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Maternity through assisted reproductive technology: a cross-sectional study on psychological experiences, couple relationship, and mother-child attachment

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ABSTRACT

Objective. This paper aimed to investigate the psychological experiences of women who became mothers in the past three years as a result of Assisted Reproductive Technology (ART) treatments.

Materials and Methods. An online survey was designed and distributed through major social networks within thematic groups dedicated to ART. Participants completed the following standardized questionnaires: Edinburgh Postnatal Depression Scale, to evaluate depressive symptoms; Perceived Stress Scale, to assess perceived stress; General Self-Efficacy Scale, to evaluate self-efficacy; Maternal Social Support Scale, to evaluate perceived social support; Dyadic Adjustment Scale, to assess couple relationship quality; World Health Organization - Five Well-Being Index, to evaluate psychological well-being; Maternal Postnatal Attachment Scale, to assess mother-child attachment.

Results. 65 women with a mean age of 35.2 years completed the online survey. Women in the sample reported higher stress levels than the general population. In addition, the quality of the couple's relationship is slightly lower than the general average. Finally, cohesion was impaired, especially in couples where the cause of infertility was mixed. Finally, women followed by an ART centre where a psychologist worked in the team reported better scores, especially in areas related to the quality of the couple's relationship.

Conclusions. This study allowed to explore the psychological aspects of women who became mothers after ART and to understand the complex dynamics involved in fertility treatments. Providing women undergoing ART treatments with adequate psychological support is crucial to cope with this situation positively.

INTRODUCTION

Infertility is defined as a couple's inability or failure to conceive after regular unprotected sexual intercourse for 6 months (for women aged 35 years) or 12 months (for women aged < 35 years) [1]. Approximately one in six individuals of reproductive age globally are estimated to face infertility at some point in their lives [2].

Infertility can have male, female, or mixed causes. Fertility problems in men are often caused by problems with sperm ejaculation, insufficient or low sperm counts, or irregular sperm shape (morphology) or motion (motility) [3, 4]. A variety of factors can cause infertility in women. The most common causes are tube disorders, such as blocked fallopian tubes caused by sexually transmitted infections, unsafe abortion complications,

postpartum sepsis, and abdominal/pelvic surgery complications [5-8]. Additionally, uterine conditions, whether they are inflammatory, such as endometriosis [9, 10], or congenital, such as septate uterus or isthmocele [11-14], can contribute. Moreover, polycystic ovarian syndrome or other follicular disorders may contribute to this condition [15, 16]. Finally, endocrine system disorders can lead to imbalances in reproductive hormones [17]. In some cases, infertility can be due to non-organic causes ("functional" or "unexplained" infertility) [18].

Receiving a diagnosis of infertility creates a significant obstacle in the family's life cycle, as the couple cannot conceive and become parents [19]. Therefore, an infertility diagnosis is an unforeseen event that profoundly affects the emotional well-being of both the infertile woman and the couple [20].

The experience of infertility can be compared to a grieving process, wherein the couple must face losing the opportunity to create a biological extension of themselves. Additionally, this condition can give rise to emotions such as abandonment, anger, depression, feelings of inferiority, and a lack of motivation [21, 22].

Several studies in this field emphasize common reactions to an infertility diagnosis, including initial shock and surprise, denial, anger, distress, guilt, grief, and a sense of loss [23]. Infertility diagnosis often results in a widespread effect of feeling depressed, which can occur periodically during moments of distress or persistently [24]. From the individual's perspective, receiving a diagnosis of infertility creates an emotional state of significant anguish, particularly for women who may experience a strong sense of guilt for not fulfilling the societal expectation of becoming a mother [25]. Additionally, many women consider becoming a mother an essential aspect of their identity, so experiencing difficulties in procreation can make them feel worthless [26].

On a dyadic level, infertile couples may feel different and inferior to others, experiencing anger, fear, shame, envy, and impotence [27]. There may be a range of emotions experienced by a couple when they are informed of their infertility diagnosis, including shock, denial, anger, isolation, and guilt, as well as feelings of resignation [28].

After receiving an infertility diagnosis, most couples strengthen their emotional bond, focusing on mutual support. However, in couples with unsta-

ble emotional bonds, communicating the infertility diagnosis may increase relationship conflicts [29].

Assisted Reproductive Technology (ART) can be a possible solution to infertility. ART includes medical procedures that can allow conception and pregnancy [30].

From a psychological perspective, ART treatments can lead to the development of depressive symptoms, anxiety, and stress, linked not only to the difficulties of conception but also to the invasiveness and duration of treatments [31, 32]. In this regard, research indicates that women who undergo ART experience higher levels of stress, anxiety, and depression than the general population [33, 34].

Additionally, the literature emphasizes the importance of variables such as social support and the quality of the couple's relationship as protective factors during ART [35, 36].

Undergoing ART treatment can also influence the creation of the attachment bond between the mother and her child. In this regard, studies show that mothers who have given birth after an ART treatment are more emotionally involved with their children than mothers who have given birth naturally [19, 37, 38]. Consequently, becoming a mother following an ART treatment does not seem to negatively affect the development of bonding with one's child [38].

Based on these considerations, this study aimed to investigate the psychological experiences of women who have had a child after an ART treatment in the last three years. Specifically, this study explores variables such as depressive symptoms, perceived stress, self-efficacy, perceived social support, psychological well-being, and the quality of the couple's relationship and relationship with the child in women who have carried a pregnancy to term with ART during the past three years.

MATERIALS AND METHODS

An online survey was designed and distributed through major social networks within thematic groups dedicated to ART to conduct this study. The study included women aged 18 and 45 who became mothers through ART between 2020 and 2023. Women with severe psychiatric conditions were excluded.

Survey participation was completely anonymous, and participants provided valid online informed consent. The survey was composed of three different sections: the first included a socio-demographic section that provides information on age, marital status, education, occupation, presence of other children, *etc.*

The second section provides information related to pregnancy and childbirth, including the week of gestation at the time of childbirth, the infant's weight at birth, the presence or absence of the partner during childbirth, risk factors during pregnancy, complications during childbirth, previous miscarriages, and preterm births.

In the third section, participants completed a battery of tests, including the following validated questionnaires:

- The Maternal Social Support Scale (MSSS) [39] is a self-report questionnaire to assess social support during pregnancy. It consists of 6 items, two of which are reverse, scored on a 5-point Likert scale from 1 (never) to 5 (often). The scale score can range from 6 to 30; a high score indicates high perceived social support. The scale had good internal reliability (Cronbach's $\alpha = 0.81$).
- The Edinburgh Postnatal Depression Scale (EPDS) [40] is a self-report questionnaire used to assess postpartum depression; it consists of 10 items related to how the individual has felt over the past seven days. Each item is rated on a Likert scale ranging from 0 to 3. The scale score can range from 0 to 30. A high score corresponds to a higher severity of the symptoms investigated. Scores ≥ 10 are recommended for identifying women with clinically relevant depressive symptoms. Typically, a score of 10 or above on the EPDS is considered a cut-off for further assessment of depressive symptoms in the postpartum period. The scale has good reliability (Cronbach's $\alpha = 0.87$).
- The General Self-Efficacy Scale (GSE) [41, 42] is a self-report questionnaire used to assess perceived self-efficacy; it consists of 10 items scored on a Likert scale ranging from 1 (not at all true) to 4 (totally true). The whole scale score can range from 10 to 40. A high score corresponds to higher perceived self-efficacy. The scale has excellent reliability (Cronbach's $\alpha = 0.91$).
- The Maternal Postnatal Attachment Scale (MPAS) [43] is a self-report questionnaire to

assess the degree of attachment with the child. It consists of 19 items related to thoughts and feelings regarding the child; each item is rated on a Likert scale ranging from 1 (low attachment) to 5 (high attachment). The MPAS has a three-factor structure: pleasure in interaction with the child, absence of hostility toward the child, and quality of attachment. In addition, the total scale score ranges from 19 to 95, and a low score indicates a problematic mother-child relationship. The scale has good reliability (Cronbach's $\alpha = 0.78$).

- The World Health Organization - Five Well-Being Index (WHO-5) [44] is a self-report questionnaire used to assess the individual's level of psychological well-being through 5 items related to how the individual has felt in the past two weeks. Each item is rated on a Likert scale ranging from 0 (never) to 5 (always); a high score corresponds to a higher state of well-being. Specifically, a score ≤ 13 indicates poor psychological well-being. According to the literature, a score below 13 indicates a poor state of psychological well-being. The internal reliability of the questionnaire is satisfactory (Cronbach's $\alpha = 0.89$).
- The Perceived Stress Scale (PSS) [45] is the most widely used questionnaire to measure stress perception and consists of 10 items that investigate how often the individual was distressed in the past month. Each item is rated on a Likert scale ranging from 0 (never) to 4 (very often); the scale score ranges from 0 to 40, and a high score indicates a higher degree of perceived stress. The scale has good reliability (Cronbach's $\alpha = 0.85$).
- The Dyadic Adjustment Scale (DAS) [46] is a self-report questionnaire used to assess the quality of the couple's relationship. It consists of 32 items divided into four subscales measuring specific dimensions: Dyadic Consensus (DC), which consists of 13 items concerning the degree of agreement/disagreement between the partners on matters of daily life (Cronbach's $\alpha = 0.84$); Dyadic Satisfaction (DS), which consists of 10 items concerning the degree of happiness/unhappiness perceived by the partners in their relationship (Cronbach's $\alpha = 0.86$); Affectional Expression (AE), which consists of 4 items relating to the degree of individual satisfaction with expressions of affection within the relation-

ship (Cronbach's $\alpha = 0.68$); Dyadic Cohesion (DH), which consists of 5 items relating to the degree of sharing of activities and interests inside and outside the home (Cronbach's $\alpha = 60.78$). DAS items have different response modes: seven-point Likert scale (from 0 = extremely unhappy to 6 = perfect); six-point Likert scale (from 0 = always disagree to 5 = always agree); 5-point Likert scale (from 0 = never to 4 = every day); dichotomous items (0 = yes, 1 = no).

Statistical analysis

Data were analysed using Statistical Package for Social Science (SPSS) software, version 25.0 (IBM Corporation, Armonk, NY).

Quantitative data were expressed as frequencies and percentages for categorical and ordinal variables and mean (M) and standard deviation (SD) for continuous variables. Correlations between continuous variables were evaluated using Pearson's correlation coefficient. Independent samples Student's t-test and one-way ANOVA with Tukey's *post-hoc* test were applied to analyse the difference in the averages of questionnaire scores according to a set of variables related to the ART pathway. Values of $p < 0.05$ were considered statistically significant.

RESULTS

The study sample includes 65 women with a mean age of 35.2 years (SD = 6.23; range = 22-50). Most of the participants have a high school graduation (32.3%) or a master's degree (32.3%) and work as clerks (33.8%) or freelancers (23.1%). In addition, almost all of the sample reported being in a stable couple relationship (96.9%).

Table 1 shows the main characteristics of the sample related to pregnancy and childbirth: participants gave birth on average at 37.8 weeks gestation, and the mean infant weight at birth was 3.02 ± 0.70 kg. Most women gave birth by spontaneous vaginal delivery (38.5%), while 30.8% were by planned caesarean section. In contrast, 20% gave birth by unplanned caesarean section. Also, 53.8% of the participants gave birth without a close partner, mainly due to restrictions related to the COVID-19 pandemic (35.4%).

Table 1. Obstetric characteristics in the sample.

Variables	Mean $\pm$ SD or frequencies (%)
Weeks of gestation	37.86 $\pm$ 5.38
Weight of baby (kg)	3.02 $\pm$ 0.70
Mode of childbirth	
Spontaneous vaginal birth	25 (38.5%)
Vaginal birth with episiotomy	7 (10.8%)
Planned caesarean section	20 (30.8%)
Unplanned caesarean section	13 (20.0%)
Partner present during birth	
Yes	30 (46.2%)
No	35 (53.8%)
Parity	
Primipara	53 (81.5%)
Multipara	12 (18.5%)
Risk factors during pregnancy	
Yes	21 (32.3%)
No	44 (67.7%)
Complications during delivery	
Yes	13 (20.0%)
No	52 (80.0%)
Previous miscarriages	
Yes	33 (50.8%)
No	32 (49.2%)
Previous preterm deliveries	
Yes	2 (3.1%)
No	63 (96.9%)

Most of the participants were in their first delivery (81.5%). Most women reported no risk factors during pregnancy (67.7%) and complications during childbirth (80%). However, a significant percentage (50.8%) reported one or more miscarriages, while only 3.1% reported one or more preterm deliveries.

Regarding the specific characteristics of the sample related to the infertility condition and the ART pathway, in 44.6% of cases, infertility was associated with a female cause. In comparison, in 33.8% of cases, it was related to a male cause. Also, 12.3% of the participants reported an infertility condition with no known cause.

A significant percentage of the sample waited long before receiving an infertility diagnosis, as shown in **Figure 1**. In addition, 41.5% of the participants sought a natural pregnancy for 3 to 5 years before starting an ART treatment.

Regarding the decision to have a child, in most cases, the desire to have a child was shared with-

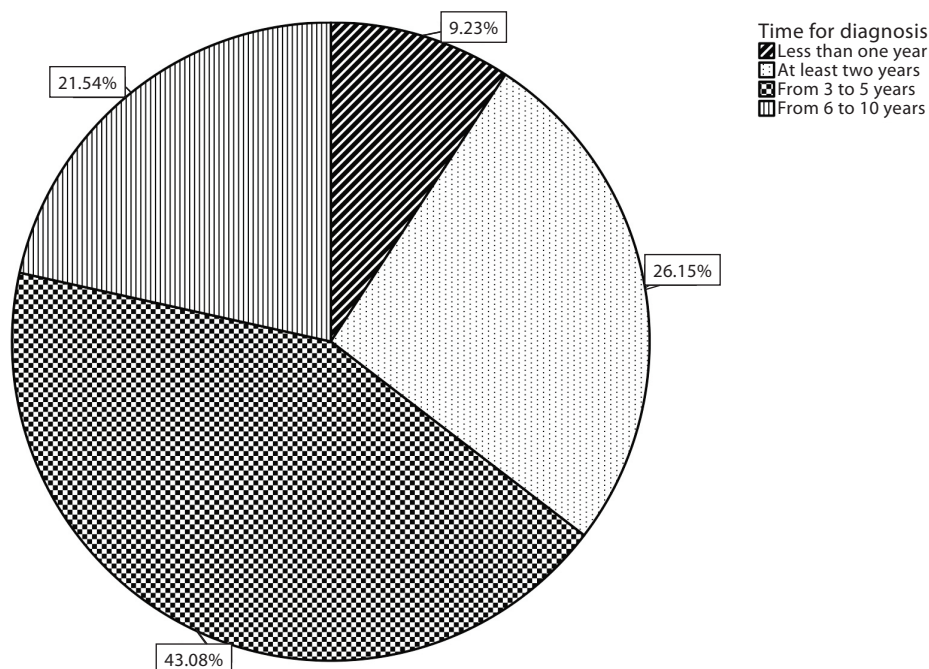


Figure 1. Distribution of the time taken for diagnosis of infertility in the sample.

in the couple (76.9%), as well as the decision to approach an ART centre (53.8%). However, it is interesting that in 44.6% of cases, women alone decided to approach an ART centre.

Regarding the characteristics of ART centres and the type of treatments, 60% of the women surveyed had turned to a private centre, and 30.8% had changed centres before they achieved preg-

nancy. In most of the cases, the ART centre provided for the presence of a psychologist on the team (56.9%), but only 38.5% of women felt it was appropriate to ask for psychological support together with their partner.

The two most frequently used techniques associated with successful treatment in our sample were IVF (46.2%) and ICSI (43.1%).



Figure 2. Satisfaction levels of women in the sample with ART treatment.

Table 2. Mean scores of the questionnaires used in the study.

	Minimum	Maximum	M	SD
EPDS	0	25	11.91	5.60
MSSS	7	29	25.08	4.32
GSE	12	39	28.37	5.23
MPAS-Quality of attachment	24.70	88.10	38.34	7.30
MPAS-Absence of hostility	8.00	23.60	16.87	3.39
MPAS-Pleasure in interaction	16.00	25.00	23.25	1.68
WHO-5	2	25	12.57	5.17
PSS	11	32	22.43	4.12
DAS-DC	23	63	50.75	7.66
DAS-DS	20	36	27.70	3.66
DAS-AE	3	11	8.62	1.72
DAS-DH	4	25	17.67	4.22
DAS-Total	55	124	104.73	13.10

EPDS: Edinburgh Postnatal Depression Scale; MSSS: Maternal Social Support Scale; GSE: General Self-Efficacy Scale; MPAS: Maternal Postnatal Attachment Scale; WHO-5: World Health Organization - Five Well-Being Index; PSS: Perceived Stress Scale; DAS-DC: Dyadic Adjustment Scale-Dyadic Consensus; DAS-DS: Dyadic Adjustment Scale-Dyadic Satisfaction; DAS-AE: Dyadic Adjustment Scale-Affectional Expression; DAS-DH: Dyadic Adjustment Scale-Dyadic Cohesion.

On average, the women in our sample made two attempts before achieving pregnancy. As shown in **Figure 2**, the participants are overall satisfied with their ART treatment.

Table 2 shows the mean scores of the questionnaires used in this study. Notably, the mean EPDS score is below the cut-off for postpartum depression (> 10). In addition, the mean score of the MSSS indicates adequate social support. The mean score of the WHO-5 questionnaire is slightly under the cut-off for psychological well-being (< 13), while the PSS questionnaire score for the assessment of perceived stress is above the normative score for the female population ($M = 13.7$; $SD = 6.6$). As for the DAS scale scores related to the quality of couple relationship, the mean scores of our sample are lower than the normative scores for the female population (dyadic consensus: 51.07; dyadic satisfaction: 37.4; affective expression: 9.70; couple adjustment: 114.98), except for dyadic cohesion (16.58).

We found statistically significant correlations among all variables investigated in this study, as shown in **Table 3**.

One-way ANOVA showed significant differences in dyadic cohesion scores ($p < 0.001$). Specifically, Tukey's *post-hoc* test showed that in mixed-cause infertility, dyadic cohesion scores were lower than in the female-cause ($p = 0.003$) and male-cause ($p = 0.003$) infertility conditions. Significant differences were also found in scores for postpartum depression ($p = 0.007$) and dyadic satisfaction ($p = 0.024$). Specifically, the *post-hoc* test showed that

women who waited longer to receive an infertility diagnosis reported higher levels of postpartum depression and lower levels of couple satisfaction. Significant differences were also found in scores related to the pleasure of interacting with the child ($p = 0.04$). Specifically, women who sought pregnancy for the longest time before starting an ART treatment (6-10 years) reported lower scores in the pleasure of interacting with the child. The t-test for independent samples showed a significant difference in dyadic cohesion ($p = 0.007$) and couple adjustment ($p = 0.013$) scores according to the type of ART centre. Expressly, women referred to a private centre reported significantly higher scores than those referred to a public centre. The t-test for independent samples also showed significant differences in affectional expression scores ($p = 0.031$) and general couple adjustment ($p = 0.036$).

Women who approached an ART centre with a psychologist reported better scores than those referred to an ART centre where the psychologist was not planned, as shown in **Table 4**.

Finally, the one-way ANOVA showed significant differences in the scores for postpartum depression, perceived stress, dyadic satisfaction, affectional expression, and couple adjustment in relation to the level of social support perceived by mothers in the sample. Specifically, women with low levels of perceived support reported higher scores of postpartum depression and perceived stress and lower scores of dyadic satisfaction, affectional expression, and couple adjustment.

Table 3. Correlations among study variables.

Variables	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.
1. Age	—														
2. Attempts	0.325 **	—													
3. EPDS	-0.199	-0.035	—												
4. MSSS	0.190	0.176	-0.449 ***	—											
5. GSE	0.274 *	0.112	-0.526 ***	0.367 **	—										
6. MPAS-Quality of attachment	0.011	-0.087	-0.317 *	0.328 **	0.192	—									
7. MPAS-Absence of hostility	0.293 *	0.308 *	-0.458 ***	0.323 **	0.441 ***	0.333 **	—								
8. MPAS-Pleasure in interaction	0.012	-0.072	-0.286 *	0.070	0.284 *	0.344 **	0.290 *	—							
9. WHO-5	0.267 *	0.149	-0.564 ***	0.328 **	0.670 ***	0.266 *	0.508 ***	0.252 *	—						
10. PSS	-0.318 **	-0.207	0.347 **	-0.387 **	-0.225	-0.099	-0.406 ***	0.092	-0.377 **	—					
11. DAS-DC	0.038	0.023	-0.280 *	0.620 ***	0.338 **	0.198	0.245	0.012	0.362 **	-0.080	—				
12. DAS-DS	-0.362 **	-0.267 *	0.107	0.043	0.010	0.213	-0.087	-0.011	0.024	0.293 *	0.176	—			
13. DAS-AE	-0.210	-0.063	-0.311 *	0.459 ***	0.069	0.228	-0.023	0.022	-0.047	0.005	0.466 ***	0.169	—		
14. DAS-DH	-0.114	-0.022	-0.261 *	0.471 ***	0.217	0.161	-0.048	0.108	0.252 *	0.134	0.671 ***	0.181 ***	0.383 **	—	
15. DAS-Total	-0.143	-0.077	-0.258 *	0.587 ***	0.280 *	0.257 *	0.100	0.042	0.293 *	0.079	0.911 ***	0.463 ***	0.574 ***	0.815 ***	—

EPDS: Edinburgh Postnatal Depression Scale; MSSS: Maternal Social Support Scale; GSE: General Self-Efficacy Scale; MPAS: Maternal Postnatal Attachment Scale; WHO-5: World Health Organization - Five Well-Being Index; PSS: Perceived Stress Scale; DAS-DC: Dyadic Adjustment Scale-Dyadic Consensus; DAS-DS: Dyadic Adjustment Scale-Dyadic Satisfaction; DAS-AE: Dyadic Adjustment Scale-Affectional Expression; DAS-DH: Dyadic Adjustment Scale-Dyadic Cohesion.

Table 4. Descriptive statistics of questionnaire scores according to the presence of a psychologist in the ART centre.

	Psychologist's presence	N	M	SD	SE
EPDS	No	28	11.61	5.79	1.09
	Yes	37	12.14	5.51	0.90
GSE	No	28	28.64	5.10	0.96
	Yes	37	28.16	5.38	0.88
MPAS-Quality of attachment	No	28	37.7714	3.65	0.69
	Yes	37	38.7757	9.18	1.51
MPAS-Absence of hostility	No	28	16.6571	3.52	0.66
	Yes	37	17.0297	3.33	0.54
MPAS-Pleasure in interaction	No	28	23.3214	1.76	0.33
	Yes	37	23.1892	1.64	0.27
WHO-5	No	28	12.46	5.15	0.97
	Yes	37	12.65	5.25	0.86
PSS	No	28	21.93	3.43	0.64
	Yes	37	22.81	4.582	0.75
DAS-DC	No	28	49.39	8.32	1.57
	Yes	35	51.83	7.02	1.18
DAS-DS	No	28	26.79	3.30	0.62
	Yes	35	28.43	3.81	.64
DAS-AE	No	28	8.07	2.03	0.38
	Yes	35	9.06	1.28	0.21
DAS-DH	No	28	16.64	4.69	0.88
	Yes	35	18.49	3.65	0.61
DAS-Total	No	28	100.89	14.35	2.71
	Yes	35	107.80	11.28	1.90

EPDS: Edinburgh Postnatal Depression Scale; MSSS: Maternal Social Support Scale; GSE: General Self-Efficacy Scale; MPAS: Maternal Postnatal Attachment Scale; WHO-5: World Health Organization - Five Well-Being Index; PSS: Perceived Stress Scale; DAS-DC: Dyadic Adjustment Scale-Dyadic Consensus; DAS-DS: Dyadic Adjustment Scale-Dyadic Satisfaction; DAS-AE: Dyadic Adjustment Scale-Affectional Expression; DAS-DH: Dyadic Adjustment Scale-Dyadic Cohesion.

DISCUSSION

Main findings

Results showed that the scores for perceived stress among the women in the sample are higher than the average, in agreement with the existing literature in which a higher level of stress is found in women undergoing *in vitro* fertilization techniques than in the control group [22, 32, 47, 48]. These results confirm that starting an ART treatment involves

a high emotional burden, placing the individual in a stressful condition.

According to various studies, another variable investigated in this study is the quality of the couple's relationship, which is an essential predictor of psychological well-being [27, 29].

Based on data analysis, scores related to couple relationship quality were lower than the average. In addition, significant differences were found in scores of dyadic cohesion according to the type of infertility diagnosis received. Specifically, couples in which the cause of infertility is mixed, thus affecting both partners, have lower levels of dyadic cohesion than couples with just male or female causes of infertility. This finding is unexpected, deviating from what emerges from the literature, as it is often couples in which the cause of infertility relates to only one partner who is most destabilized because of the recriminations that the healthy partner may make against the other [49, 50]. However, in our case, the couple's functioning appears more impaired when the cause of infertility is mixed. It could be hypothesized that this finding is due to mutual recrimination between the two partners and a lack of balance in the attribution of responsibility related to the infertility diagnosis. As this result deviates from what is found in the literature, it needs further investigation in future research to understand better how different causes of infertility may affect the couple's functioning.

Data analysis also showed significant differences in the scores for postpartum depression and dyadic satisfaction according to the timing of diagnosis. It is found that women who waited longer to receive an infertility diagnosis report higher levels of postpartum depression but, at the same time, have higher levels of couple satisfaction. In this regard, prolonged waiting, uncertainty, and unsuccessful attempts to conceive may increase stress, anxiety, and feelings of loss and disappointment. However, despite these challenges, women waiting longer for a diagnosis may also experience higher levels of couple satisfaction. This finding can be explained by the fact that couples experiencing infertility may foster greater emotional intimacy and communication. Therefore, resilience and support developed during the journey can strengthen the bond between partners, resulting in enhanced satisfaction in their relationship.

Significant differences were also found in dyadic cohesion scores and the overall quality of the cou-

ple's relationship according to the type of ART centre to which the couples referred.

Specifically, couples who approached a private ART centre reported higher scores than those who came to a public ART centre. This interesting result highlights the weaknesses of public ART centres in Italy, resulting in a more negative psychological experience within the couple than in private centres.

Significant differences were also found in affectional expression and overall couple satisfaction based on the presence or absence of a psychologist in the ART centre to which the participants were referred. Specifically, women who approached an ART centre with a psychologist reported higher scores than those who came to an ART centre where the psychologist was absent. This finding is highly significant, as it highlights the importance for infertile couples to receive adequate psychological support during ART, especially for women who, according to data in the existing literature, are at higher emotional risk than men [27].

Data also showed significant differences in the scores of the pleasure of interacting with the child. Specifically, women who waited longer to get pregnant (6-10 years) reported lower scores in the joy of interacting with their children. Several factors may contribute to this finding. First, a prolonged waiting period could have increased expectations and anticipation, resulting in a sense of pressure or anxiety around motherhood. As a result, mothers may feel disappointed or inadequate if the actual experience of interacting with their children does not meet their imagined ideal.

Furthermore, the passage of time may have resulted in changes in personal circumstances, such as career commitments or health issues, which may affect these women's emotional well-being and satisfaction. In addition, aging-related factors, such as declining energy levels or physical limitations, may influence the joy of interacting with their children, especially if they are older mothers. Further research is needed to delve deeper into the factors contributing to these lower scores and develop appropriate interventions to enhance the well-being and satisfaction of women who have waited longer to become mothers.

Finally, significant differences emerged in scores of postpartum depression, perceived stress, dyadic satisfaction, affectional expression, and general couple satisfaction in relation to perceived social support. Specifically, women with low levels of perceived social support report higher scores of

postpartum depression and perceived stress and lower scores of dyadic satisfaction, affectional expression, and general couple satisfaction. This finding confirms the critical role of social support in postpartum [51, 52], especially after a challenging journey such as ART.

Strengths and limitations

The present study provides a significant opportunity to explore the emotional and psychological aspects of women who became mothers after ART, allowing a deeper understanding of the complex dynamics involved in fertility treatments. Additionally, the study can offer practical implications for healthcare professionals and policy-makers to support this specific population better.

However, it is essential to consider the limitations of this study. As a first point, the results may not apply to all women who have undergone ART due to the small sample size and demographics that may not reflect the entire population accurately. In addition, the study relies on self-report measures and retrospective data collection, which may introduce recall bias and affect the reliability of the findings. The lack of long-term follow-up may also limit the study, as it might not capture the evolving experiences and challenges of these women as their children grow up. Furthermore, cultural and contextual factors could influence the women's experiences, which the study may not adequately address or account for. Despite these limitations, this study remains an essential contribution to the field, highlighting the strengths and challenges of ART and providing valuable insights for healthcare providers, researchers, and individuals considering or undergoing similar treatments.

CONCLUSIONS

Based on the results of this study, it is clear that women who have become mothers after an ART treatment tend to experience higher stress than the average. It is crucial to provide these women with adequate psychological support so that they can cope with this situation positively.

It is also important to note that not all ART centres the participants approached had a psychologist available. Moreover, only some participants thought asking for psychological support during this procedure was appropriate.

The importance of the involvement of a psychologist in the ART pathway is evident, as women who went to an ART centre where a psychologist was present reported better scores, especially in areas related to the quality of the couple's relationship, than those who went to an ART centre that did not have a psychologist.

In conclusion, there is still much to be done about the psychological support provided to couples with infertility. It is essential, therefore, to implement the presence of psychologists within all centres that deal with ART so that couples can have the opportunity to take advantage of qualified help and receive adequate support, even in the postnatal phase.

Based on these findings, it is also hoped that the present study may serve as a stimulus for conducting new studies about psychological experiences related to ART.

Therefore, it is considered appropriate that future research continues to investigate those variables that seem to significantly affect the psychological well-being of individuals undertaking an ART treatment.

COMPLIANCE WITH ETHICAL STANDARDS

Authors contribution

V.L.L.R.: Conceptualization, methodology, data curation, formal analysis, writing – original draft, visualization. F.A.: Investigation, writing – original draft. E.C.: Project administration, supervision; writing – review & editing.

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Study registration

N/A.

Disclosure of interests

The authors declare that they have no conflict of interests.

Ethical approval

The study was approved by the Internal Review Board of Psychology Research, Department of Ed-

ucational Sciences, University of Catania (Prot. n° Ierb-Edunict-2023.05.23/04).

Informed consent

Online informed consent was obtained from all women involved in the study.

Data sharing

Data are available under reasonable request to the corresponding author.

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