

Psychological Distress, Dyadic Coping, and Quality of Life in Infertile Clients Undergoing Assisted Reproductive Technology in China: A Single-Center, Cross-Sectional Study

Jie Bai¹, Jinxia Zheng¹, Yueyan Dong¹, Ke Wang¹, Cheng Cheng², Hui Jiang³

¹Shanghai Key Laboratory of Maternal Fetal Medicine, Shanghai Institute of Maternal-Fetal Medicine and Gynecologic Oncology, Shanghai First Maternity and Infant Hospital, School of Medicine, Tongji University, Shanghai, 200092, People's Republic of China; ²School of Nursing, Fudan University, Shanghai, 200032, People's Republic of China; ³Nursing Department, Shanghai First Maternity and Infant Hospital, School of Medicine, Tongji University, Shanghai, 200092, People's Republic of China

Correspondence: Hui Jiang, Nursing Department, Shanghai First Maternity and Infant Hospital, School of Medicine, Tongji University, Shanghai, 200092, People's Republic of China, Tel +86 021-20261221, Fax +86 021-20261221, Email jianghuiest@163.com

Purpose: Infertile clients undergoing assisted reproductive technology (ART) are exposed to a stressful situation and evidence has highlighted the importance of dyadic coping in reducing stress, yet little is known about the associations between psychological distress, dyadic coping, and quality of life in this population.

Patients and Methods: A cross-sectional study was conducted at a tertiary hospital in Shanghai, China. A structured questionnaire was administered online to assess psychological distress, dyadic coping, and fertility quality of life. Sociodemographic information was collected. Descriptive statistics, Pearson correlation, and stepwise regression models were used to analyze the data.

Results: Of 715 infertile males and females who completed the survey. Results showed that there was a negative association between psychological distress and quality of life. The use of positive dyadic coping was associated with better quality of life, whereas negative dyadic coping might contribute to worse quality of life. Moreover, males reported having a better quality of life in contrast to females.

Conclusion: The findings of this study highlighted the significant associations between particular dyadic coping and quality of life in clients undergoing ART. Healthcare professionals should recognize the significance of dyadic coping in the context of ART and consider improving clients' quality of life through coping-oriented interventions.

Keywords: adaptation, infertility, psychological distress, reproductive techniques

Introduction

Infertility is a term to describe a couple not being able to conceive despite unprotected intercourse for at least a year. It is estimated that approximately 8–12% of reproductive-aged couples worldwide are affected by infertility.¹ A population-based survey in China showed that the prevalence of infertility was 25% among couples actively trying to conceive.²

Infertility, as a life crisis, posits stress in both members of couples.³ Assisted reproductive technology (ART) is a technology used to attain pregnancy but may cause extra stress, being stressful physically, emotionally, and financially.⁴ For example, receiving infertility treatment with ART may represent a great economic burden to clients.⁵ Costs of ART treatment included direct costs such as paying for medical consultations and indirect costs such as providing healthcare for ART multiple birth infants. Couples at every stage of ART treatment may expose to risks of failure such as embryos failing to implant.⁶ Such stress may have adverse impacts on health-related outcomes⁷ and trigger depressive and anxious symptoms.⁸ Also, qualitative evidence presented that those women seeking ART services might experience negative emotions, frustrations, and financial problems.⁷ In addition, biological research has found that ART treatment may increase levels of estrogen and progesterone, which play a role in adjusting moods among women.⁹

Dyadic coping refers to how partners appraise stress, support each other, and deal with stressors together. In addition to coping at the individual level, dyadic coping developed on the systemic-transactional model provides an interpersonal view of stress and coping in couples.¹⁰ The premise of dyadic coping is interdependence between partners and assumes that both partners in a relationship have a mutual impact on each other.¹¹ Dyadic coping can be classified as either positive or negative. Positive dyadic coping includes stress communication, supportive, delegated, and common dyadic coping, whereas negative dyadic coping refers to controlling, hostile, over-protection, protective buffering, and uninvolved.¹² The common ways of evaluating dyadic coping are self-reported questionnaires such as Dyadic Coping Inventory (DCI), dyadic coping behavioral coding system, or diary studies.¹³

Research has confirmed the benefits of dyadic coping for non-medical and medical stressors at the individual and couple levels. For example, Yurkiw and Johnson¹⁴ analyzed data involving 2529 couples of the German Family Panel and found that supportive dyadic coping was a protective factor for the impacts of perceived stress on sexual communication. Suo, Zhang, Tao, Ye, Zhang and Yan¹⁵ surveyed 206 pairs of patients with breast cancer and their spouses and found that patients' positive dyadic coping could improve their marital satisfaction. Badr, Herbert, Bonnen, Asper and Wagner¹⁶ conducted an interventional trial among patients with head and neck cancer and showed that the couple-based interventions could enhance positive and lessen negative dyadic coping for both patients and their spouses, and the enhancement of positive dyadic coping could contribute to better psychological and marital adjustment.

World Health Organization (WHO) defined quality of life (QoL) as people's perceptions regarding their position in life, which may differ from one society/culture to another.¹⁷ The QoL has now been seen as a key indicator for outcome measurement in infertility. Masoumi, Garousian, Khani, Oliaei and Shayan¹⁸ conducted a cross-sectional study involving 250 fertile and infertile couples in Iran and found that infertile couples experience lower QoL compared with their fertile peers. Another survey showed that infertile Chinese women had significantly worse QoL scores and more symptoms of anxiety scores, compared with fertile ones.¹⁹ In addition, sociodemographic (eg healthcare insurance) and clinical characteristics (eg infertile type) are significant factors that predict QoL.^{20,21}

Despite increasing interest in dyadic coping in the context of physical health conditions,²² to our knowledge, relatively little is known regarding dyadic coping among infertile populations, especially clients undergoing ART. Tang, Jia, Zhao, Liu, Li, Zhang, Han and Huangfu²³ identified that multiple factors such as religion, number of miscarriages, family intimacy, and adaptability were key predictors for dyadic coping in Chinese infertile women. Molgora, Fenaroli, Acquati, De Donno, Baldini and Saita²⁴ investigated a sample of 167 heterosexual Italian couples undergoing ART treatment and showed that more use of positive dyadic coping styles (common, emotion-focused, problem-focused, and delegated dyadic coping) might lead to better marital adjustment. Considering the importance of the psychological aspect of infertility, the present study aimed to assess the levels of psychological distress, dyadic coping, and quality of life among Chinese infertile clients undergoing ART at an infertility center and to examine the associations of QoL with psychological distress, dyadic coping, and other sociodemographic factors in this population.

Materials and Methods

A web-based, cross-sectional survey was conducted using Wenjuanxin (This is an online questionnaire program, <https://www.wjx.cn/>) at the In-vitro Fertilization (IVF) center of Shanghai first maternity and infant hospital between September 2020 and March 2022. The reporting guideline of the current study adhered to the Checklist for Reporting Results of Internet E-Surveys (CHERRIES).²⁵

The Institutional Review Board of Shanghai first maternal and infant hospital has reviewed and approved the study protocol, informed consent form, and all study materials (Ref. number: KS21296). The current study complied with the Declaration of Helsinki.

Sample and Procedure

Clients presenting for a fresh IVF cycle were screened against the inclusion and exclusion criteria. Inclusion criteria were: (1) reported being in a stable couple relationship, (2) planning a pregnancy by IVF, and (3) can speak and understand Chinese. Clients who refused to join were excluded. The eligible clients were informed about the details of

this study, voluntary participation, anonymity, and confidentiality. After obtaining verbal informed consent, those who agreed to participate were given a link to the online survey and were asked to fill out a set of questionnaires on site.

Measures

The structured questionnaire consisted of:

Sociodemographic information such as age, gender, marriage, and education level.

Kessler Psychological Distress Scale (K6),²⁶ a six-question instrument measuring psychological distress on a five-point Likert scale (0 = none of the time, 4 = all of the time). Scores of the six questions are summed, yielding a total score from 0 to 24. Higher scores suggest more symptoms of psychological distress. K6 is a psychometrically robust instrument and has been validated in the Chinese population.²⁷ In this study, the reliability of K6 was 0.892.

Dyadic Coping Inventory (DCI),²⁸ a 37-item instrument measuring dyadic coping strategies on a Likert scale (1 = very rarely, 5 = very often). Scores of the first 35 items are summed after reversing eight key items, yielding a total score. Items 36 and 37 are evaluation items for dyadic coping. The DCI also assesses nine forms of dyadic coping (eg, stress communication, supportive dyadic coping, delegated dyadic coping, and stress communication) and evaluation of dyadic coping with two items. The DCI is a psychometrically robust instrument and has been validated in the Chinese population.²⁹ In this study, the reliability of DCI was 0.910. For subscales, it ranged from 0.812 to 0.905.

Fertility Quality of Life Questionnaire (FertiQoL),³⁰ a 36-items instrument measuring the quality of life (QoL) in people experiencing fertility problems on a Likert scale from 0 to 4. The FertiQoL yields six subscales (emotional, mind-body, relational, social, treatment environment, and treatment tolerability) and three total scores (core FertiQoL, treatment FertiQoL, and total FertiQoL) with a range of 0 to 100. Higher scores represent better QoL. The FertiQoL is a psychometrically robust instrument and has been validated in the Chinese population.³¹ In this study, the reliability of FertiQoL was 0.911, 0.872 for core QoL, and 0.804 for treatment QoL.

Data Analysis

Means and standard deviations (SD) were used to describe continuous variables and frequencies and percentages for categorical variables. Kolmogorov–Smirnov method (K–S test) was applied to test for normality. Pearson correlation was used to examine the associations between psychological distress, dyadic coping, and FertiQoL. A stepwise multiple regression analysis to identify whether psychological distress, dyadic coping, and sociodemographic factors such as age and gender explained the scores on FertiQoL, as well as the two subscales. The significance level was considered $p < 0.05$ for all the tests. Multicollinearity is examined by tolerance level and variance inflation factor (VIF) value. Data analysis was performed on SPSS version 20 for Windows (Armonk, NY: IBM Corp.).

Results

Sociodemographic Information

Sociodemographic information is outlined in [Table 1](#). A total of 715 clients (Female: 458, 64.1%) with a mean age of 34.08 (SD = 5.18) finished the survey. Most clients lived in urban areas (69.4%), were in their first marriage (88.7%), and had no kids (86.6%).

Levels of Psychological Distress, Dyadic Coping, and FertiQoL

According to the scoring standard of each measure, the mean scores of psychological distress, dyadic coping total, and FertiQoL were 5.80 (SD = 4.18), 124.59 (SD = 20.2), and 66.00 (SD = 13.35). See [Table 2](#).

Associations Between Psychological Distress, Dyadic Coping, and FertiQoL

Pearson correlation showed that psychological distress negatively correlated with dyadic coping total ($r = -0.208$, $p < 0.01$) and all aspects of FertiQoL ($r = -0.598$, $p < 0.01$, $r = -0.363$, $p < 0.01$, $r = -0.589$, $p < 0.01$). The dyadic coping total was positively associated with core QoL ($r = 0.368$, $p < 0.01$), treatment QoL ($r = 0.270$, $p < 0.01$), and FertiQoL ($r = 0.375$, $p < 0.01$). See [Table 3](#).

Table 1 Descriptive Statistics for Sociodemographic Information

Variables		Total (n = 715)	
		n	%
Age (years)	34.08 ± 5.18, ranging from 19 to 57	/	/
Gender	Male	257	35.9
	Female	458	64.1
Residence	Urban	496	69.4
	Rural and remote	218	30.5
First marriage	Yes	634	88.7
	No	81	11.3
Number of kids	None	213	86.6
	1	88	12.3
	2 and more	8	1.1
Satisfaction of current income	Satisfied	245	34.3
	Neither satisfied nor dissatisfied	361	50.5
	Dissatisfied	109	3.3
Years of education	14.74 ± 3.23, ranging from 2 to 24	/	/

Table 2 Descriptive Statistics for Psychological Distress, Dyadic Coping, and FertiQoL

Variables	Mean	SD	Range	
PD	5.80	4.18	0.00	24.00
Dyadic coping total	124.59	20.20	62.00	175.00
SCO	13.76	3.50	4.00	20.00
SDC	18.34	3.59	5.00	25.00
DDCO	7.24	1.69	2.00	10.00
NDCO	14.48	2.89	4.00	20.00
SCP	13.71	3.47	4.00	20.00
SDCP	18.15	4.32	5.00	25.00
DDCP	7.08	1.89	2.00	10.00
NDCP	14.22	2.99	4.00	20.00
CDC	17.69	4.23	5.00	25.00
EDC	7.45	1.84	2.00	10.00
FertiQoL	66.00	13.35	13.24	98.53
Core FertiQoL	67.87	15.41	10.42	100.00
Emotional	68.43	18.12	0.00	100.00
Mind-Body	66.31	21.89	0.00	100.00
Relational	66.38	15.94	4.17	100.00
Social	70.35	16.62	8.33	100.00
Treatment FertiQoL	61.52	12.70	20.00	97.50
Treatment Environment	62.70	13.24	16.67	100.00
Treatment Tolerability	59.76	19.53	0.00	100.00

Abbreviations: PD, psychological distress; SCO, stress communicated by oneself; SDC, supportive dyadic coping by oneself; DDCO, delegated dyadic coping by oneself; NDCO, negative dyadic coping by oneself; SCP, stress communication of the partner; SDCP, supportive dyadic coping of the partner; DDCP, delegated dyadic coping of the partner; NDCP, negative dyadic coping by partner; CDC, common dyadic coping; EDC, Evaluation of dyadic coping.

Results of Multiple Linear Regression Models

Multiple linear regression analysis was applied in three models (core QoL, treatment QoL, and FertiQoL). Results of variance inflation factor (VIF) and tolerance of variables showed no collinearity in both three models. See [Table 4](#).

Table 3 Associations Between Psychological Distress, Dyadic Coping, and FertiQoL

	PD	SCO	SDC	DDCO	NDCO	SCP	SDCP	DDCP	NDCP	CDC	DCI	Core	Treatment	FertiQoL
PD	I	−0.120**	−0.239**	−0.168**	0.114**	−0.254**	−0.216**	−0.151**	0.184**	−0.224**	−0.208**	−0.598**	−0.363**	−0.589**
SCO		I	0.451**	0.375**	−0.152**	0.424**	0.617**	0.579**	−0.114**	0.521**	0.696**	0.228**	0.172**	0.234**
SDC			I	0.733**	−0.253**	0.643**	0.638**	0.548**	−0.199**	0.691**	0.788**	0.417**	0.246**	0.409**
DDCO				I	−0.116**	0.572**	0.502**	0.488**	−0.089*	0.577**	0.704**	0.291**	0.238**	0.304**
NDCO					I	−0.021	−0.191**	−0.161**	0.623**	−0.215**	0.060	−0.202**	−0.160**	−0.209**
SCP						I	0.585**	0.515**	−0.115**	0.584**	0.774**	0.400**	0.303**	0.411**
SDCP							I	0.776**	−0.263**	0.703**	0.828**	0.351**	0.263**	0.360**
DDCP								I	−0.203**	0.604**	0.748**	0.272**	0.213**	0.282**
NDCP									I	−0.253**	0.034	−0.268**	−0.138**	−0.257**
CDC										I	0.805**	0.417**	0.275**	0.417**
DCI											I	0.368**	0.270**	0.375**
Core												I	0.565**	0.973**
Treatment													I	0.740**
FertiQoL														I

Notes: **Correlation is significant at the 0.01 level (2-tailed).

Abbreviations: PD, psychological distress; SCO, stress communicated by oneself; SDC, supportive dyadic coping by oneself; DDCO, delegated dyadic coping by oneself; NDCO, negative dyadic coping by oneself; SCP, stress communication of the partner; SDCP, supportive dyadic coping of the partner; DDCP, delegated dyadic coping of the partner; NDCP, negative dyadic coping by partner; CDC, common dyadic coping; DCI, Dyadic Coping Inventory.

Table 4 Results of Multiple Linear Regression Models

Variables	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
Model for Core							
(Constant)	54.137	3.203		16.901	0.000		
PD	-1.721	0.106	-0.468	-16.311	0.000	0.880	1.136
CDC	0.662	0.138	0.182	4.800	0.000	0.506	1.977
Gender	-5.165	0.884	-0.161	-5.845	0.000	0.950	1.052
SDC	0.659	0.161	0.154	4.100	0.000	0.516	1.939
NDCP	0.587	0.145	0.114	4.042	0.000	0.915	1.093
Model for Treatment							
(Constant)	67.246	3.664		18.351	0.000		
PD	-0.848	0.108	-0.279	-7.886	0.000	0.882	1.134
CDC	0.348	0.129	0.116	2.692	0.007	0.598	1.673
Gender	-2.227	0.921	-0.084	-2.417	0.016	0.909	1.101
SCP	0.621	0.156	0.169	3.990	0.000	0.612	1.635
NDCO	-0.533	0.153	-0.121	-3.484	0.001	0.917	1.091
Education level	-0.456	0.134	-0.116	-3.414	0.001	0.960	1.041
Model for FertiQoL							
(Constant)	67.738	2.776		24.404	0.000		
PD	-1.471	0.092	-0.461	-16.004	0.000	0.887	1.128
CDC	0.643	0.110	0.203	5.828	0.000	0.605	1.653
Gender	-4.120	0.790	-0.148	-5.215	0.000	0.909	1.101
SCP	0.576	0.133	0.150	4.319	0.000	0.612	1.634
NDCO	-0.602	0.131	-0.130	-4.591	0.000	0.917	1.091

Abbreviations: PD, psychological distress; SDC, supportive dyadic coping by oneself; NDCO, negative dyadic coping by oneself; SCP, stress communication of the partner; NDCP, negative dyadic coping by partner; CDC, common dyadic coping.

The results of the first model showed that psychological distress ($B = -1.721$), common dyadic coping ($B = 0.662$), supportive dyadic coping by oneself ($B = 0.659$), negative dyadic coping by partner ($B = 0.587$), and gender ($B = -5.165$) were significantly related to core QoL scores (Adjusted $R^2 = 48.4\%$, $p < 0.001$).

In the second model for treatment QoL, psychological distress ($B = -0.848$), common dyadic coping ($B = 0.348$), stress communication of the partner ($B = 0.621$), negative dyadic coping by oneself ($B = -0.533$), gender ($B = -2.227$) and education level ($B = -0.456$) were significantly related to treatment QoL scores (Adjusted $R^2 = 21.4\%$, $p < 0.05$).

In the model for FertiQoL, psychological distress ($B = -1.471$), common dyadic coping ($B = 0.643$), stress communication of the partner ($B = 0.576$), negative dyadic coping by oneself ($B = -0.602$), and gender ($B = -4.120$) were significantly related to FertiQoL scores (Adjusted $R^2 = 47.6\%$, $p < 0.001$).

Discussion

This cross-sectional study reported the levels of psychological distress, dyadic coping, and FertiQoL in Chinese clients undergoing ART and analyzed the associations between the above variables. The findings of this study might expand the

current knowledge regarding psychological distress and FertiQoL experienced by Chinese clients undergoing ART and have beneficial results for the development of supportive programs for this population from the aspect of dyadic coping.

In this study, clients undergoing ART experienced a low level of psychological distress. Presumably, clients completed the investigation during their first-time ART visit. Research showed that people's emotional experiences might be impacted by previous experience with ART treatment.³² In line with a past study on Chinese infertile females,²³ clients of this study reported a middle level of dyadic coping. Moreover, the mean scores of core QoL, treatment QoL, and total FertiQoL reported in this study were consistent with previous findings in China.^{31,33}

This study showed a negative association between psychological distress and total mean scores on the FertiQoL, as well as the aspects of core and treatment. Echoed by previous studies,^{34,35} this finding suggested that clients going through ART might have a varying degree of emotions such as anxiety and depression and experience an impaired QoL. Factors such as long-lasting and complex treatment procedures, financial strain, and socio-cultural context (eg stigma) may contribute to symptoms of psychological distress, in turn, will cause a declining QoL.^{36,37} Research has also shown that infertility causes stress, unsatisfactory communication in couples, and marital conflicts, which are linked to psychological symptomatology.³⁸ Thus, supportive programs such as counselor services should be integrated into the management of psychosocial distress in those clients.

This study found that high levels of common dyadic coping, supportive dyadic coping, and stress communication were associated with better FertiQoL, core QoL, and treatment QoL. According to Bodenmann,³⁹ common dyadic coping and supportive dyadic coping were categorized as positive dyadic coping in which a couple manages problems together, shares information, and supports each other to mitigate the impacts of stress, in turn, will lead to a better QoL. According to the Conceptual Model for Thriving through Relationships,⁴⁰ couples serve as a principal source of physical and mental backup, and both offering and receiving support will conduce to promising relationship outcomes, which is crucial to people's well-being. Stress communication is seen as the initial step of dyadic coping and includes ways that a couple shares feelings and opinions. Evidence showed that stress communication is closely associated with better relationship outcomes and satisfaction and might help to facilitate mental health,^{41,42} which is important to QoL. In addition, similar to earlier studies,^{41,43} a significant link was identified between negative dyadic coping by partner and oneself and worse QoL. Broadly speaking, it is beneficial to improve QoL if infertile couples have frequent communication during the ART process. Also, being more willing to use positive dyadic coping such as engaging together in shared problem-solving, taking over partner's tasks, and showing empathic understanding might lead to a better QoL.

Interestingly, this study found a negative association between levels of education and treatment QoL. A possible explanation is that the clients with a higher education level might seek more information about infertility and ART so that they could perceive more infertility-related stress, which was associated with a declined treatment QoL. Moreover, males reported higher QoL scores than females in FertiQoL, core QoL, and treatment QoL. These results were similar to those that have been reported in previous studies,⁴⁴ reflecting that females generally reported a worse adjustment to the infertility condition and higher infertility-related stress compared with males.

This study had limitations. This was a single-center study that only assessed clients who were mainly involved in their first ART, thus the generality of the findings needs to be verified with more representative samples. Next, this study cannot detect the causal relationships between the researched variables due to the nature of the cross-sectional design. In addition, the emotional experiences and people's coping might be changed with the procedure of ART, this study has not described the dynamic process of association. Lastly, given that both spouses might suffer from psychological distress, previous studies analyzed the effects of dyadic coping on health-related outcomes using the Actor-Partner Interdependence Model (APIM),⁴⁵ in which the bidirectional impacts between the spouses can be explained. However, this study hindered the display of the mutual impacts as the clients were not surveyed as couples.

Conclusion

This study has provided evidence regarding the levels of psychological distress, dyadic coping, and FertiQoL in Chinese clients undergoing ART. In those clients, more use of common dyadic coping, supportive dyadic coping, and stress communication were associated with better QoL. Also, significant associations between high levels of psychological distress and impaired QoL were observed. Further researchers may consider capturing the traits of the dynamic process of dyadic

coping and its interactions with health-related outcomes using a longitudinal design, which will help to facilitate individualized and tailored interventions for clients undergoing ART. Additionally, research on the reciprocal influential processes in couples during ART is warranted as individuals' stress can not only impact their health but also their spouses. Most importantly, healthcare professionals should propose the promotion of positive dyadic coping and avoidance of negative ones as a breakthrough point to improve the psychological services of clients undergoing ART. In addition, gender differences in perceiving QoL should be taken into consideration when providing support and counseling to this population.

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Disclosure

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