


Success of assisted reproductive technology treatment and couple relationship: A pilot study on the role of romantic attachment

Health Psychology Open
January-June 2020: 1–9
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DOI: 10.1177/2055102920933073
journals.sagepub.com/home/hpo


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Abstract

Infertility is a deeply distressing experience, which can threaten important personal and marital goals, frequently affecting the psychophysical health. A supportive relationship and a secure romantic attachment appear to reduce infertility stress, as well as play a relevant role in the success of assisted reproductive technology treatments. The principal aim of the study is to investigate the predictive effect of romantic attachment, couple characteristics, quality of life and age on assisted reproductive technology outcome. A total of 88 infertile women, enrolled in an assisted reproductive technology Centre of Rome, completed the Experience in Close Relationship-Revised, the Couple Relationship Inventory, the Fertility Quality of Life and a socio-demographic questionnaire. The participants completed the questionnaires at the beginning of the medical treatment. Data analyses showed significant associations among Experience in Close Relationship-Revised dimensions, Couple Relationship Inventory and Fertility Quality of Life Scales. Assisted reproductive technology outcome was negatively correlated to Experience in Close Relationship-Revised Avoidance and positively related to Couple Relationship Inventory Dependence. A multi-variable logistic regression revealed that Experience in Close Relationship-Revised Avoidance decreased the probability of pregnancy. The present findings partially confirmed the study hypotheses since several associations among couple characteristics, attachment anxiety and avoidance dimensions, infertility-related quality of life in infertile women were found. Furthermore, according to a definition of Avoidance, assisted reproductive technology positive outcome appears to be associated to lower levels of fear of dependence and interpersonal intimacy, and to a low need both for self-reliance and for reluctance to self-disclose within the romantic relationship. Further investigations are needed both to confirm this preliminary finding and for promoting focused therapeutic interventions for couples facing assisted reproductive technology.

Keywords

Assisted Reproductive Technology treatment, couple relationship, infertility, outcomes, romantic attachment, women's health

Introduction

Infertility is defined as the failure to achieve a clinical pregnancy after 12 months or more of regular unprotected sexual intercourse (Zegers-Hochschild et al., 2009). It affects approximately 48.5 million couples worldwide (3% of the population), and in developed countries, infertility is diagnosed in 17–26 per cent of reproductive age couples (Mascarenhas et al., 2012).

Infertility represents a major life crisis that threatens significant life goals and can be accompanied by a variety of

psychological disorders (Anderheim et al., 2005; Ghavi et al., 2016; Renzi et al., 2019). Assisted reproductive technology (ART) treatments regard all treatments including

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the handling of eggs and/or embryos with the aim to obtain a pregnancy (American Society for Reproductive Medicine, 2015). These treatments represent for many couples diagnosed with infertility a chance to have a child; nevertheless, these medical procedures represent a long and difficult journey that often can imply multiple failures (Fisher and Hammarberg, 2012; Sut and Kaplan, 2015) and several stressful aspects: daily injections, blood samples, hormonal changes, laparoscopic surgery, the waiting for the outcome and financial expenses (An et al., 2013). Over time, several investigations have highlighted that a diagnosis of infertility can lead to emotional distress, anxiety and depression which occur more frequently and with more severity in women (Greil et al., 2019; Holley et al., 2015; LoGiudice and Massaro, 2018). Furthermore, most fertility treatments, especially those where fertilization is outside the body, *in vitro*, are invasive, time-consuming, often expensive and with generally low success rates (Greil et al., 2019; Katz et al., 2011). All of this may interplay and further exacerbate physiological and psychological burden experienced by the infertile couple, particularly when treatments are not successful (Chazan and Kushnir, 2019; Maroufizadeh et al., 2017).

The inability to conceive a child can induce stress in the individual as well as in the couple; both partners face the possible loss of parenting potential (Galhardo et al., 2011; Pasch and Sullivan, 2017). The literature has shown that the effect of facing fertility problems is highly variable among couples (Pottinger et al., 2016). Facing fertility problems can have a negative effect on a couple's well-being (Cousineau and Domar, 2007; Luk and Loke, 2015), marital relationship (Onat and Beji, 2012; Vizheh et al., 2015), success of treatment (Boivin and Schmidt, 2005) willingness to continue with treatment (Smeenk et al., 2005) and treatment evaluation (Dancet et al., 2010) with some partners becoming distant from each other (Randall and Bodenmann, 2009). On the contrary, some couples might benefit from facing the hardship of the infertility diagnostic process and treatment together (Gulec et al., 2011; Randall and Bodenmann, 2009; Sultan and Tahir, 2011; Ying and Loke, 2016).

However, despite great interest in the effect of infertility on couples facing this condition, little attention has been given to the exploration of the possible role of other constructs such as attachment dimensions (Donarelli et al., 2012). In recent decades, the attachment theory proposed by Bowlby (1973) has become one of the main theories for understanding the process of affect regulation (Donarelli et al., 2016). According to Mikulincer and Shaver (2007), within romantic relationships, attachment describes the individual's specific way of relating to the partner or the spouse, with the attachment system activated especially in adverse/stressful situations. In the most recent studies on attachment, two principal dimensions of adult attachment are examined: (1) attachment anxiety, which involves the concern for interpersonal rejection or abandonment and pain when one's partner is perceived as unavailable or

unresponsive, and (2) attachment avoidance, which involves the fear for dependence and interpersonal intimacy, an extreme need for autonomy and reluctance to self-disclose (Donarelli et al., 2016; Mikulincer and Shaver, 2007; Shaver and Mikulincer, 2002). Lowyck et al. (2009) found that individuals who were securely attached to their partner reported higher levels of psychophysical health during the infertility treatment than individuals with an insecure attachment style. In a study by Bayley et al. (2009), a correlation between attachment anxiety and infertility distress was reported in both men and women. In Donarelli et al. (2012), the infertility distress of women was related to their partners' attachment anxiety, whereas the infertility distress of men was associated to their partners' attachment avoidance. Subsequently, Donarelli et al. (2016) found that wives' distress was predicted by their own and by their husbands' attachment avoidance, whereas husbands' distress was predicted by wives' attachment anxiety. Previously, Mikulincer et al. (1998) found that the partners of individuals reporting a secure attachment experienced less infertility distress than partners of individuals reporting an anxiety/avoidant attachment. Amir et al. (1999) found in a sample of infertile women that attachment dimensions and social support were associated to marital quality and psychological well-being; furthermore, both attachment and social support functioned also as stress moderators.

In conclusion, attachment dimensions and the existence of a supportive relationship seem to be protective factors that can reduce infertility-related stress (Gourounti et al., 2012; Martins et al., 2014; Ying and Loke, 2016). Attachment characteristics might also play a relevant role in ART positive outcome considering that the success of infertility treatments success has been associated with low levels of infertility-related stress (Boivin and Schmidt, 2005; Klonoff-Cohen and Natarajan, 2004; Verhaak et al., 2007). Specific studies investigating the predictive effect of quality of life, couple characteristics and romantic attachment on ART outcome are needed.

Therefore, the aim of this study is to investigate the relationships among romantic attachment, couple characteristics, quality of life, age and ART outcome. We hypothesize a predictive effect of couple characteristics, romantic attachment and quality of life on ART outcome.

Method

Participants

Participants were recruited from patients undergoing ART in a Centre in Rome according to the following inclusion criteria:

Childless women;

Attending the first medical visit of the specific cycle of ART;

- Undergoing ART for a fertility problem;
- An adequate understanding of the Italian language.

We excluded women with an inadequate understanding of the Italian language and/or with a history of psychiatric disorder. For the evaluation of this last criterion, it has been considered women's declaration of having received a diagnosis of psychiatric disorders and/or using pharmacological treatments for mental disorders. Potential adjustment difficulties associated with the infertility experience, which are common in this clinical population, were not considered as exclusion criteria.

Measures

Socio-demographic questionnaire. A specific socio-demographic questionnaire was designed to collect information concerning gender, age, social status, education level, occupational activity, cause of infertility, time since the beginning of pregnancy attempts and number of previous ART attempts. Through this questionnaire, information about participants' mental health was also collected (psychiatric diagnosis and pharmacological treatment for psychiatric disorders).

Experiences in Close Relationships-Revised. To assess and classify adult romantic attachment dimensions, a 36-item self-report questionnaire was used (Busonera et al., 2014; Fraley et al., 2000). The test is comprised of two scales that assess attachment anxiety and avoidance (18 items for each scale). Participants indicate their agreement with each item on a 7-point Likert-type scale. Higher scores are associated with a higher endorsement of the construct. The questionnaire showed good internal reliability (anxiety: Cronbach's $\alpha = .90$; avoidance: Cronbach's $\alpha = .89$). In the current sample, the Experiences in Close Relationships-Revised (ECR-R) demonstrated good internal reliability (anxiety: Cronbach's $\alpha = .82$; avoidance: Cronbach's $\alpha = .79$).

Couple Relationship Inventory. The scale developed by Solano et al. (2012) was utilized to assess the different components of a couple's relationship. This measure includes five factors: (1) Idealization/Persecution (four items) indicates how initial idealization of the partner presently appears as deep disappointment verging on persecution; (2) Attunement (12 items) reflects the capacity of partners to signal mutual needs or to join in shared intimate activities; (3) Mistrust (seven items) investigates uncertainty related to fidelity and reliability of the partner with a tendency to control the relationship; (4) Erotic Fantasies (seven items) reports sexual fantasies; and (5) Dependence (six items) indicates aspects of tenderness, attachment, care and dependence. Each item is rated on a 4-point Likert-type scale, and a score for each factor is obtained. The questionnaire showed sufficient

internal reliability of the scales (Solano et al., 2012): Idealization/Persecution (four items, Cronbach's $\alpha = .49$); Attunement (12 items; Cronbach's $\alpha = .80$); Mistrust (seven items; Cronbach's $\alpha = .59$); Erotic Fantasies (seven items; Cronbach's $\alpha = .62$); and Dependence (six items; Cronbach's $\alpha = .57$). In the current sample, a sufficient internal reliability of the scales was confirmed: Idealization/Persecution (four items; Cronbach's $\alpha = .51$); Attunement (12 items; Cronbach's $\alpha = .72$); Mistrust (seven items; Cronbach's $\alpha = .57$); Erotic Fantasies (seven items; Cronbach's $\alpha = .60$); and Dependence (six items; Cronbach's $\alpha = .58$).

Fertility Quality of Life. A questionnaire developed by Boivin et al. (2011a, 2011b) was used to measure the quality of life in infertile people and is divided into two modules. The Core Fertility Quality of Life (FertiQoL) consists of 24 items divided into four subscales: (1) Emotional, aimed to evaluate the impact of infertility on emotions (six items); (2) Mind-Body, aimed to evaluate the impact on physical health, cognition and behaviour (six items); (3) Relational, aimed to evaluate the impact of the condition of infertility in partnerships (six items); and (4) Social, aimed to evaluate the impact on social aspects (six items). The Treatment FertiQoL is an optional module consisting of 10 items divided into two subscales: (1) Environment, aimed to evaluate the impact related to the treatment environment (six items); and (2) Tolerability, aimed to evaluate the impact due to the consequences of treatment (four items). Each item is scored according to five response categories ranging from 0 to 4. Scores are reversed, summed and scaled to range from 0 to 100. High scores on the total FertiQoL scale or any subscale indicate a better quality of life. The questionnaire showed adequate internal reliability (total and subscale Cronbach's α ranged from .72 to .92; in the present sample, total and subscale Cronbach's α ranged from .71 to .92) and good overall psychometric characteristics (Aarts et al., 2011; Boivin et al., 2011a, 2011b; Donarelli et al., 2016).

Pregnancy outcome. Positive pregnancy outcome was defined as sustained positive (3 IU/mL) hCG followed by confirmation of clinical pregnancy by ultrasound. Negative pregnancy outcome was defined as negative hCG or the absence of confirmation of a clinical pregnancy by ultrasound, or the impossibility to proceed with embryo transfer due to the failure of the procedure. The ART outcome was determined through a review of medical records by the gynaecologist who followed the medical procedure of each participant.

Procedure

The present investigation is an observational, semi-longitudinal study that was conducted between January

and December 2018. The investigation was carried out in accordance with the code of ethics of the World Medical Association (Declaration of Helsinki) for experiments involving humans. Ethical approval was granted by the Ethics Committee of the Department of Dynamic and Clinical Psychology of the University of Rome 'Sapienza'.

Women were informed of the study at their first gynaecological visit in which the pharmacological treatment was established to begin the ART procedure. The gynaecologist screened for the eligibility of the women during their clinical evaluations, with the exclusion/inclusion criteria being routinely explored. After the medical visit, the gynaecologist introduced to eligible women the psychologist responsible for the research protocol implementation. In this occasion, the psychologist more deeply illustrated the research protocol, and the women who agreed to participate signed an informed consent before filling the tests. The entire research protocol took place for all the participants during the second medical visit for the ART procedure (and therefore during the medical treatment). The whole research protocol took place in the medical centre and was implemented by a qualified psychologist while subjects were waiting to be visited. After the conclusion of the medical procedure (about 2 weeks after the test filling), information about ART outcome were collected through the analysis of patients' medical records.

Ninety-eight women were invited to participate in the study: 88 agreed to participate while 10 declined. No woman was excluded for mental health problems since none has reported in the anamnesis procedure, or in the socio-anamnestic questionnaire, to have suffered from psychiatric disorders or to use drugs for their treatment. A total of 88 women were included in the research protocol. Non-participation was mainly due to time constraints.

Statistical analyses

Statistical analyses were conducted using the Statistical Package for Social Science (SPSS) version 24. Data were reported as frequency and percentage for discrete variables and as means and standard deviations for continuous variables. Pearson correlations were used to measure the associations among romantic attachment, couple characteristics, infertility-related quality of life and ART outcome (classified as a dummy variable pregnancy/not pregnancy). Furthermore, the variables significantly related to ART outcome in the correlational analysis were selected to be subsequently inserted in the multi-variable logistic regression, which included ART outcome as the dependent variable. All variables were entered simultaneously. Statistical significance was considered when $p < .05$.

Results

In Table 1, socio-demographic characteristics and test scores of participants are reported.

Table 1. Socio-demographic and psychological characteristics of the sample.

Variables	M/%	SD/n
Age	37.42	4.79
Partner's age	39.23	6.24
Number of previous attempts	0.91	1.59
Months since the beginning of pregnancy attempts	19.35	13.24
Romantic attachment:		
ECR-R Anxiety	44.23	14.72
ECR-R Avoidance	43.97	13.32
Couple Relationship Inventory (CRI):		
Idealization/Persecution	7.27	2.12
Attunement	38.04	3.82
Mistrust	10.98	2.82
Erotic Fantasies	10.11	2.72
Dependence	15.64	3.43
Fertility Quality of Life (FertiQoL):		
Emotional	70.64	20.86
Mind-Body	76.22	19.50
Relational	81.93	14.16
Social	72.66	18.31
Environment	65.41	17.35
Tolerability	66.07	16.55
Total Core FertiQoL	75.35	14.77
Total Treatment FertiQoL	65.60	13.53
Total FertiQoL	72.62	13.09
Social status:		
Married	65.9%	58
Educational level:		
13 years	32.9%	29
≥ 16 years	67.1%	59
Employment status:		
Employee	45.45%	40
Freelance	29.55%	26
Housewife	14.77%	13
Unemployed	10.23%	9
Infertility cause:		
Unknown	43.2%	38
Female	30.7%	27
Male	11.3%	10
Both partners	14.8%	13
ART:		
IUI	29.6%	26
IVF-ET/ICSI	70.4%	62

ECR-R: Experience in close relationship-revised; ART: assisted reproductive treatment; IUI: intrauterine insemination; IVF-ET: in vitro fertilization with embryo transfer; ICSI: intracytoplasmic sperm injection.

Correlation analyses showed several associations between couple characteristics, infertility-related quality of life and anxiety/avoidance attachment in the infertile women (see Table 2).

More specifically, ECR-R Anxiety showed significant positive correlations with Couple Relationship Inventory (CRI) Idealization/Persecution and Mistrust and significant

Table 2. Correlations among romantic attachment, couple dimensions, infertility-related quality of life and socio-demographic characteristics.

	Age	Months of pregnancy attempts	ART outcome	ECR-R Anxiety	ECR-R Avoidance	FertiQoL Emotional	FertiQoL Mind-Body	FertiQoL Relational	FertiQoL Social	FertiQoL Environment	FertiQoL Tolerability	Total Core FertiQoL	Total Treatment FertiQoL	Total FertiQoL
Age	-													
Months since the beginning of pregnancy attempts		-												
ECR-R Anxiety			-											
ECR-R Avoidance				-										
ART outcome					-									
CRI Idealization/Persecution														
CRI Attunement														
CRI Mistrust														
CRI Erotic Fantasy														
CRI Dependence														

ECR-R: Experience in Close Relationship-Revised; ART: assisted reproductive treatment; CRI: Couple Relationship Inventory; FertiQoL: Fertility Quality of Life. * $p < .05$; ** $p < .01$.

negative correlations with FertiQoL Emotional, Mind-Body, Social, Environment and Tolerability scales as well as Total Core, Total Treatment and Total FertiQoL. ECR-R Avoidance showed a significant positive association with CRI Mistrust and a negative association with CRI Attunement.

Several significant associations were also found between couple characteristics (CRI) and several scales of FertiQoL. More specifically, CRI Idealization/Persecution was negatively related to all FertiQoL totals and scales. CRI Attunement was positively related to the Relational and Environment scales of FertiQoL. CRI Dependence was positively related to the Relational scale of FertiQoL. ART outcome was negatively related to ECR-R Avoidance and positively related to CRI Dependence. Age was positively related to FertiQoL Mind-Body scores and negatively to CRI Dependence.

In our sample, the rate of ART positive outcome was 23.9 per cent. To investigate possible predictors of medical treatment success, a logistic regression analysis was performed using ART outcome as the dependent variable and age (not significant in correlation analyses but theoretically predictive of the outcome), ECR-R Avoidance, and CRI Dependence as independent variables. The model accounted for 20 per cent ($R^2 = .201$; $\chi^2 = 12.695$; $df = 3$; $p = .005$) of the criterion variable (ART outcome). In particular, the model showed a significant predictive effect of ECR-R Avoidance on ART outcome ($B = -.066$; $\text{Exp}(B) = .95$; $df = 1$; confidence interval (CI) = .884–.992; $p = .025$), whereas age and CRI Dependence were not statistically significant.

Discussion

We sought to examine the associations among romantic attachment, couple characteristics, infertility-related quality of life and medical treatment outcome in women attempting an ART, as well as study the possible predictive effect of psycho-social variables on the success of the medical treatment. The results partially confirmed the study hypotheses, as several associations among couple characteristics, attachment anxiety and avoidance dimensions, and infertility-related quality of life in infertile women were found.

Regarding attachment dimensions, the ECR-R Anxiety levels were positively related to CRI Idealization/Persecution and Mistrust, demonstrating that increased scores on the anxiety dimension were associated with higher levels of disappointment, persecution and doubtfulness related to the loyalty and reliability of one's partner. Furthermore, the ECR-R Anxiety levels were negatively related to FertiQoL Emotional, Mind-Body, Social, Environment, and Tolerability scales as well as to all Totals, demonstrating how increased scores on the anxiety dimension were associated with a high impact of infertility on emotions, physical health, cognition and behaviour,

social aspects and also to the impact of treatment (i.e. accessibility and perceived quality of services). More generally, high levels of anxiety were associated with a worse quality of life related to a great impact of the infertility condition on several individuals' life domains. Moreover, the ECR-R Avoidance dimension showed a significant positive association with CRI Mistrust and a negative association with CRI Attunement, suggesting that increased scores on the avoidance dimension were associated with higher levels of mistrust related to the fidelity and availability of one's partner and with a lower capability to signal mutual necessities or to join in shared activities. These findings are in line with previous studies which have demonstrated that the dysfunctional thoughts, feelings and behaviours characterizing insecure people make them less likely to be satisfied with their intimate relationships and more likely to experience mistrust of others (Donarelli et al., 2016; Mikulincer and Shaver, 2007; Simpson and Rholes, 2010). All of this might concur to the difficulty in demonstrating one's needs to the partner and obtaining concrete and emotional support, which has possible consequences on perceived quality of life.

In the same direction, several significant associations between couple characteristics (CRI) and some scales and totals of FertiQoL were also found. More specifically, CRI Attunement was positively related to Relational and Environment scales of FertiQoL; thus, the capability of partners to signal mutual needs seems to reduce the negative impact of both the condition of infertility on partnership and the issue associated with the treatment. Furthermore, CRI Dependence was positively related to the Relational scale of FertiQoL, indicating that perceiving aspects of tenderness and care can reduce the negative impact of the condition of infertility on partnerships. Moreover, CRI Idealization/Persecution was negatively related to all FertiQoL totals and scales. This finding indicates that in women attending ART, a worse quality of life seems to be associated with an initial idealization of the partner that over time turns into a deep disappointment similar to persecution. This may characterize the situations in which the infertility condition is unknown or due to the male partner, or more generally, these negative feelings through the partner might be favoured by the nature of the treatments, which mainly affect the women that 'embody' the infertility and related medical treatments. In fact, all women potentially embody infertility because success or failure to conceive plays out through women's bodies (Clarke et al., 2006). Moreover, regardless of who is diagnosed with fertility problems in the couple, the treatment asymmetrically focuses on women's bodies (Greil et al., 2010; Johnson and Fledderjohann, 2012). In fact, in the different fertility medical procedures, and especially in those where the fertilization occurs *in vitro*, there is a greater women's bodily engagement, even in the absence of a personal diagnosis: daily injections, blood samples,

hormonal stimulation, laparoscopic surgery with the pick-up of the oocytes and after a few days the embryos transfer (An et al., 2013).

All findings of this study appear to be in line with those of previous investigations highlighting that the perception of a satisfying dyadic relationship and the adoption of social support coping strategies were associated with higher quality of life and psychological health in female patients (Zurlo et al., 2018).

Regarding the success of medical treatment, in this study, ART outcome showed a negative correlation with ECR-R Avoidance and a positive correlation with CRI Dependence, whereas contrasting with our hypothesis, quality of life and age did not show significant associations with ART outcome. Furthermore, the results from a multivariable logistic regression analysis suggested that only ECR-R Avoidance played a role in ART positive outcome. Therefore, in contrast to the existing literature, age and infertility-related quality of life did not show significant effects on treatment outcome in this study (Chuang et al., 2003; Pottinger et al., 2016).

This study is part of the research line aimed to explore the specific role of attachment dimensions in infertility (Amir et al., 1999; Bayley et al., 2009; Donarelli et al., 2012, 2016; Lowyck et al., 2009; Mikulincer et al., 1998); moreover, it represents the first attempt in the investigation of the possible role of romantic attachment on ART outcomes. In this study, ART positive outcome appears to be associated with lower levels of fear of dependence and interpersonal intimacy, and to a low need for both self-reliance and resistance in self-disclosing within the romantic relationship. It could be hypothesized that in close relationships, avoidant individuals consider negatively the other people as they believe that others cannot be trusted to care for them (Simpson and Belsky, 2008). Therefore, such an attitude might prevent women from obtaining a suitable support from partners with a consequent increase of negative emotions and feelings, all associated to an increase of stress in the women (Matsubayashi et al., 2004). At the same time, previous studies investigating the role of stress and psychological dimensions on medical outcome had shown that the levels of stress can influence ART outcome by impairing psychobiological pathways associated to the pregnancy (Cousineau and Domar, 2007; Ebbesen et al., 2009; Nakamura et al., 2008; Renzi et al., 2020). Therefore, we can hypothesize that attachment avoidance is associated with lower capacity to show the own needs and to get support from others, determining higher stress that was found to be associated with lower positive outcomes. It should be noted that this is a preliminary investigation and that other possible explanations for the present findings could be evaluated in future studies.

The present findings must be interpreted in the light of some limitations. First, the study design was observational and semi-longitudinal, which precludes drawing definitive

conclusions regarding the direction of relationships and the causal relationships between variables. In addition, the sample was composed only of women facing fertility problems, and this was due to the fact that most of the infertility literature is focused on women considering that they receive the medical treatment and are most likely to develop psychological disorders during ART (Chiaffarino et al., 2011; Culley et al., 2013; Ramírez-Uclés et al., 2015). However, the functioning of couples in the specific contest of infertility and ART has received little attention during the last decades and therefore should be further investigated (Schmidt, 2009). In this direction, future studies should include the male partner and investigate the couple as a unit, examining how both partners' psychological characteristics (such as attachment and couple dimensions) can influence ART outcomes. Furthermore, the sample was drawn from only one infertility clinic, which might have introduced selection bias. Other potential limitations are the selection of mixed participants regarding both the cause of infertility problems (male partner, female partner, both partners or unknown causes) and the number of previous ART attempts. The specific cause of infertility problems and the experience of previous attempts could influence the experience and the feelings of women facing ART. Further studies should be focused on these specific sub-populations to exclude or explore the potential influencing effect of these variables. Moreover, the lack of an evaluation of infertility-related stress represents a further limitation; an evaluation of stress should be included to specifically explore its role in mediating the association between romantic attachment and ART outcomes. All these limitations could have influenced the present findings acting as confounders and should be carefully considered in future studies.

Conclusion

To our knowledge, this study is the first to investigate the effect of both romantic attachment, specific couple characteristics, and infertility-related quality of life on ART outcomes, highlighting the role of avoidant attachment. These results have clinical implications for psychological interventions. As stated by Moura-Ramos et al. (2017), attachment dimensions and related strategies of emotion regulation represent central elements for promoting couples' well-being in clinical settings. Therefore, health professionals working in this contest should focus their intervention on the marital relationship, particularly on the issue of mutual support between partners, since promoting mutual support and care seem to be the best ways to preserve the quality of a marriage from possible negative consequences of infertility and related treatments.

Ethical approval

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. Ethical approval was granted by the Ethics Committee of the Department of Dynamic and Clinical Psychology of the University of Roma 'Sapienza'.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship and/or publication of this article.

Informed consent

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

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