Self-efficacy, coping strategies and quality of life in women and men requiring assisted reproductive technology treatments for anatomical or non-anatomical infertility

Title

Self-efficacy, coping strategies and quality of life in women and men requiring assisted reproductive technology treatments for anatomical or non-anatomical infertility

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Abstract

Objective: To examine the magnitude and the predictors of emotional reactions to an infertility diagnosis, comparing women and men who were clinically diagnosed with an anatomical cause of infertility or non-anatomical cause of infertility.

Study design: Cross-sectional study involving a total of 133 adults waiting for infertility treatment at the IVF and Infertility Unit of the S. Orsola University Hospital in Bologna (Italy). Of these, 107 patients (55 with anatomical causes of infertility and 52 with non-anatomical causes of infertility; response rate: 80%) took part to the study. After providing informed written consent, each participant was asked to complete the Infertility Self-efficacy Scale, the Fertility Quality of Life, and the Brief Coping Orientation to Problem Experienced, which they returned at their second access to the Unit. Differences between the groups were analyzed through a series of univariate ANOVA, whereas a multiple regression analysis was used to jointly examine the predictors of fertility quality of life.

Results: Results showed both gender related and diagnosis related differences. Women had statistically significant lower scores than men on the Infertility Self-Efficacy Scale and on the global, emotional, and mind-body subscales of the Fertility Quality of Life, while they scored significantly higher on the emotion focused and socially supported subscales of the Coping Orientation to Problem Experienced. Independently of gender, patients with non-anatomical causes of infertility scored poorly than patients with anatomical causes of infertility on the relational subscale of the Fertility Quality of Life and on the Avoidant scale of the Brief Coping Orientation to Problem Experienced. Hierarchical multiple regression analyses revealed that higher levels of

self-efficacy and a lower use of avoidant coping strategies predicted a more positive quality of life over and above gender and cause of infertility.

Conclusion: This study partly confirms data on gender differences in experiencing the psychological burden of infertility and adds some new information, particularly with respect to the prediction of quality of life indicators over and above infertility cause.

Keywords: infertility, assisted reproductive technology, coping strategies, self-efficacy, quality of life, health psychology

1. Introduction

Worldwide around 186 million people suffer from infertility [1]. Though causes of infertility may be attributed to female, male, mixed, or unknown factors, epidemiological data show a prevalence of female-specific infertility diagnosis in one out of seven couples in the western world and in one out of four couples in developing countries [2]. At the same time, male-specific factors are found to be responsible for approximately 20–30% of infertility cases [2- 3]. Given these numbers, the demand for Assisted Reproductive Technology (ART) treatments is on the rise, as well as the need for an improvement in techniques attempting to ensure the preservation of reproductive health even in serious pathological conditions, such as in the case of cancer patients [4-6].

Despite the progresses made in infertility treatments, both involuntary childlessness and ARTs may negatively impact on several domains of a person's life [7,8], including marital relationship [9,10], sexuality [11], quality of life, and mood [12]. Besides, current literature shows that emotional responses to infertility and ARTs may have a negative effect on treatment outcomes, thus decreasing the probabilities of achieving pregnancy [13,14]. For this reason, expanding our understanding of the diverse psychological profiles of infertile patients may be essential to improve tailored intervention, which could lead to potential positive outcomes on treatment results.

Although infertility is an equally exhausting condition for both women and men [15], studies generally report that women are more vulnerable to the emotional experience of infertility than men [16-19]. Even if some investigators suggest that men may experience a greater distress when infertility is due to the male factor [20-22], others found no evidence to support the hypothesis that male factor infertility affects men more negatively than other diagnoses of infertility (i.e., female, mixed, or unexplained) [23-24]. A study by Dhillon and colleagues [25] showed that

mood and coping styles in oligoaspermic, euspermic and fertile men were similar, suggesting that men's psychological adjustment to their own infertility is generally healthy.

However, not many studies have taken into account the potential role of specific conditions of infertility. Existing research focuses mainly on psychological wellbeing either of infertile women or men in general. A few studies have been conducted on populations of infertile women being diagnosed with specific conditions such as endometriosis [26], pelvic inflammatory disease [27], and diminished ovarian reserve (DOR) [28]. To our knowledge, only a recent study by Nicoloro-SantaBarbara and colleagues [29] took into account simultaneously women diagnosed with DOR and women with anatomical cause of infertility (ACI; e.g., tubal occlusion, tubal damage, and intrauterine adhesions) showing that women with DOR had greater infertility distress but similar self-esteem and emotional reactions to women whose infertility was caused by anatomical or physiologic factors. These findings aside, we are unaware of any report examining potential differences in the experience of infertility in men and women seeking treatments to conceive depending on whether the underlying cause of their infertility is known or unknown. At the same time, to our knowledge there is no study focusing on the differences between men diagnosed with ACI (e.g., varicocele, maldescended testes, and testicular tumor) and infertile men whose medical examinations did not reveal any physical and/or hormonal alterations.

The present study aimed to describe and compare levels of infertility self-efficacy, coping strategies and quality of life in women and men waiting for ART treatments by taking into account whether the diagnosis of infertility had anatomical or non-anatomical causes. In line with the existing literature, showing worse psychological adjustment for women, we expected women to have lower levels of both quality of life and self-efficacy compared to men. With regards to differences based on the cause of infertility, we did not have specific hypothesis given the lack of prior investigation. However, according to a recent study by Nicoloro-SantaBarbara and colleagues

[29], we can expect patients with a diagnosis of anatomical infertility to show a better adjustment compared to men and women with a non-anatomical infertility diagnosis. We also examined the predictive role of coping strategies and infertility self-efficacy on quality of life in both men and women controlling for infertility causes. In the field of infertility, self-efficacy was defined as the individuals' confidence level on their cognitive, emotional and behavioral skills related to the impossibility to conceive and to the experience of ARTs [30]. Though self-efficacy has proven to be a relevant psychological variable regarding health promotion and outcomes, few studies investigate this construct with infertile women and men. Findings from these studies suggest that higher infertility self-efficacy may be protective against depression, anxiety and infertility related stress [31]. Hence, we expected higher self-efficacy to predict a more positive quality of life irrespective of gender and cause of infertility.

2. Material and Methods

Participants were enrolled from October 2018 through October 2019 at the Infertility and IVF Unit of the S. Orsola University Hospital (Bologna, Italy) during their first medical consultation. All patients had received a diagnosis of infertility and took part in a larger study on the psychological impact of ARTs supported by the Italian Ministry of Health (study reference number J33C17000560001). The time since diagnosis was not recorded. The causes of infertility for each patient were supported by patient's medical reports.

Regarding women, the Anatomical Cause of Infertility (ACI) group included conditions such as bilateral tubal occlusion or damage, unilateral tubal occlusion or damage if deemed likely to have affected both tubes, surgical removal of one or both ovaries, chemotherapy or radiation therapy, Turner syndrome, endometriosis, myomas distorting the uterine cavity, congenital uterine anomalies, and other less frequent anomalies of the reproductive tract. The ACI group was aged 18–46 years at enrollment, had regular menstrual cycles, and was deemed ovulatory at the time of

enrollment by the physician. The non-anatomical cause of infertility (non-ACI) group, included women who received the following clinical diagnoses: (1) unexplained Premature Ovarian Insufficiency (POI) based on elevated but not postmenopausal FSH levels timed to their menstrual cycle and low antimüllerian hormone (AMH) levels for their age; (2) unexplained Diminished Ovarian Reserve (DOR) based on low AMH levels for women's age or elevated FSH or few antral follicles, despite the presence of regular menstrual cycles in the last six months.

With regards to men, the ACI group included conditions such as varicocele, cryptorchidism, testicular cancer, chemotherapy or radiation therapy, injuries or trauma, Y-chromosome microdeletions, Klinefelter syndrome, which determined an alternation of semen analysis if compared to the guidelines on semen parameters established by the World Health Organization [32]. The non-ACI group included instead those men who showed abnormal semen analysis [32], without reporting physical and/or hormonal alterations [33] on their medical examinations.

The study was approved by the Hospital's Ethics Committee and was conducted in accordance with the Helsinki Declaration. After providing informed written consent, demographic and clinical data were recorded during a first medical consult. Both women and men who took part in the study received an envelope with a set of self-report questionnaires to assess infertility-related emotional and psychological variables. Questionnaires were returned approximately after three months, during a second medical consult.

2.1 Measures

2.1.1 Self-Efficacy. Self-efficacy was assessed with the 16-item Infertility Self-Efficacy Scale (ISE) [30], which evaluates the levels of self-efficacy in individuals with fertility problems. Items are scored on a nine-point Likert scale (1 strongly disagree – 9 strongly agree), with higher scores indicating a more positive perception of individual's self-efficacy. The ISE has strong reliability as evidenced in the current study (Cronbach's $\alpha = .85$).

2.1.2 Coping strategies. The Brief Coping Orientation to Problem Experienced (Brief COPE) [34] evaluates the individual's capacity to cope with life's problems through 28 items rated on a five-point Likert scale ranging from 1 to 5. It measures 14 different coping strategies: active coping, planning, positive reframing, acceptance, humor, religion, using emotional support, using instrumental support, self-distraction, denial, venting, substance use, behavioral disengagement, and self-blame. Each of the 14 coping strategies is indicated by two items and can be grouped into four major coping strategies categories: Avoidant, Emotion Focused, Problem Solving, and Socially Supported [35]. The Italian version of Brief COPE has been psychometrically tested and proved adequate properties [36]. In the current study, the instructions asked each participant to indicate what they generally do and feel when they experience infertility-related distress. The dimensions of the Brief COPE showed good reliability levels (Cronbach's α ranged between .80 and .84).

2.1.3 Quality of Life. The FERTIQoL (FERTIQoL) [37] assesses the quality of life in couples with fertility problems. It consists of 24 items scored according to a five-point Likert scale ranging from 0 to 4, with higher scores meaning higher quality of life. The FERTIQoL provides a global score and yields four subscales consisting of six items each: Emotional, Mind-Body, Relational and Social. Reliability levels for each subscale and the for the global FERTIQoL score were satisfactory (Cronbach's α ranged between .83 and .86).

2.2 Statistical analysis

Statistical analyses were performed using the Statistical Package for the Social Sciences Version 25 for Windows (NY, USA). A series of Chi-Squared test were run to analyze for differences between ACI and non-ACI groups in demographic and clinical variables. Univariate Analysis of Variance (ANOVA) was performed to examine mean-level differences on psychological variables between ACI and non-ACI groups, and gender effects on those differences.

A three-block hierarchical regression was used to test the predictive value of gender, cause of infertility, coping strategies, and infertility self-efficacy on fertility quality of life.

3. Results

3.1 Sample composition

Overall, 69 infertile women (ACI = 38, non-ACI = 31) and 38 infertile men (ACI = 17, non-ACI = 21) took part to the study, out of 133 patients who were asked to complete the questionnaires. All participants were Italian, married, and seeking treatment to conceive with a partner. Table 1 shows comparisons for demographic and clinical variables between women and men by cause of infertility. Both women and men with non-ACI were older than their ACI counterparts, however this comparison did not reached significance ($p > .05$). The most common causes of ACI for women were endometriosis (52.6%), surgery to the fallopian tubes (17.6%), and chemotherapy or radiation therapy (8.8%), with some women reporting more than one cause. Non-ACI conditions for women were DOR (67.8%) and POI (32.2%). With regards to men, the most common causes of ACI were varicocele (58.8%) and chemotherapy or radiation therapy (29.4%).

3.2 Comparison between women and men with ACI or non-ACI on study variables

The results of univariate ANOVA are displayed in Table 2. Overall, non-ACI women and men presented significant lower levels of relational quality of life assessed with the FertiQoL (i.e., a greater impact of fertility problems on couples sexuality, communication, and commitment) as well as a prevalent use of avoidant coping strategies to face infertility distress compared with women and men with ACI. The ACI group also presented higher levels at all dimensions of the FERTIQoL and at the global fertility quality of life score, though such differences did not reach significant levels. No significant interaction cause of infertility x gender was detected (all *p*s > .05). Moreover, compared to men, women reported significant lower levels of infertility self-efficacy, global, emotional, and mind-body quality of life, while they scored significantly higher on emotion focused

and socially supported coping strategies. On these variables, the differences related to the cause of infertility did not reach significance.

3.3 Prediction of quality of life

Results from multiple regression analysis to jointly examine the predictors of fertility quality of life are presented in Table 3. We did not include problem solving among predictors of regression models given that the differences we found on this variable did not reach statistical significance. The cause of infertility was instead included as a predictor in the first step of the regression model together with gender, even though results from univariate ANOVA indicated that four out of five dimensions of the FERTIQoL did not differ by infertility diagnosis (see Table 2). Results of the regression models showed that in the first step, gender predicted significantly the global score of the FERTIQoL as well as the subscales Mind-Body ($p < .05$) and Emotional ($p < .01$), while infertility diagnosis was a statistically significant predictor of the subscale Relational of the FERTIQoL only (b = -.24, B = -1.85, $t = -2.43$, $p < .01$). Such results indicate that women show an overall worse quality of life compared to men, and that infertility caused by non-anatomical factors predicted lower levels of relational quality of life. In the second step of all regression models, avoidant coping negatively predicted overall quality of life ($p < .001$), and the dimensions Social (P < .05), Mind-Body ($p < .01$), and Emotional ($p < .001$) of the FERTIQoL. In the third step, self-efficacy resulted a positive predictor of all FERTIQoL scores (all Ps < .001) over and above the effects of other variables included in the model.

4. Discussion

This study wanted to explore the differences in emotional responses to infertility between women and men who were clinically diagnosed with an anatomical cause of infertility (ACI) or a non-anatomical cause of infertility (non-ACI). Moreover, the present study examined the predictive

effects of gender, etiology of infertility (ACI vs. non-ACI), infertility self-efficacy, and coping strategies on quality of life levels in two samples of men and women seeking treatment to conceive with their partners.

We observed that women and men with a diagnosis of infertility caused by non-anatomical factors presented significant lower levels of relational quality of life assessed with the FertiQoL (i.e., a greater impact of fertility problems on couples sexuality, communication, and commitment) as well as a prevalent use of avoidant coping strategies to face infertility distress compared with women and men with ACI. Contrary to patients diagnosed with non-anatomical infertility, women and men with ACI have the possibility to identify a reason for their childlessness, and such "tangible reason" may contribute to a better emotional adjustment [29, 38] in coping with infertility challenges. Our data also showed that the non-ACI group presented lower overall levels of quality of life and self-efficacy compared to both men and women diagnosed with ACI, though these differences did not reach significance. We believe that childlessness might be a plausible explanation for the absence of significant group differences found in infertility-related variables, since most participants didn't reach pregnancy before data were collected (only 12% and 11% of the ACI and non-ACI participants reported previous pregnancies respectively). Moreover, it has to be acknowledged that all patients accessed the infertility clinic to seek treatment to conceive and that most of them (76% and 56% of the ACI and non-ACI groups respectively) were at their first experience with ART.

In line with the existing literature [7, 12, 18-19, 39], the present study found that women have worse psychological conditions compared to men, irrespectively of the etiology of infertility. Particularly, we found that women showed statistically significant lower levels of self-efficacy and quality of life, represented by the global, emotional, and mind-body subscales' scores of the FertiQoL. At the same time, women used more positive coping strategies to face infertility

challenges, namely, focusing on emotions and seeking social support. These findings are in line with existing literature on the topic [40-41] thus suggesting the need to consider gender differences in coping strategies in the treatment of infertility.

Particularly, findings from hierarchical regressions demonstrated that, irrespective of both gender and cause of infertility, self-efficacy was the strongest predictor of quality of life indicators, together with avoidant coping strategy. Such result seems to indicate that good levels of self-efficacy as well as a minor use of avoidant coping strategies may be protective against the emotional burden of infertility assessed with the FertiQoL, a well-validated measure of infertility-related quality of life, over and above infertility etiology (anatomical vs. non-anatomical). Along this line, we would recommend future studies to expand our findings by comparing the results obtained over the FertiQoL with other useful tools assessing the risk for emotional distress and pre-treatment dropout among patients, such as the SCREENIVF [42], despite less research is currently available on its cross-cultural stability of its psychometric properties.

Understanding the factors that influence fertility related quality of life, a multidimensional construct relevant to the psychological health and wellbeing of infertile patients [37], can help fertility clinic professionals to identify patients in greater need for support, as well as to develop effective interventions. Counseling provided by mental health professionals with specific training in infertility may be especially beneficial to patients seeking for treatment [43], and such new knowledge may help to provide more effective support to individuals in need.

Several limitations have to be acknowledged. Our findings rely on a small, homogeneous sample comprising only patients seeking treatment with their partner. Yet, the time since diagnosis was not recorded systematically and this might have affected our results. Along this line, it is important to consider that the emotional burden experienced by women and men with infertility issues may vary in response to different psychosocial and medical factors [44], including how and

when they learn about their chances for natural conception, the particular diagnostic procedures they have to undergo, the social support they receive, the quality of counseling given by members of the clinical staff. Therefore, future studies should take these variables into account.

In conclusion, despite these limitations, the present study is one of the first investigation examining associations among coping strategies, infertility self-efficacy, and fertility quality of life in two well-defined infertility cohorts of men and women seeking treatment for infertility. Study results show that beyond the differences related to the etiology of infertility, a good self-efficacy and a low use of avoidant coping may be protective factors for a better psychological and emotional adjustment. Hence, these evidences offer a foundation for further investigations using more heterogenous samples and a wider range of clinical and psychosocial variables.

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Table 1. Demographic and clinical variables of both men and women stratified by anatomical versus non-anatomical cause of infertility.

	Women		Men	
Sample characteristics	Non-ACI (n = 31)	ACI (n = 38)	Non-ACI (n = 21)	ACI (n = 17)
Mean age in years (SD)	39.8 (4.3)	37.4 (4.9)	39.7 (4.9)	36.7 (5.6)
Level of education (%)				
High school or below	6 (19.5)	6 (15.8)	8 (38.1)	6 (35.3)
University	11 (35.6)	17 (44.8)	8 (38.1)	6 (35.3)
Postgraduate	8 (25.9)	10 (26.4)	5 (23.8)	5 (29.4)
Occupational status (%)				
Employed	29 (93.6)	36 (94.7)	21 (100)	17 (100)
Unemployed	2 (6.4)	2 (5.3)	0	0
Previous ARTs attempts (%)				
Yes	16 (51.6)	10 (26.3) [a]	7 (33.3)	3 (17.6)
No	15 (48.4)	28 (73.7)	14 (66.7)	14 (82.4)
Previous pregnancies (%)				
Yes	3 (9.7)	5 (13.2)	2 (9.5)	1 (5.9)
No	28 (90.3)	33 (86.8)	19 (90.5)	16 (94.1)

Note. ACI = anatomical cause of infertility; Non-ACI = non anatomical cause of infertility; SD = standard deviation.

[a] $p < .05$

Table 2. Comparisons on study variables between women and men with anatomical and non-anatomical cause of infertility.

	Women			Men					
	ACI (n = 38)	Non-ACI (n = 31)	Total (n = 69)	ACI (n =17)	Non-ACI (n = 21)	Total (n = 38)	Gender	Cause of infertility	Gender and Cause of Infertility
Infertility self-efficacy	6.6 ± 1.5	6.1 ± 1.5	6.4 ± 1.5	7.2 ± 3.8	7 ± 1.2	7.1 ± 1	F (1, 106) = 7.04 [b]	F (1, 106) = 1.46	F (2, 104) = .29
Coping strategies									
Avoidant	2.8 ± .9	3.3 ± 1.1	3.1 ± .9	2.8 ± .8	3.2 ± .9	3 ± .9	F (1, 106) = .5	F (1, 106) = 6.1 [b]	F (2, 104) = .1
Problem Focused	7.2 ± 19.7	7.1 ± 21.2	7.2 ± 1.7	7.1 ± 23.8	7.3 ± 22.5	7.2 ± 1.5	F (1, 106) = .00	F (1, 106) = .01	F (2, 104) = .18
Emotion Focused	6.5 ± 1.1	6 ± 1.3	6.2 ± 1.2	5.8 ± 1.2	5.6 ± 1.8	5.7 ± 1.5	F (1, 106) = 4.6 [c]	F (1, 106) = 1.5	F (2, 104) = .29
Socially Supported	5.8 ± 1.4	5.8 ± 1.7	5.8 ± 1.5	4.6 ± 1.3	4.5 ± 1.5	4.6 ± 1.3	F (1, 106) = 14.4 [a]	F (1, 106) = .00	F (2, 104) = .03
Fertility Quality of Life	73.4 ± 14.8	68.9 ± 16.5	71.3 ± 15.7	82.1 ± 9.5	75.6 ± 13.5	78.6 ± 12.1	F (1, 106) = 6.3 [b]	F (1, 106) = 3.2	F (2, 104) = .1
Emotional	16.9 ± 4.8	15.7 ± 5.5	16.4 ± 5.1	20.2 ± 4.3	18.7 ± 3.9	19.4 ± 4.1	F (1, 106) = 9.2 [b]	F (1, 106) = 1.9	F (2, 104) = .3
Mind-Body	18.8 ± 5	18.2 ± 5	18.6 ± 5	22 ± 2.8	20 ± 3.8	20.9 ± 3.5	F (1, 106) = 6.5 [c]	F (1, 106) = 1.9	F (2, 104) = .5
Relational	19.8 ± 3.4	17.6 ± 4.5	18.8 ± 4.1	20.2 ± 3.8	18.9 ± 2.4	19.5 ± 3.3	F (1, 106) = 1.1	F (1, 106) = 4.9 [c]	F (2, 104) = .27

	Women			Men					
	ACI (n = 38)	Non-ACI (n = 31)	Total (n = 69)	ACI (n =17)	Non-ACI (n = 21)	Total (n = 38)	Gender	Cause of infertility	Gender and Cause of Infertility
Social	17.8 ± 4.8	17.3 ± 4.8	17.5 ± 4.8	19.6 ± 2.9	18 ± 3.8	18.8 ± 3.4	F (1, 106) = 1.9	F (1, 106) = 1.2	F (2, 104) = .29

Note. Data are presented as mean ± standard deviation. ACI = anatomical cause of infertility; Non-ACI = non anatomical cause of infertility.

[a] $p < .001$

[b] $p < .01$

[c] $p < .05$

Table 3. Hierarchical regressions testing the effects of coping strategies and self-efficacy on quality of life indicators.

	Global Quality of Life		Relational		Social		Mind-Body		Emotional	
	$F(6, 107) = 18.36$ [a], $R^2 = .55$		$F(6, 107) = 4.84$ [a], $R^2 = .24$		$F(6, 107) = 6.39$ [a], $R^2 = .30$		$F(6, 107) = 14.6$ [a], $R^2 = .49$		$F(6, 107) = 20.19$ [a], $R^2 = .57$	
Predictor	β	ΔR^2_{adj}	β	ΔR^2_{adj}	β	ΔR^2_{adj}	β	ΔR^2_{adj}	β	ΔR^2_{adj}
Step 1		.07 [c]		.06 [c]		.02		.07 [c]		.09 [c]
Gender	-.23 [c]		-.09		-.12		-.24 [b]		-.28 [a]	
Cause of infertility	-.17		-.24 [c]		-.09		-.11		-.13	
Step 2		.25 [a]		.09 [b]		.13 [a]		.20 [a]		.31 [a]
Avoidant coping	-.42 [a]		-.28 [b]		-.32 [a]		-.35 [a]		-.42 [a]	
Socially supported	-.15		-.02		.06		-.21 [a]		-.27 [a]	
Emotion focused	.26 [b]		.12 [c]		.16		.23 [a]		.33 [b]	
Step 3		.23 [a]		.09 [a]		.15 [a]		.23 [a]		.17 [a]
Self-efficacy	.62 [a]		.39 [a]		.51 [a]		.62 [a]		.54 [a]	

[a] $p < .001$

[b] $p < .01$

[c] $p < .05$

Highlights

- Common and diagnosis-specific factors for a better adjustment to infertility were detected
- Common and gender-specific factors for a better adjustment to infertility were detected
- Higher levels of self-efficacy and a lower use of avoidant coping strategies predicted a better infertility quality of life
- Self-efficacy and coping strategies can help to identify patients in greater need for emotional support