://doi.org/10.3389/fpsyg.2020.614887>

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