THE FEASIBILITY AND EFFECTS OF A 'PARTNERSHIP AND COPING ENHANCEMENT PROGRAMME (PCEP)' FOR COUPLES UNDERGOING IN VITRO FERTILIZATION TREATMENT

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YING LIYING

A THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIRMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

DECEMBER 2016

CERTIFICATE OF ORIGINALITY

I hereby declare that this thesis entitled “The feasibility and effects of a ‘Partnership and Coping Enhancement Programme (PCEP)’ for couples undergoing in vitro fertilization treatment” is my own work and that, to the best of my knowledge and belief, it reproduces no material previously published or written, nor material that has been accepted for the award of any other degree of diploma, except where due acknowledgement has been made in the text.

Signed _____

YING Liying

Abstract of dissertation entitled:
"The feasibility and effects of a 'Partnership and Coping Enhancement Programme (PCEP)' for couples undergoing in vitro fertilization treatment"
submitted by YING Liying
for the degree of Doctor of Philosophy
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Abstract

Title: The feasibility and effects of a 'Partnership and Coping Enhancement Programme (PCEP)' for couples undergoing in vitro fertilization treatment

Background: Couples undergoing In Vitro Fertilization (IVF) Treatment suffer as dyads from the stressful experience of the painful treatment and the fear that the cycle will fail. In the process of treatment, couples have experienced elevated emotional distress, particularly during the waiting period before pregnancy test. The failed IVF cycle had long-term negative psychological consequences on both spouses. They are likely to report that their marital relationship has become unstable due to the prolonged period of treatment. Mental health status and marital relationship of couples can be strained and there is a need for a supportive intervention to improve the psychological well-being and marital relationship of couples undergoing IVF treatment.

Aim: This is a feasibility study to examine the effects of a 'Partnership and Coping Enhancement Programme (PCEP)' on improving the psychological well-being and marital functions of the couples undergoing In Vitro Fertilization treatment.

Methods: The Medical Research Council (MRC) framework for developing and evaluating the complex intervention was adopted to guide the development of the Partnership and Coping Enhancement Programme (PCEP). This project conducted the first two stages of the process of the development-evaluation-implementation of a complex intervention, namely, the development and piloting of the intervention.

In developing the PCEP, three steps were taken, namely: (1) identifying evidence by conducting literature reviews, a concept analysis, and a qualitative study; (2) identifying / developing a theory: in this case, a preliminary Endurance with Partnership Conceptual Framework (P-EPCF) was proposed; and (3) modelling the process and outcomes of the PCEP.

In the stage of piloting, the acceptability and preliminary effects of the 'Partnership and Coping Enhancement Programme (PCEP)' were examined by a feasibility study with quasi-experimental controlled design. A total of 100 couples (100 males and 100 females) were recruited consecutively and assigned to a PCEP intervention group or a routine care control group. Couples in both groups received three 30 min-sessions of health teaching on medical information related to the treatment, while the PCEP group also received an additional face-to-face, couple-based, 90 min-session on enhancement of partnership and coping on the day of embryo transfer (ET).

The programme consists of experience sharing, psycho-education, meditation exercise, skill practice, and supplemental written materials. The dyadic outcome measures were:

psychological well-being (anxiety and depression) and marital benefits (marital satisfaction and marital adjustment). The partnership mediator and dyadic coping were also measured. The outcome measures were assessed at baseline (T0), 10 days after the ET (T1), and one month after the ET (T2).

Results: The recruitment rates were 94.3% and 87.7% for intervention group and control group respectively. In the intervention group, the retention rates for T1 and T2 assessment were 88% and 82%, while the corresponding retention rates in the control group were 92% and 80%.

Significant improvements were seen in partnership and dyadic coping in women at one month after embryo transfer (T2). The level of anxiety of the women was lower in the intervention than control group at waiting period (T1). The men of infertile couples only reported significantly improvement in the scores of partnership at T2. The effect sizes (Cohen's *d*) for these variables ranged from 0.42 to 0.46.

Conclusion: The findings of this feasibility study indicated that the PCEP is feasible and acceptable for couples undergoing IVF treatment. Improvement in the dosage and the various components of the intervention are to be considered, before a full-range and multi-centered randomized controlled trial is needed to further confirm the effectiveness of the PCEP.

Key Words: Couple-based intervention; coping; infertility; In Vitro Fertilization; marital benefit; partnership; psychological well-being.

Publications arising from the thesis

Refereed Journal Articles

1. Ying, L., Chen, X., Wu, L.H., Shu, J., Wu, X., Loke, A.Y. (2017). The Partnership and Coping Enhancement Programme for couples undergoing In Vitro Fertilization treatment: the development of a complex intervention in China. *Journal of assisted reproduction and genetics*, 34(1):99-108.

2. Ying, L., Wu, L. H., & Loke, A. Y. (2016). The effects of psychosocial interventions on the mental health, pregnancy rates, and marital function of infertile couples undergoing in vitro fertilization: a systematic review. *Journal of assisted reproduction and genetics, 33*(6), 689-701.

3. Ying, L., Wu, L. H., & Loke, A. Y. (2016). Gender differences in emotional reactions to in vitro fertilization treatment: a systematic review. *Journal of assisted reproduction and genetics, 33*(2), 167-179.

4. Ying, L., & Loke, A. Y. (2016). An Analysis of the Concept of Partnership in the Couples Undergoing Infertility Treatment. *Journal of Sex & Marital Therapy, 42*(3), 243-256.

5. Ying, L. Y., Wu, L. H., & Loke, A. Y. (2015). The Experience of Chinese Couples Undergoing In Vitro Fertilization Treatment: Perception of the Treatment Process and Partner Support. *PLoS One, 10*(10), e0139691.

6. Ying, L. Y., Wu, L. H., & Loke, A.Y. (2015). Gender differences in experiences with and adjustments to infertility: A literature review. *International Journal of Nursing Studies, 52*(10), 1640-1652.

Manuscripts under review

1. Ying, L., Wu, L. H., Wu, X., Shu, J., & Loke, A.Y. Endurance with Partnership: A Preliminary Conceptual Framework for Couples Undergoing In Vitro Fertilization Treatment. *Journal of reproductive and infant psychology* (under review, submitted: 15 Apr, 2017).

2. Ying, L., Wu, X., Wu, L. H., Shu, J., & Loke, A.Y. A 'Partnership and Coping Enhancement Programme (PCEP)' for Couples Undergoing In Vitro Fertilization Treatment: A Feasibility Study. *British journal of health psychology* (under revision, submitted: 19 Jan, 2017).

Conference Presentation Reference

1. Ying, L. Y., Wu, L. H., & Loke, A. Y. (2015). Experiences with and adjustments to infertility: the Gender Difference. *The 18th East Asia Forum of Nursing Scholar (EAFONS),* Taipei, Taiwan, February 5-6, 2015

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*__English and Chinese versions included__

PART I INTRODUCTION AND THE ADOPTED MEDICAL RESEARCH COUNCIL (MRC) FRAMEWORK

Chapter 1

Introduction

1.1 Research background

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1.4 The adopted Medical Research Council (MRC) framework

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1.1 Research background

Infertility is a condition defined as “the failure to achieve a successful pregnancy after 12 months or more of appropriate, timed unprotected intercourse or therapeutic donor insemination” (American Society of Reproductive Medicine, 2013, p. 63). It is estimated that, worldwide, the primary infertility (inability to bear any live child) and secondary infertility (inability to carry an additional live birth) rate of women aged 20–44 years is 1.9% and 10.5%, respectively (Mascarenhas, Flaxman, Boerma, Vanderpoel, & Stevens, 2012). The prevalence of infertility varies in different countries. In China, the primary infertility rate is 1.3% among women of reproductive age, while no estimation has been made of the secondary infertility rate owing to the influence of government regulations on childbearing (Mascarenhas et al., 2012).

The cause of infertility is attributed to various factors, of which about 65% are female factors, including irregular ovulation, blocked fallopian tubes, and problems with embryo implantation. Male factors, mainly consisting of low sperm count and sperm motility, accounts for 25% of infertility; while the remaining factors are due to unexplained factor or other conditions (Beckmann, 2014a) .

To fulfill the desire for parenthood, 50% infertile couples would seek medical treatment, which initially include medication treatment and/or surgery (Greil, Slauson‐Blevins, & McQuillan, 2010). When these first-line treatments do not work or inappropriate, about 3% of the treatment-seeking couples will be recommended to undergo assisted reproductive technologies (ARTs) (Sullivan et al., 2013). ARTs include, but are not limited to, in vitro fertilization and embryo transfer, gamete intrafallopian transfer,

zygote intrafallopian transfer, tubal embryo transfer, etc. (Zegers-Hochschild et al., 2009). More than 99% of ARTs are In Vitro Fertilization (IVF)(Sullivan et al., 2013).

IVF is a torturous and intrusive treatment. The conventional process of IVF involves ovarian stimulation, oocytes retrieval, oocyte fertilization in vitro, embryo incubation, and transfer of embryos into woman's uterus (Beckmann, 2014a). After a two-week waiting period, the couple needs to take a pregnancy test to determine whether the cycle is successful. However, the success rate (delivery rate) is low at 18.4-20.3% (for frozen embryo transfer and fresh aspiration, respectively) (Ishihara et al., 2015). It can therefore be expected that couples, as a unit, suffer from the stressful experience of infertility, as they endure the torturous treatment and the fear that that it will fail.

With the diagnoses of infertility, both infertile women and infertile men suffered. The couples as a unit are disturbed psychologically and physically. However, it is usually the women who endured the majority of fertility testing that cause discomfort. Studies have reported that the state of infertility is psychologically taxing for women, causing such feelings as depression (Herbert, Lucke, & Dobson, 2010; Nelson, Shindel, Naughton, Ohebshalom, & Mulhall, 2008; Qi, Wei, Duan, Wang, & Lv, 2008), distress (Fido, 2003; Lansakara, Wickramasinghe, & Seneviratne, 2011; Omoaregba, James, Lawani, & Morakinyo, 2011), anxiety (Albayrak & Günay, 2007), sadness (Umezulike & Efetie, 2004), anger, regret, social isolation, and loss of self-esteem (Behboodi-Moghadam, Salsali, Eftekhar-Ardabily, Vaismoradi, & Ramezanzadeh, 2013). The prevalence of psychiatric disorders and alexithymia has been found to be higher among women experiencing infertility than among fertile women (Lamas et al., 2006; Noorbala et al.,

2008). Some infertile women may have suicidal thoughts because of infertility (Umezulike & Efetie, 2004) , with the risk of suicide among women who failed to conceive after an initial fertility evaluation being twice that of those who successfully conceived (Kjaer et al., 2011).

Although there have been fewer studies focusing on the experiences of infertile males than of infertile females, studies have shown that the emotional response of the genders to infertility is similar. Studies have indicated that infertile men have a higher incidence of anxiety, depression (Ahmadi, Montaser-Kouhsari, Nowroozi, & Bazargan-Hejazi, 2011; Folkvord, Odegaard, & Sundby, 2005; Gao et al., 2013), stress (Peronace, Boivin, & Schmidt, 2007), premature ejection and erectile dysfunction (Gao et al., 2013), sexual dissatisfaction (Schmidt, 2006), and a poorer quality of life (Klemetti, Raitanen, Sihvo, Saarni, & Koponen, 2010) than fertile men. The inferior sperm quality of infertile men to some extent affects their perception of their masculinity (Mikkelsen, Madsen, & Humaidan, 2013).

When couples seek for IVF treatment, they would further suffer from the torturous treatment and the uncertainty of the outcome. Studies revealed that infertile patients have elevated stress and anxiety, and lower level of quality of life during the period of IVF treatment (Pinar & Zeyneloglu, 2012; Turner et al., 2010). A systematic review reported that women initiating IVF reported higher level of emotional distress than the norm - fertile women, and the oocyte retrieval and pregnancy test were the most stressful stages of the IVF cycle (Verhaak et al., 2007), with the infertility treatment-related stress mainly attributed to the fear of failure. Literature mainly compares the stress level of

women undergoing IVF treatment with fertile women, but less in identifying the overall pictures of factors contributing to stress.

There are studies that attempted to explore the predictive effects of treatment-related stress on IVF outcome. Two systematic reviews with meta-analysis on the effects of stress on IVF outcome were identified. The first systematic review examined 31 prospective studies with a total of 4,902 participants from 1978 to 2010 and concluded that small but significant associations were found between pretreatment stress / distress and reduced pregnancy outcomes [effect size correlation (ESr): stress = -0.08, trait anxiey = -0.14, state anxiety = -0.10] among women undergoing IVF (Matthiesen, Frederiksen, Ingerslev, & Zachariae, 2011). However, the other systematic review of 14 prospective studies with a total of 3,583 infertile women from 1985 to 2010 did not find pretreatment anxiety or depression to be associated with treatment outcome after a cycle of assisted reproductive technology (Boivin, Griffiths, & Venetis, 2011). Thus, studies regarding the association between women's emotional distress and IVF outcome yielded inconclusive results.

In terms of the effects of infertility on couple level, some couples may benefit from the joint hardship during the initiation stage of treatment, while many others were subject to a stressful married life (Güleç, Hassa, Yalçın, & Yenilmez, 2011; Sultan & Tahir, 2011). Marital problems between infertile couples may arise due to the gender differences in the couples' reaction to infertility and incompatible perceptions to fertility problem (Pasch, Dunkel-Schetter, & Christensen, 2002; Peterson, Pirritano, Block, & Schmidt, 2011).

It has also been revealed that couples seeking for IVF treatment were more likely to report unstable relationship due to the prolonged and demanding of treatment (Newton, 2006; Wang et al., 2007). Infertility-induced toll on the couples' relationship has been reported as the major stress that led to the termination of IVF treatment (Domar, Smith, Conboy, Iannone, & Alper, 2010). On the other hand, marital relationship can also be a protective factor for couples enduring the different stages of IVF cycle (Lowyck et al., 2009a) , especially for women with unsuccessful outcomes of IVF (Chochovski, Moss, & Charman, 2013).

Therefore, research needs to be conducted on a supportive intervention for couples undergoing IVF treatment, targeted at both females and males, especially one that focuses on the improvement of psychological well-being and marital relationship.

1.2 Research aim and objectives

The aim of this study is to develop, deliver, and evaluate a 'Partnership and Coping Enhancement Programme (PCEP)' aiming at improving psychological well-being and marital benefit of couples undergoing In Vitro Fertilization treatment in China.

The objectives of this study are: (1) to explore Chinese infertile couples' experience of IVF treatment, especially their perceptions of 'partnership' in couples and support from others; (2) to delineate a framework for couples undergoing IVF treatment; (3) to develop a 'Partnership and Coping Enhancement Programme (PCEP)' that focus on partnership in couples and dyadic coping; and (4) to conduct a piloting study that

examining the feasibility and preliminary effects of PCEP on improving psychological well-being and marital benefit of IVF couples.

1.3 Project Significance and value

It will be the first study in China that focus on both female and male partners, and partnership and coping of IVF couples, and to examine the effectiveness of a 'Partnership and coping Enhancement Programme (PCEP)' in supporting couples undergoing IVF treatment by improving their dyadic partnership and coping skills. The findings of the study will provide preliminary evidence on the effectiveness of PCEP on improving the psychological well-being and marital benefits of couples undergoing IVF treatment. If the feasibility and acceptability of PCEP is established, further trial to confirm the effects in RCT can be conducted. Consequently, it will provide health care professionals an effective approach to care for the infertile couples.

1.4 The adopted Medical Research Council (MRC) framework

The Medical Research Council (MRC) framework provides guidance on the development, evaluation and implementation of complex interventions to improve health (Craig et al., 2008). Complex interventions are usually described as interventions that consist of several independent or interacting components (Campbell et al., 2000; Craig et al., 2008), and in which the process and outcomes are modeled (Hawe, Shiell, & Riley, 2004).

The development-evaluation-implementation process for a complex intervention

As shown in Figure 1-1, the process contains four stages including development, feasibility/ piloting, evaluation, and implementation, which usually interact with each other.

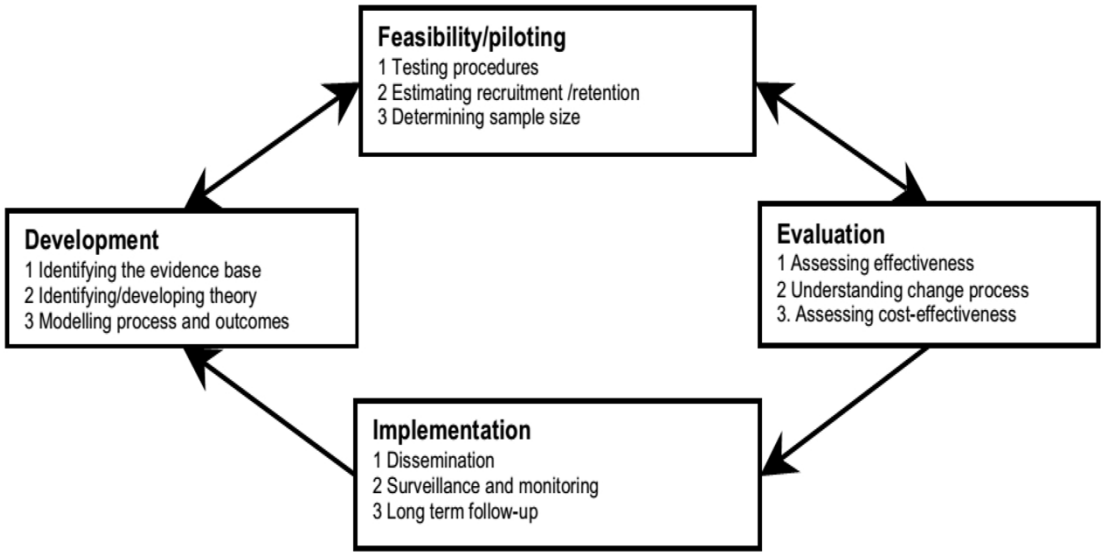

Figure 1-1. Key elements of the development and evaluation process

(Craig et al., 2008)

There are three steps for developing a complex intervention: identifying the evidence base, identifying / developing a theory, and modeling process and outcomes of the intervention. First, it is recommended to identify the relevant, existing evidence by conducting systematic reviews. Second, finding out the appropriate theory for guidance would be more likely to develop an effective intervention than merely relying on empirical evidence or pragmatic approach. Third, modeling procedure and outcomes prior to a full scale evaluation can provide important guidance on the development and evaluation of intervention (Craig et al., 2008).

The stage of feasibility and piloting consists of testing the acceptability of the procedures, estimating the possible rates of recruitment and retention of subjects, and calculating the sample size.

Regarding the evaluation of the intervention, study designs should be selected according to the research questions and circumstances. A comprehensive understanding of the suitability of different approaches would enable the researchers to choose the appropriate methodology.

In the stage of implementation, several ways are suggested including publication in professional journals, or integrating the findings into routine practice or health policy.

Studies conducted in developing and testing the 'Partnership and Coping Enhancement Programme (PCEP)' according to MRC framework

In following MRC framework, this project conducted the first two stages of the process of the development-evaluation-implementation of a complex intervention, namely, the development and piloting of the intervention. The key elements of these two stages and the studies conducted in each step of the stages are outlined in Figure 1-2, and presented in the thesis as well.

The development stage includes three steps: (1) identifying evidence by conducting reviews of the relevant literature **(Chapter 2-4)**, and carrying out a concept analysis (**study I**) and a qualitative study (**study II**); (2) identifying / developing a theory – in this case, putting forward a preliminary Endurance with Partnership Conceptual

Framework (P-EPCF) for couples undergoing IVF treatment (**study III**); and (3) modeling the process and outcomes: Developing and presenting the related contents of the Partnership and Coping Enhancement Programme (**study IV**). In the stage of piloting, the acceptability and preliminary effects of PCEP were examined by a feasibility study before further trial to be conducted (**study V**).

1.5 Outline of the thesis

This thesis is presented in three parts and eleven chapters in accordance with the research process, from the introduction of study and the adopted MRC framework (Part I) , and studies conducted according to MRC framework (Part II), to conclusions and implications for practice and future research (Part III).

Part I includes the research background and significance of the development of a 'Partnership and Coping Enhancement Programme' for infertile couples undergoing In Vitro Fertilization treatment, and the introduction of the adopted Medical Research Concil (MRC) framework.

Part II presents the studies conducted in following the MRC framework, as showed in figure 1-2, including three literature reviews (**Chapter 2-5**), and five interelated studies (**Chapter 6-10**).

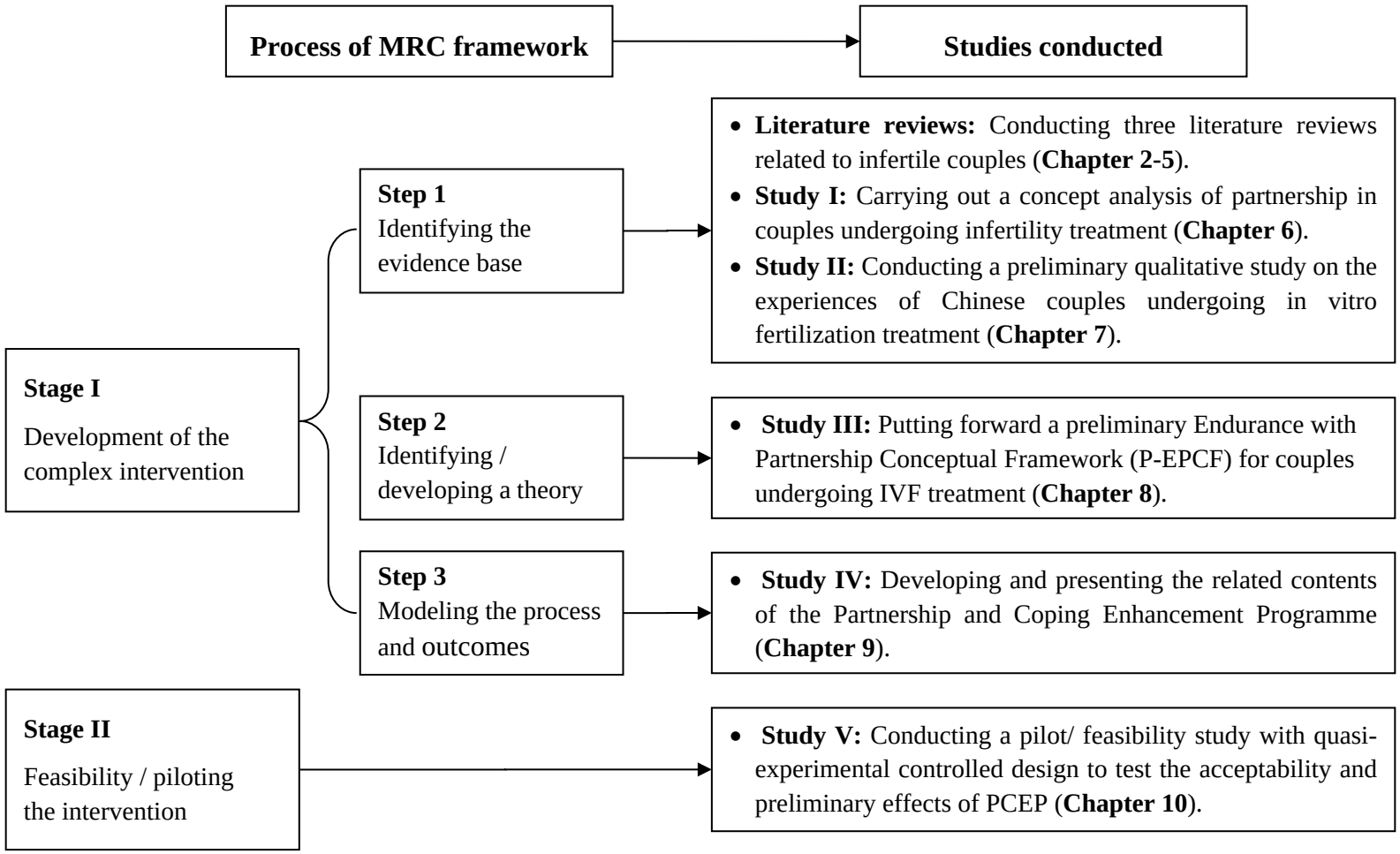

Figure 1-2. Process of MRC framework and corresponding studies conducted in developing and piloting the PCEP

A total of three extensive reviews were conducted to obtain a better understanding of the couples' experiences with infertility (**Chapter 2**) and IVF treatment (**Chapter 3**), and to examine the effects of established randomized controlled studies of psychosocial interventions on patients / couples undergoing IVF treatment (**Chapter 4**). **Chapter 5** presents a summary of the three reviews and the clarification of the selection of methodology adopted in this project.

According to the MRC guideline, five interrelated studies were then conducted. Study I involves a concept analysis of the concept of partnership that identified the dyadic dynamics of the couples' responses to infertility and its treatment (**Chapter 6**). Study II explored the experience of Chinese couples undergoing IVF treatment, especially their perceptions of the treatment process and the support between partners (**Chapter 7**). In study III, a preliminary Endurance with Partnership Conceptual Framework (P-EPCF) for couples undergoing IVF treatment was proposed (**Chapter 8**). Study IV reports on the process of developing the Partnership and Coping Enhancement Programme (PCEP) (**Chapter 9**). Study V tested the acceptability and preliminary effects of PCEP through a pilot/ feasibility study with quasi-experimental controlled design (**Chapter 10**).

Part III comes to the conclusions of this study and discussed its implications for clinical practice and future research. In addition, the limitations of the intervention, and the reflection of the entire project were presented (**Chapter 11**).

PART II STUDIES CONDUCTED ACCORDING TO THE PROCESS OF MRC FRAMEWORK

Chapter 2

LITERATURE REVIEW (I)

Infertile couples' experience with and adjustment to infertility*

* The content of this chapter was published:

Ying, L. Y., Wu, L. H., & Loke, A. Y. (2015). Gender Differences in Experiences with and Adjustments to Infertility: A Literature Review. *International Journal of Nursing Studies*, 52(10), 1640-1652.

Introduction

It has been recognized that the state of infertility is psychologically taxing for married couples. Among infertile couples, women usually endure the majority of fertility testing and other treatments, which causes discomfort (Albayrak & Günay, 2007; Herbert et al., 2010; Lansakara et al., 2011). Studies have also indicated that the emotional response of males to infertility is similar to that of women (Ahmadi et al., 2011; Gao et al., 2013; Peronace et al., 2007). However, given biomedical differences, and differences in socialization processes and gender-role expectations (Petok, 2006), it is reasonable to suspect that females and males may respond differently to infertility. In addition, It has been suggested that marital problems between infertile couples may arise due to the gender differences in the couples' reaction to infertility and incompatible perceptions to fertility problem (Pasch et al., 2002; Peterson et al., 2011). Thus, there is a need to provide a comprehensive picture of the experiences of infertile women and men from the perspective of gender differences.

There have been on-going debates concerning gender differences in the ways in which couples respond to infertility (Greil, 1997). While women have a strong desire to have a child, men tend to be more concerned about fulfilling the social role of being a parent (Hjelmstedt et al., 1999). Men respond to infertility in the same way as they do to other problems, but women regard infertility as a very different problem in life (Andrews, Abbey, & Halman, 1992), and some even considered it comparable to cancer or congenital heart disease (Domar, Zuttermeister, & Friedman, 1993). It has been argued that women's experience with infertility is more "direct," whereas the effect of infertility on men is "indirect," through their relationship with their wives (Greil, 1997).

An increasing number of studies are focusing on gender differences with respect to experiences relating to infertility. Studies have examined the differences between the genders in the areas of psychological health (anxiety, depression, stress, distress, stigma, and shame), physical health, quality of life, and marital satisfaction. The experiences of infertile couples have previously been explored in reviews or books, with a higher level of stress being reported in women than in men (Abbey, 2000; Eugster & Vingerhoets, 1999; Greil, 1997; Henning & Strauss, 2002). Two reviews were conducted focusing on psychological distress in connection with the experience of infertility from the socio-psychological perspective (Greil, 1997; Greil et al., 2010). The key findings related to the importance of sociocultural context, cross-cultural variations, and the sociocultural environment of treatment. These reviews were valuable in that they shed light on the cultural perspectives of infertility and its related experience. Another review examined the coping strategies of infertile couples. It reported that women tended to adopt strategies of escape and avoidance, and to seek social support and positive reappraisals to a greater extent than their partners (Jordan & Revenson, 1999). In the review, only eight studies were included in the meta-analysis of the results of a scale on coping.

Thus far, there has been no review of the experiences of infertile couples in terms of gender differences and adjustments to the condition. The intention in this review is to tackle this task from the health care perspective. The findings of this review may give health care professionals and researchers who work with infertile couples a better understanding of what these couples experience and how they adjust. This understanding will provide the information needed to develop interventions to improve the experiences

of infertile couples, by taking into account the differences between the genders. The implications for further study will also be discussed.

Methods

Search strategy

An extensive literature search was performed using the following databases: PubMed (1966+), CINAHL (1982+), PsycInfo (1806+), Web of Science (1970+), Scopus (1996+), and China Academic Journal Full-text Database. The key words or phrases used to conduct the search were “infertile” AND “partnership OR marital OR relation* OR psycho* OR stress* OR distress* OR anxiety OR depress* OR mental health OR emotion* OR disorder* OR sexual*OR physical* OR identity OR self-esteem OR stigma OR shame OR coping OR support” AND “gender.” The studies that were included were those that had been published from the years 2000 to 2014, and in English or Chinese, due to the limited language competency of the authors. The references of all of the studies selected for this review were also searched. An author search was also performed to retrieve relevant articles.

Inclusion and exclusion criteria

The criteria for inclusion in this review were: studies that examined the experiences of infertile couples; a study population that included both women and men in qualitative and quantitative studies; quantitative studies should include the statistical testing of gender differences; and, for articles in Chinese, inclusion in the Chinese Science Citation Database. Studies involving emotional responses relating to treatments using Assisted Reproductive Technology were excluded. The selection procedures for this study are presented in Figure 2-1.

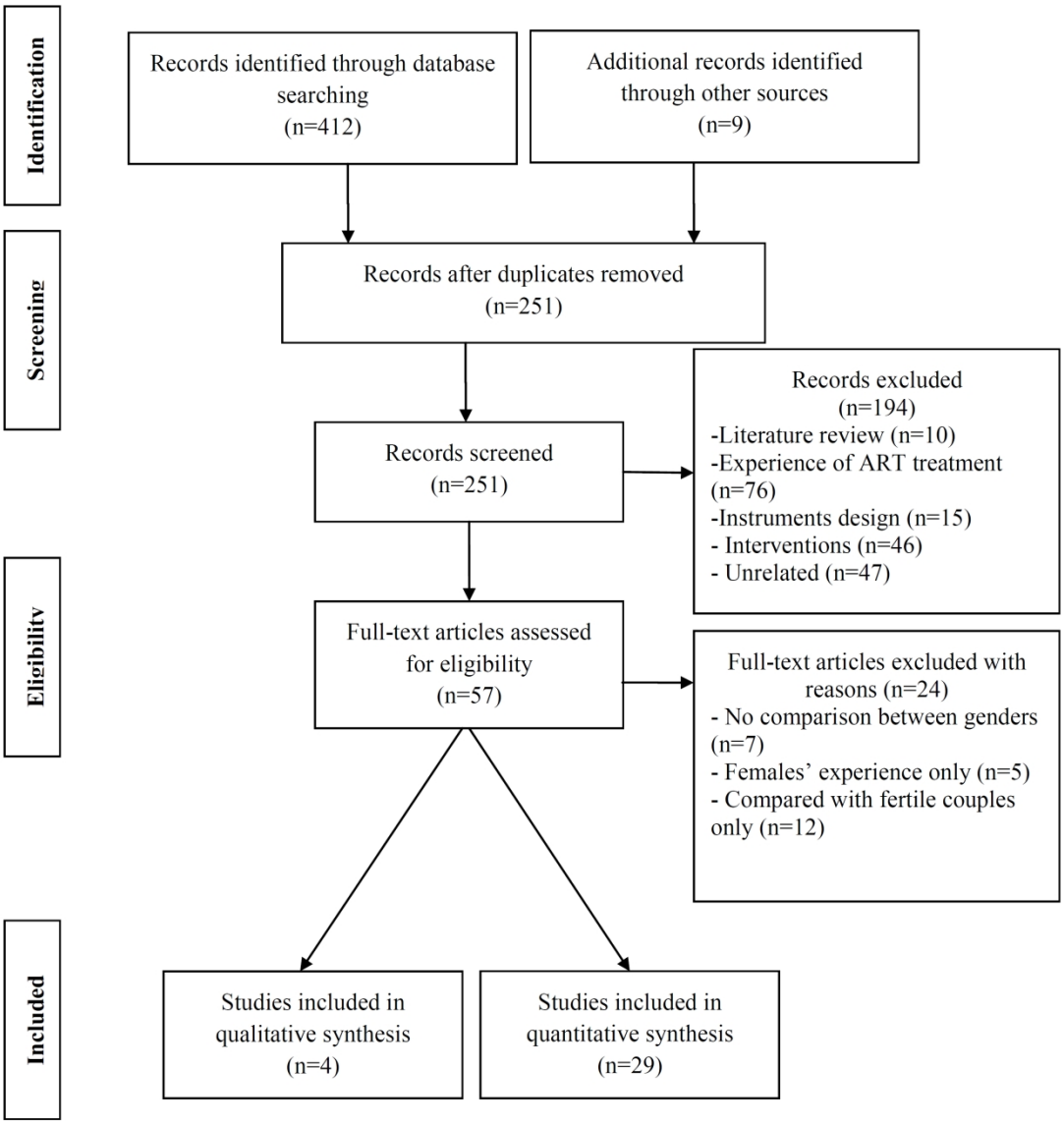

Figure 2-1. The flow diagram on identifying the literature

Quality assessment of the reviewed papers

The quality of these studies was assessed using the Joanna Briggs Institute Critical Appraisal Checklist for Descriptive/Case Series and for Comparable Cohort/Case Control studies (JBI, 2014). Two reviewers independently assessed the quality of the studies according to the appraisal checklist.

The outcomes of quality assessment showed that the average scores on the quality of the included studies were 12.4 (range: 10-15; maximum possible score 18) for the quantitative studies, and 17.3 (range: 17-18; maximum possible score 20) for the qualitative studies. As there is no priori cut-off score for study selection, the scores are for reference only. A discussion meeting was then held among the two reviewers. Although it was noted that there were methodological limitations, such as unclear inclusion criteria for the samples and insufficient descriptions of the subject groups in the studies, both reviewers considered all studies of reasonable good quality and that they should be included in the review.

Infertility-specific theory adopted for scrutinizing the results

The biopsychosocial theory of infertility (Gerrity, 2001a), originating from the Stress and Coping Model and modified to focus not only on individual but also on interpersonal and couple-based stressors, was used as the framework to present the findings of this review. This theory describes infertility as both a life crisis and a nonevent that affects individuals, couples, and families in various stressful ways. It depicts human experiences as an interaction of the biological, psychological, and social. With regard to the biological aspect, the discussion focuses on the impact of infertility

on an individual's body, as a physical stressor. The psychological aspect refers to the behavioral and mental impacts of infertility as emotional stressors on infertile couples. A couple's experience with infertility is influenced by the structures and organizations of their society, leading to existential and interpersonal stressors. What is impacted is the sense of self, and a person's relationships with his/her partner, family, and friends.

Accordingly, biopsychosocial theory classifies a diverse range of infertility-impacts into four stressors and two moderators, namely: physical stressors, emotional stressors, existential stressors, interpersonal stressors; and the support and coping moderators of stress (Gerrity, 2001a). The stressors and moderators of the biopsychosocial theory were used to scrutinize the couples' experiences with and adjustments to infertility. Within each domain, the impact of, or adjustment to, infertility are discussed from the perspective of gender.

The key components of the studies were extracted and tabulated according to a standard format: authors, country of the study, aims, participants, instruments, study design, and significant findings (see Appendices Table 2-1).

Results

The literature search yielded a total of 412 citations, with 9 additional records identified through a hand and author search. After duplicate entries were removed, 251 papers remained. The abstracts of these articles were screened and 194 articles that did not meet the inclusion criteria were excluded. The full-texts of the remaining 57 articles were further assessed for eligibility, and 24 were excluded. In the end, a total of 33 studies (29

quantitative and 4 qualitative) on experiences relating to infertility were included in this review (Figure 2-1).

A total of 33 studies were included. The studies were conducted in Asia (n=13, China, Korea, Malaysia, Thailand, Pakistan, and Turkey), Europe (n=12, United Kingdom, Germany, Portugal, Hungary), Africa (n=4, Nigeria), and North America (n=4, USA, Canada). Among the studies that were included, only one was published in Chinese, although four studies were conducted in China.

A total of four studies involved community-based samples (Brucker and McKenry, 2004; Mabasa, 2002; Maximova and Quesnel-Vallee, 2009; Mumtaz et al., 2013), while the others involved clinic-based samples. Of the 29 quantitative studies, there were 25 cross-sectional studies, 2 longitudinal studies (Edelmann and Connolly, 2000; Maximova and Quesnel-Vallee, 2009), 1 cohort study (Anderson et al., 2003), and 1 case-control study (Onat and Beji, 2012).

The participants in the quantitative studies were infertile individuals (n=10) and infertile couples (n=19). These studies had an average of 165 females (range, 27-1,076), and 168 males (26-1,448), with a mean age of 32.08 years for females (range, 28-36.1 years old), and 35.03 years for males (30-40.1 years old). Eight studies provided information on the cause of infertility, with 27.17% involving female factors (range, 9%-37.1%), 30.40% male factors (12.1%-51%), 13.98% combined factors (6.1%-21.7%), and 28.37% unknown causes (14.9%-46.5%). It may be worth noting that the highest incidence of male infertility (51%) was found in a study from Turkey (Gulec et al., 2011).

The qualitative studies were an ethnographic study (Dimka and Dein, 2013), a study based on field research (Inhorn, 2003), a study that adopted an interpretive, descriptive approach (Mumtaz, Shahid and Levay, 2013), and a study with a social constructionist orientation (Mabasa, 2002). Sample sizes ranged from 14 to 322.

2.1 Existential stressors

Infertility impairs infertile couples' existential role of participating in the continuity of their family, their community, and their culture (Gerrity, 2001a) . Its influences can be observed in the couples' sense of identity and self-esteem, and in their sense of stigma. Identity reflects an individual's concept and expression of self, as manifested in gender social roles, self-esteem represents a person's appraisal or evaluation of his or her own worth, and stigma refers to personal characteristics that are contrary to cultural norms and therefore deeply discrediting.

2.1.1 Identity

Three studies examined the impact of infertility on the identity of women and men. A study conducted in Hungary showed that females obtained a higher mean score on the Masculinity–femininity scale (m=36.78 vs. 26.5) than their male partners, indicating that females, more than males, rejected their own traditional gender roles. When infertile women were compared with women in the general public, it was found that women from the infertile group scored higher in the area of femininity [m=0.41(*z*-transformed), d=0.54] (Cserepes, Kollar, Sapy, Wischmann, & Bugan, 2013). The linear regression

revealed that femininity is a positive predictor of infertility-related stress (β=0.460, p < 0.05).

A qualitative study conducted in Egypt, exploring the experiences of couples with male infertility, found that the femininity of the women was impaired even though they were not responsible for the infertility, as their motherhood could only be realized through childbearing. However, the masculinity of the infertile men was not seriously affected by their infertility (Inhorn, 2003). This is because the men had alternative ways to manifest their masculinity, through achievements at work or in sports. Another qualitative study conducted in Pakistan reported that the social identity of fatherhood is not as important for men as the social identity of motherhood is for women (Mumtaz, Shahid, & Levay, 2013) . In short, among infertile couples women experience a greater identity crisis than their male partners.

2.1.2 Self-esteem

Seven studies employing a variety of instruments explored the impact of infertility on the self-esteem of infertile couples. Three studies utilized the Self-esteem Subscale of the Infertility Questionnaire, the Index of Self-Esteem, and the Self-Esteem and Relationship Questionnaire to measure self-esteem.

Studies showed that among infertile couples women tend to have lower levels of self-esteem than males: Self-esteem Subscale of the Infertility Questionnaire, m=2.22 vs. 1.95(Lee & Sun, 2000) , Index of Self-Esteem, m=39.19 vs. 37.18 (Sultan & Tahir, 2011), and Self-esteem Subscale of Self-Esteem and Relationship Questionnaire,

m=75.61 vs. 84.27 (Wischmann et al., 2014). In Infertility Questionnaire and Index of Self-Esteem scales, higher scores represent lower self-esteem, whereas in Self-Esteem and Relationship Questionnaire, lower scores indicate greater problems with self-esteem. Another study also showed that in infertile couples, the self-esteem of both females and males were much lower than those of the non-clinical normal population (including men and women) (Self-esteem Scale, m=20.39 vs. 23.32 vs. 28.60) (Edelmann & Connolly, 2000).

Two other studies that utilized self-developed questionnaires reported that among infertile couples women experienced a greater loss of self-esteem than their husbands (Anderson, Sharpe, Rattray, & Irvine, 2003; Pasch et al., 2002). Furthermore, wives who were infertile had lower self-esteem than husbands who were infertile (Self-esteem Subscale of Infertility Questionnaire, m=2.49 vs. 2.12) (Lee, Sun, & Chao, 2001) . It can therefore be concluded that among infertile couples females tend to have lower self-esteem than their male partners, especially in cases of female infertility.

2.1.3 Stigma

There was one quantitative study and three qualitative studies exploring the stigma experienced by infertile couples. A study using the Stigma Consciousness Questionnaire to assess and compare the stigma experienced by infertile couples indicated that women experienced greater stigma than men (mean=22.30 vs. 16.81) (Slade, O'Neill, Simpson, & Lashen, 2007) . A path analysis revealed that for both women and men, there was a strong direct pathway from stigma to infertility-related distress (β=0.681, 0.285) and to low perceived support (β=0.325, 0.435) (Slade et al., 2007).

The findings of a qualitative study showed that, compared with men, women of infertile couples in Nigeria endured more verbal and physical abuse, which usually came from female members of their husbands' families (Dimka & Dein, 2013). Another study in Pakistan revealed that the stigma of infertility was more painful than the infertility itself, and that this stigma was gendered, with women facing greater stigmatization than their husbands, even in cases of male infertility. Childless females were usually excluded from taking part in societal rituals, such as wedding celebrations and gatherings to celebrate a newborn baby, while men were never similarly treated (Mumtaz et al., 2013).

The study conducted in South Africa also indicated that, under the influence of patriarchy, male infertility was always kept a secret. Hence, the husbands of infertile couples were exempted from the stigma of infertility while their wives suffered, including by being called names and being blamed for infertility (Mabasa, 2002). Overall, compared with males of infertile couples, females experienced greater stigma, which for both men and women was related to higher distress and lower perceived support.

2.2 Physical stressors

Apart from the existential stressor, fertility tests and medical treatments also cause physical suffering for infertile couples. Five studies explored the physical stressors of infertility for infertile couples. A survey conducted in a rural area of China indicated that, among infertile couples, wives were more likely than their husbands to report poorer general physical health (perceived as poor, 49.5% vs. 29.2%) (Lau et al., 2008). In one

study in Pakistan, women even reported having been subjected to physical abuse from their husbands and in-laws – an extra stressor resulting from infertility (Mumtaz et al., 2013) . However, the two studies, which examined the physical health of infertile couples using the Physical Health Subscale of the World Health Organization Quality of Life-Brief Scale, did not find gender differences (Bolsoy, Taspinar, Kavlak, & Sirin, 2010; Onat & Beji, 2012a). The spouses of infertile couples were found to consistently believe that their partners were in worse physical health than they in fact were, and this trend was similar for both genders (Chachamovich et al., 2010).

2.3 Emotional stressors

The state of infertility evoked a variety of emotional responses in individuals and couples, including depression, anxiety, stress, shamefulness, and mental health problems. Depression reflects a state of low mood and lack of interest, while anxiety can be defined as a feeling of uneasiness or concern about an impending unpleasant event. Stress refers to a person's response to a stimulus that influences their physical or psychological equilibrium. Shamefulness represents to the negative emotions resulting from the failure to meet one's own standards of behavior.

Depression

A total of 17 studies measured depression among infertile couples using a variety of instruments: the Beck Depression Inventory (Bak et al., 2012; Chachamovich et al., 2010; Cserepes et al., 2013; Edelmann & Connolly, 2000; Galhardo, Pinto-Gouveia, Cunha, & Matos, 2011; Güleç et al., 2011; Karlidere et al., 2007; Pinto-Gouveia, Galhardo, Cunha, & Matos, 2012; Sultan & Tahir, 2011), the Self-Rating Depression

Scale (Liu & Zhao, 2011) , the Depression, Anxiety, and Stress Scale (Musa et al., 2014), the Brief Symptom Inventory (Brucker & McKenry, 2004) , the Hospital Anxiety and Depression Scale (Anderson et al., 2003; Fatoye, Owolabi, Eegunranti, & Fatoye, 2008; Slade et al., 2007), the Symptom Checklist (Wischmann, Scherg, Strowitzki, & Verres, 2009), and the Center for Epidemiologic Studies Depression Scale (Maximova & Quesnel-Vallée, 2009) .

Eleven studies that examined depression among infertile couples showed that women reported more depressive symptoms than their husbands. The mean scores from the Beck Depression Inventory for women and men respectively were 6.23 vs. 4.74 (Chachamovich et al., 2010) , 5.84 vs. 4.06 (Edelmann & Connolly, 2000), 11.14 vs. 5.91 (Galhardo et al., 2011), 11.14 vs. 5.90 (Pinto-Gouveia et al., 2012), and 17.82 vs. 16.46 (Sultan & Tahir, 2011). The study that adopted the Self-Rating Depression Scale were with mean score of 43.2 vs. 40.4 (Liu & Zhao, 2011). Depression was more prevalent among women than men (Depression, Anxiety, and Stress Scale, 31.7% vs. 15.4%) (Musa et al., 2014). The mean score in the Brief Symptom Inventory was 1.03 for women and 0.47 for men (Brucker & McKenry, 2004). The studies that used the Hospital Anxiety and Depression Scale yielded mean scores of 3.93 vs. 2.34 (Slade et al., 2007), and 6.05 vs. 3.23 for women and men, respectively (Fatoye et al., 2008). One study reported that, with a score of higher than 10 in the Hospital Anxiety and Depression Scale, 2.7% of women and 1.8% of men were classified as depressed, and the gender differences remained unchanged at the 6-month follow-up session (Anderson et al., 2003). The mean score in the Symptom Checklist was 53.02 for women and 48.93 for men (Wischmann et al., 2009).

One of the eleven studies claimed that although there were gender differences, females did not report a significantly higher score than the norms obtained from the non-depressed sample (including men and women) (the Beck Depression Inventory, female vs. males vs. norm, m=5.84 vs. 4.06 vs. 5) (Edelmann & Connolly, 2000). Three other studies found no significant difference between infertile women and men in levels of depression (Cserepes et al., 2013; Güleç et al., 2011; Maximova & Quesnel-Vallée, 2009).

It was also noteworthy that the cause of infertility plays an important role in an individual's state of depression. One study found that men had a much higher level of depression than their fertile partners (the Beck Depression Inventory, m=34.33 vs. 21.25) after discovering that the infertility was due to their low sperm count (Bak et al., 2012). Another study revealed that women had more depressive symptoms only in cases of female infertility (the Beck Depression Inventory, m=11.8 vs. 7.1) or both female and male infertility (the Beck Depression Inventory, m=8.9 vs. 5.9) when compared with their husbands (Karlidere et al., 2007).

To conclude, females of infertile couples were more likely to report symptoms of depression than their male partners. The exception was when men acknowledged that the cause of the infertility lay with them, in which case they were found to have an even higher level of depression than their wives (Bak et al., 2012).

Anxiety

A total of ten out of the 33 studies measured the anxiety levels of infertile couples using different instruments. All of the studies reported that among the infertile couples women had a higher level of anxiety than men.

A study of couples experiencing infertility that used the Depression, Anxiety, and Stress Scale showed that more wives than husbands reported having anxiety (56.1% vs. 30.1%, $p<0.05$) (Musa et al., 2014). Two studies identified gender differences in anxiety, with females of infertile couples demonstrating higher levels of anxiety than males (the Self-Rating Anxiety Scale, m=39.3 vs. 36.7; the Beck Anxiety Inventory, m=20.10 vs. 17.24) (Liu & Zhao, 2011; Sultan & Tahir, 2011).

A study that adopted the Global Severity Index Subscale of the Brief Symptom Inventory also indicated that females showed higher levels of anxiety than males (m=0.84 vs. 0.52) (Brucker & McKenry, 2004). Three other studies reported that women scored higher than men on anxiety using the Hospital Anxiety and Depression Scale (Anderson et al., 2003; Fatoye et al., 2008; Slade et al., 2007). Two studies that utilized the State-Trait Anxiety Inventory revealed that females of infertile couples scored higher on trait anxiety than their husbands (Edelmann & Connolly, 2000; Karlidere et al., 2007), while only one of the studies showed gender differences in the score on state anxiety (the State-Trait Anxiety Inventory, female vs. male: m=36.72 vs. 32.80) (Edelmann & Connolly, 2000). Noticeably, a study that employed the Symptom Checklist-90 revealed that no gender difference in anxiety was found in the no-counseling group but that in the group that took up counseling, distress was a more important factor for females in the move to seek counseling (Wischmann et al., 2009).

There were two studies examining the effect of time on anxiety levels between the genders. A study claimed that there is a gender difference in anxiety levels, and that the difference remained unchanged at the 6-month follow-up session (the Hospital Anxiety and Depression Scale, anxiety>10, T1:T2, Females=25.7% vs. 21.8%, Males=8.9% vs. 10.9%) (Anderson et al., 2003). A greater decline was seen in the anxiety score for women than for men 7 months after their initial consultation (F=9.83, p<0.01) (Edelmann & Connolly, 2000), which might indicate that females had adjusted better to infertility.

Stress

A total of seven studies explored the stress suffered by infertile couples and compared gender differences using the Fertility Problem Inventory (Bayley, Slade, & Lashen, 2009; Cserepes et al., 2013; Galhardo et al., 2011; Slade et al., 2007; Sreshthaputra, Sreshthaputra, & Vutyavanich, 2008), the Depression, Anxiety, and Stress Scale (Musa et al., 2014), and the Brief Symptom Inventory (Brucker & McKenry, 2004).

Four studies using the Fertility Problem Inventory to measure the level of infertility-related stress found that infertile women reported higher levels of infertility-related stress than men (Bayley et al., 2009; Cserepes et al., 2013; Galhardo et al., 2011; Slade et al., 2007). The study that utilized the Depression, Anxiety, and Stress Scale showed that stress is more prevalent among infertile women than men (25.2% vs. 18.7%) (Musa et al., 2014). Another study that employed the Brief Symptom Inventory revealed that

females reported a higher level of stress than males (m=0.75 vs. 0.47) (Brucker & McKenry, 2004).

However, the study conducted in Thailand revealed a different story, in that both infertile women and men reported a high level of infertility-related stress, but without significant gender differences (the Fertility Problem Inventory, m=154.7 vs. 154.2) (Sreshthaputra et al., 2008).

Shamefulness

A total of three studies assessed and compared the shame felt by infertile couples. The instruments used were the Experience of Shame Scale and the Others as Shamer Scale.

One study reported that among the infertile couples, females experienced more internal shame (refers to individual's negative judgments of their personalities, feelings and fantasies; the Experience of Shame Scale, m=52.59 vs. 43.35) and external shame (refers to global judgments of how people feel others perceived them; the Others as Shamer Scale, m=19.92 vs. 17.14) than their male partners (Galhardo, Cunha, Pinto-Gouveia, & Matos, 2013). Another study also revealed that women in the infertile group felt more internal shame (ESS, m=54.86 vs. 44.95) than men, and that external shame (β=0.26, p=0.001) and internal shame (β=0.18, p=0.022) were strong predictors of depressive symptoms in infertile couples (Galhardo et al., 2011). The study further indicated that shame had a direct and indirect association with stress in infertile patients (Galhardo et al., 2013). A path analysis indicated that for women, external shame was directly linked to infertility-related stress, while the relationship between internal shame and infertility-specific stress was mediated by self-compassion (being kind and understanding toward

oneself when facing failure or suffering). For men, external and internal shame was associated with infertility-related stress via self-judgment (a critical attitude towards oneself in the situations of failure or pain) (Galhardo et al., 2013).

A qualitative study conducted in Nigeria indicated that although infertility is equated with a lack of manhood, it is easier for males to conceal their shame than females. Men may shift the blame on their wives or even make secret arrangements involving friends or siblings to cause their wives to become pregnant (Dimka & Dein, 2013).

Mental health problems

Three studies examined the mental health of infertile couples. Two of these studies reported that infertile women complained more than their husbands of mental problems, as measured by the Short Form of the General Health Questionnaire, owing to the diagnostic procedures and medical treatment (Cserepes et al., 2013; Edelmann & Connolly, 2000). Another study reported that males of infertile couples also tend to have higher level of total well-being than females (The Mental Health Inventory: 18-item version, m=4.58 vs. 4.10) (Bayley et al., 2009).

2.4 Interpersonal stressors

Interpersonal stressors, including relationships with one's partner, family, and friends, can be felt by many infertile couples. As infertility involves the issue of sexuality, its private nature causes couples to isolate themselves from the outside world, and rely nearly exclusively on each other for support. This could lead to increased tension in the intra-couple relationship, over such aspects as marital adjustment, marital satisfaction,

and sexual satisfaction. The marital adjustment, measured by the Dyadic Adjustment Scale, refers to the overall adjustment that married couples experienced in their relationship, including the dyadic satisfaction, dyadic consensus, dyadic cohesion, and affectional expression.

Marital adjustment

A total of six studies included in this review have evaluated the marital adjustment of infertile couples due to infertility. Five of the six studies utilizing the Dyadic Adjustment Scale revealed that there were no statistically significant gender differences among infertile couples with regard to the total scores. Of these five studies, four showed that both women and men of infertile couples had a score higher than the cut-off score of 107 on dyadic adjustment, indicating that the couples enjoyed great marital or relationship harmony (Cserepes et al., 2013; Edelmann & Connolly, 2000; Galhardo et al., 2013; Onat & Beji, 2012a). There was no gender difference in relationship satisfaction (subscale of Dyadic Adjustment Scale, m=4.14 vs. 4.14, U=2975.50) among infertile couples (Bayley et al., 2009).

However, the study conducted in Turkey revealed that infertile females and males had a low but similar level of dyadic adjustment (Dyadic Adjustment Scale, females: median=60, male: median=59.95). The differences were more significant in the subscale of consensus (female, median=10 vs. 17; male, median=8 vs. 16) and affectionate expression (female and male, both with median=3 vs. 5) (Güleç et al., 2011).

Three of the six studies further examined the relationships among marital adjustment, stress, and the attachment of infertile couples. It was reported that the marital relationship partly predicts infertility-related stress (β=-0.251, p<0.05) (Cserepes et al., 2013). In women, dyadic adjustment had a direct (β=-0.19) or indirect effect on infertility-specific stress, which was mediated by self-compassion (β=0.19, -0.24), while in men, dyadic adjustment had only a direct effect (β=-0.27) on infertility-related stress (Galhardo et al., 2013). Furthermore, attachment anxiety was inversely linked to the infertile couples' relationship satisfaction (β=-0.28, -0.33), as measured by the Satisfaction Subscale of Dyadic Adjustment Scale (Bayley et al., 2009). It is concluded that the infertility-related stress among couples was inversely predicted by marital adjustment, while the dyadic adjustment was negatively associated with attachment anxiety.

Marital satisfaction

Three studies examined the marital satisfaction of infertile couples by employing the Index of Marital Satisfaction, the Questionnaire on Life Satisfaction, and the Marital Satisfaction Questionnaire, respectively.

A study conducted in Pakistan used the Index of Marital Satisfaction to measure the marital satisfaction of couples (Sultan & Tahir, 2011). The results showed that infertile couples demonstrated a low level of marital satisfaction, however, no significant gender differences (m=30.95 vs. 30.09) were detected between infertile women and men. Similarly, a study that adopted the Marriage and Partnership subscale of the Questionnaire on Life Satisfaction and which involved a large sample of 633 females

and 535 males found no gender differences in satisfaction with marriage both in the group that took up counseling and those who did not (Wischmann et al., 2009).

Using the Marital Satisfaction Questionnaire, another study explored the effect that the diagnosis of infertility had on the marital satisfaction of husbands and wives (Lee et al., 2001). The results revealed that females expressed less marital satisfaction than males among couples no matter if the infertility is related to a female factor (m=36.77 vs. 32.46) or a male factor (m=32.56 vs. 29.19). However, no significant gender differences were found in couples with mixed (m=34.21 vs. 31.95) or unexplained (m=33.41 vs. 29.12) infertility (Lee et al., 2001).

Sexual satisfaction

A total of five studies adopted the Index of Sexual Satisfaction, the Questionnaire on Life Satisfaction, the Sexual Satisfaction Questionnaire, the Self-Esteem and Relationship Questionnaire, and the Golombok-Rust Inventory of Sexual Satisfaction to explore the sexual satisfaction of infertile couples.

A study in Pakistan that adopted the Index of Sexual Satisfaction found that infertile couples have less sexual satisfaction, but no significant differences were detected between female and male partners (m=29.49 vs. 28.80) (Sultan & Tahir, 2011). Likewise, a study in Germany that used the Marriage and Partnership subscale of the Questionnaire on Life Satisfaction found no gender differences in satisfaction with sexuality (Wischmann et al., 2009).

In another study, wives in Taiwan reported feeling less sexual satisfaction than their male partners, regardless of whether the cause of infertility was related to a male factor (the Sexual Satisfaction Questionnaire, m=16.22 vs. 14.63) a female factor (m=17.63 vs. 15.50) or a mixed factor (m=16.71 vs. 14.24); while no statistically significant gender differences were found where the cause was an unexplained factor (Lee et al., 2001). Similarly, a recent study involving 158 females and 153 males revealed that females of infertile couples reported lower level of satisfaction (Sexual Relationship Satisfaction subscale of the Self-Esteem and Relationship Questionnaire: m=75.61vs. 84.27)than their male partners (Wischmann et al., 2014).

However, another study in Turkey revealed a different story, with men reporting lower quality sexual experiences (the Golombok-Rust Inventory of Sexual Satisfaction, m=43 vs. 21) than women in the infertile group, indicated by higher scores of the scale (Güleç et al., 2011). It should be noted that similar results were found in the fertile group (the Golombok-Rust Inventory of Sexual Satisfaction, m=44 vs. 27), which suggests that sexual dissatisfaction might not be infertility-specific. All told, the studies on the sexual satisfaction of infertile couples yielded inconsistent results.

Relationship with family members and friends

Four studies used the Acceptance by In-laws Subscale of the Marital Satisfaction Questionnaire, a self-developed questionnaire, and the Questionnaire on Life Satisfaction to measure the relationship that infertile couples have with family members and friends.

A study conducted in Taiwan found that the wives of infertile couples expressed less satisfaction with their acceptance by their in-laws than their husbands (subscale of the Marital Satisfaction Questionnaire, m=14.54 vs. 12.43), reflected by higher scores in the scale (Lee & Sun, 2000). Another study using the same instrument found that gender differences (female vs. male: m=15.47 vs. 13.14) were only found in couples with female factor infertility (Lee et al., 2001).

One study used a self-developed questionnaire to examine the infertility-related concerns of couples referred to an infertility clinic. The results revealed that females reported being more likely than males to avoid being around friends with children or who were pregnant (median=1 vs. 0, 0=strongly disagree, 1=disagree), and that no change was found in this gender difference over a period of 6 months (median=1 vs. 0) (Anderson et al., 2003). However, another study involving 633 females and 535 males found no gender differences in the satisfaction with friends, acquaintances, and relatives in couples attending infertility counseling (Wischmann et al., 2009).

2.5 Mediators of Stress

In the biopsychosocial theory, coping and support are regarded as two essential factors that mediate the impact of infertility on infertile couples.

Coping

A total of six studies, using the Coping Styles Questionnaire, the Ways of Coping-revised, the abbreviated form of the Freiburg Questionnaire on Coping with Illness, the

Coping Inventory for Stressful Situations, and the Life Meaning Subscale of the Brief Stress and Coping Inventory, focused on the coping strategies of infertile couples.

Overall, women tended to regard themselves as less capable than men of coping with infertility (Pinto-Gouveia et al., 2012). It was reported that infertile women showed a less emotionally detached coping style (the Coping Styles Questionnaire, mean=33.68 vs. 37.74) than infertile men, indicating that women are usually less detached from the state of infertility and the related emotions. However, there was no statistically significant gender difference with regard to rational and avoidant coping styles (Pinto-Gouveia et al., 2012).In coping with infertility, women when compared with men, reported greater use of self-blame and avoidance (the Ways of Coping-revised, mean=1.80 vs. 1.10), made more effort to seek information and emotional support (mean=1.86 vs. 1.20), and engaged more in cognitive restructuring (m=1.84 vs. 1.51), while having lower total well-being and higher infertility-related stress (Bayley et al., 2009).

Another study using the Freiburg Questionnaire on Coping with Illness contended that women were more likely to employ “depressional coping” (m=2.09 vs. 1.61) and “self-distraction and self-stabilization” (m=2.91 vs. 2.53) strategies than their partners to cope with infertility. However, when the infertility was related to a female factor, women were significantly more active than men in adopting problem-oriented coping (m=3.55 vs. 2.85) (Kowalcek, Wihstutz, Buhrow, & Diedrich, 2001).

In contrast, the findings of a recent study using the Coping Inventory for Stressful Situations argued that there is no statistically significant gender difference among

infertile couples in three coping styles: task-oriented coping, emotion-oriented coping, and avoidance coping (Musa et al., 2014). Similarly, a study conducted in China using the Coping Styles Questionnaire indicated that there were no statistically significant gender differences in the coping styles of problem-solving, self-accusation, help-seeking, avoidance, and rationalization among infertile women and men. However, infertile females use the fantasy as a coping strategy more often (m=0.5 vs. 0.4) than infertile males (Liu & Zhao, 2011).

Interestingly, in a study in Hungary using the Life Meaning Subscale from the Brief Stress and Coping Inventory, men were reported to use life meaning as a coping strategy more often (m=12.62 vs. 11.11) than women did (Cserepes et al., 2013).

Support

A total of five studies explored the perception that infertile couples have of the support that they have received from health professionals, partners, family members, and friends. A variety of instruments were used, including the Duke-UNC functional social support questionnaire, the Personal Resource Questionnaire, the Multidimensional Scale of Perceived Social Support, the Perceived Family Support, the Perceived Peer Support, and a self-developed scale.

Three of these studies revealed that there were no statistically significant gender differences in perceived social support (Slade et al., 2007; Sreshthaputra et al., 2008) or support from health care providers (Brucker & McKenry, 2004). It was noteworthy that the diagnosis of infertility played a role in the perception of the support received. A

study conducted in Turkey showed that the perception of support from family was greater among women than men in couples with female infertility (the Perceived Family Support, m=26.5 vs. 22.3) as well as male infertility (m=26.4 vs. 23.1). There was no statistically significant gender difference in perceived peer support for couples with all causes of infertility (Karlidere et al., 2007).

However, perceived support contributed differently to the psychological adjustment of males and females. Greater levels of perceived support from health care providers predicted lower levels of stress (F_{Change}=4.90, p<0.05) and anxiety (F_{Change}=4.81, p<0.05) in men, but there was no similar effect in women (Brucker & McKenry, 2004). Social support was negatively correlated to global stress (r=-0.1894, p<0.001) in infertile females, but not in males (Sreshthaputra et al., 2008). Low levels of family support and partner support (measured by the Multidimensional Scale of Perceived Social Support) were both associated with infertility stress (measured by the Fertility Problem Inventory) in women (β=-0.27, p=0.003; β=-0.45, p=0.006), while for men, only partner support was correlated (β=-0.29, p=0.001)(Martins, Peterson, Almeida, Mesquita-Guimarães, & Costa, 2014).

Neither the perception of males or females of the support that they had received from friends was correlated with their infertility stress. A correlation analysis showed that women's perceptions of spousal and family support (β=-0.24, p=0.049; β=-0.23, p<0.001) were inversely associated with their partner's infertility stress (Martins et al., 2014). According to the results of these studies, it can be concluded that both support from partners and family, and social support, were negatively related to stress in infertile

women, while for men perceived support from health care providers and partners inversely predicted their stress.

Discussion

In the present review, the experiences of infertile women and men were explored from the perspective of gender. The findings from the existing literature were organized into five domains: existential stressors, physical stressors, emotional stressors, interpersonal stressors, and the moderators of stress (Gerrity, 2001a).

Gender differences in the experiences with infertility

Stressors

The results of this review showed that females generally had more negative experiences with infertility than infertile men in most of the dimensions, such as lower levels of identity, self-esteem, and physical health, and higher levels of depression, stress, anxiety, stigma, and shame. These results are supported by the results of a previous review (Greil et al., 2010).

The inconsistencies in the findings of these studies may be attributable to differences in the study samples (men and women vs. couples) and in the various instruments used to measure the same dimension, such as the use of the Beck Depression Inventory, the Self-Rating Depression Scale, and the Center for Epidemiologic Studies Depression Scale to measure depression. Other confounders, such as the duration of infertility, level of education, economic status, and regional and cultural differences, have not been taken into account. However, one should also keep in mind that the gender differences in

distress reported in these studies may have been influenced by gender stereotyping, as women tend to report more distress than men (Edelmann & Connolly, 2000). In spite of this, the vast majority of the studies included in this review showed that among infertile couples, women reported higher scores for distress than their male partners. Cultural and social norms that emphasize the importance of childbearing as a woman's role might explain the gender differences in stress. Women usually feel more responsible for infertility than men (Abbey, 2000; Loke, Yu, & Hayter, 2012).

Most of the studies revealed that both infertile females and males experienced high levels of marital adjustment, and there were no gender differences. The dyadic adjustment had a direct protective effect on infertility-related stress for infertile couples. However, the marital and sexual satisfaction of infertile couples was a more complicated matter. Overall, infertile couples reported a low level of marital satisfaction – also with no gender differences. Nonetheless, when the causes of infertility were revealed, the results were very different. Infertile females expressed less marital satisfaction than infertile males, when the cause of the infertility was revealed to be either a female or male factor, but no gender differences when the infertility was attributed to mixed causes or unexplained causes. Likewise, infertile couples also reported less sexual satisfaction. No gender differences were detected. However, on some occasions, both fertile and infertile males might be more sexually dissatisfied than females owing to sociocultural factors. Furthermore, the cause of infertility also played a significant role in the experiences of infertile couples. In all factors related to infertility, women experienced less satisfaction than men, except when the cause of infertility was unexplained.

It appears that the causes of infertility might be a plausible explanation for the inconsistent results concerning gender differences in marital and sexual satisfaction found in a previous review (Greil, 1997). The stage of fertility treatment is another factor that should be examined. Studies support the view that marital stress varies at different stages in a relationship (Gerrity, 2001b). The sociocultural context can also influence marital relationships. In a society where to produce and raise children is viewed as a duty to family, infertile couples are more likely to dissolve their marriage to fulfill the obligation for one's family. This occurs less often in developed countries where infertility is usually treated as a personal medical and psychological issue (Greil et al., 2010) .

In conclusion, similar to the findings of a previous study (Henning & Strauss, 2002) , infertile couples do not necessarily experience conflict. However, fertility disorders and their associated treatments can result in a substantial amount of stress on married life.

Coping

There was a tendency for women to perceive themselves as less confident than their partner in coping with infertility. Females adopted a less emotionally detached coping style than males, which was linked to depression. In terms of coping strategies, women employed more self-blame and avoidance, and were more likely to seek information and emotional support, engage in cognitive restructuring, and practice self-accusation, all of which were linked to higher levels of depression, anxiety, and stress, and lower levels of well-being. Furthermore, infertile wives reported greater use of "self-distraction and

self-stabilization" as a strategy to keep a distance between themselves and their unfulfilled wish for a child. Gender differences were also detected in the coping strategy of seeking meaning in life, with infertile men believing that life has meaning, which may have helped them to endure the burden of being infertile.

Numerous instruments measuring different names and styles of coping strategies were used in the studies included in this review, making it difficult to compare the findings. Although there appeared to be a variety of strategies, they can be grouped under three main categories: emotional-focused, problem-focused, and meaning-based strategies of coping(Schmidt, Holstein, Christensen, & Boivin, 2005). The coping strategies presented in the studies in this review can be grouped under the category of emotion-focused strategies, which positively or negatively regulate distress. These include: emotionally detached coping (Pinto-Gouveia et al., 2012), self-blame and avoidance (Bayley et al., 2009), depression, self-distraction and self-stabilization (Kowalcek et al., 2001), self-accusation, and rationalization (Liu & Zhao, 2011). Help-seeking (Liu & Zhao, 2011), and seeking information and emotional support (Bayley et al., 2009) in an attempt to manage stress can be grouped under the category of problem-focused strategies. Finally, meaning-based coping strategies, such as life-meaning coping, involve seeing the positive side in dark times/adverse situations (Cserepes et al., 2013).

As infertility is a form of stress over which couples have little control and the outcome of which they can do little to influence, it is expected that they would tend to employ emotion-focused coping rather than problem-focused strategies (Wischmann, 2013). Evidence for this is given in the studies in this review, in the finding that women are

more likely to adopt emotion-focused strategies. The greater use of emotion-focused coping by women is supported by a similar finding in an earlier review (Jordan & Revenson, 1999). The lower scores for women than men in the life meaning subscale was interpreted as indicating that men are more likely than women to use life meaning as a coping strategy (Cserepes et al., 2013). However, it could be argued women achieved a lower score in the life meaning subscale because their roles and identity were affected by infertility. This is a reasonable assumption and one that is supported by the notion that men's roles and identity are less affected by infertility (Greil, Leitko, & Porter, 1988).

Support

Inconsistent with the finding in previous reviews that women enjoy more social support than men (Abbey, 2000; Greil, 1997), most studies found no gender differences in perceived social support among infertile females and males. However, it was found that women reported more perceived support from family than did their male partners in cases of female or male factor infertility.

In addition, for infertile women and men the relationship between social support and psychological adjustment was complicated. The support from health care providers might help men more than women to cope with infertility-related stress and anxiety, while social and family support was related to stress in females but not in males. For both men and women, partner support was negatively related to infertility stress. Support from friends had no correlation at all with the stress experienced by both infertile men and women. For women, support from one's partner, family, and society was inversely

linked to stress, while for men, partner support, support from health care providers, and their spouse's perception of partner support was negatively related to infertility stress.

Our findings were compatible with the prevailing view that spousal support is essential in dealing with a shared hardship like infertility (Abbey, 2000). When exploring the relationship between social support and well-being, the duration of the infertility treatment should be considered. It was revealed that a couple's relationship tends to be weaker after three years of treatment for the state of childlessness (Abbey, 2000).

The adoption of biopsychosocial theory

These studies revealed that infertility has impacts on physical, emotional, and social realms, mediated by coping strategies and social support (Greil, 1997; Greil et al., 2010). The biopsychosocial theory of infertility is in fact a combination of the biopsychosocial theory and the stress and coping model, addressing the effects of infertility on the three realms at the individual, couple, family, and society levels (Gerrity, 2001a). In this review, the findings of the selected studies can be subsumed under the four stressors and two moderators of this theory. Although this review identified some of the dynamics between stressors and the mediating factors, further scrutiny is needed to consolidate the model by examining more in depth the dynamics between stressors and mediating factors.

It was also suggested that the cultural and social dimension of the experience could be incorporated in this model. A review of studies has reported that the experience of infertility is shaped by socio-cultural context, affected by such factors as race, ethnicity,

religion, and social class (Greil et al., 2010). A study conducted in Korea also reported that men had a higher rate of depression when the cause of infertility was due to low sperm counts (Bak et al., 2012), a situation in which cultural and social expectations may play a role. However, all but one study in this review revealed that women, regardless of country or culture of origin, suffered more from infertility than men. Nevertheless, the influence of specific social contexts should be taken into account in practice and research.

Methodological issues of the reviewed studies

There are methodological shortcomings to the studies that were included in this review. In a total of 29 of the 33 studies, the participants were recruited from clinics; thus, the experiences of those who had not sought help from health services were underrepresented. Recruiting couples from the community proved to be difficult, as couples who were referred by close friends refused to be interviewed, giving the reason that they were voluntarily childless (Loke et al., 2012). This is inevitable in studies with a sensitive topic. Social desirability may also have created a bias in the reports of the experiences of infertile couples. Infertile men were less likely to admit their psychological distress than women, in order to present a socially desirable image of themselves (Greil, 1997). Another methodological shortcoming was that, in as many as 14 studies, the infertile couple dyads were not analyzed as units, neglecting the mutual impact and reciprocal influence of the infertile dyads.

Limitations of this review

This review is not without limitations. First, grey literature related to this topic was not included. The published articles were selected because of their quality, but published articles usually contain significant results, creating a reporting bias. Second, due to language barriers only articles written in English or Chinese were included. Third, some pre-existing differences including existing support structures, personality, age, and occupation, may have influenced the findings and are unable to be controlled in the descriptive and observational studies. Another limitation is that this review included only studies examining the experience of, and adjustments to, infertility, but excluded studies related to stress experienced while undergoing Assisted Reproductive Technology. The decision was made on the assumption that since women undergo most of the invasive tests and related treatments, the gender differences during the treatment will be apparent.

A limitation of this review is that a meta-analysis of the results could not be conducted. Although similar concepts were measured in the quantitative studies, the results were detailed in different ways with 15 variables, and some only included a few studies, making it impossible for a meta-analysis to be carried out. The inclusion of qualitative studies also did not allow for direct comparisons to be made between the genders, only descriptions of differences. However, the advantage is that the qualitative studies make possible more an in-depth understanding of the differences between the genders in their experiences and in the social and cultural impacts of infertility (Greil et al., 2010), particularly in developing countries, where the sociocultural context makes infertility a sensitive topic (Bos, van Balen, & Visser, 2005).

Recommendations for future research

This literature review provided some directions and insights for future studies. First, there is a need for mixed method studies in order to capture the whole spectrum of the experiences of infertile people, including the early stage of realizing the problem, seeking health care, during treatment, and post-treatment outcomes. While qualitative research provides a unique lens to achieve an in-depth understanding of the experiences of infertile people, quantitative techniques have their advantages in assessing the various responses and adjustments to infertility and the need for intervention. Accordingly, the integration of these two research methodologies in the same study might be of value to obtain a comprehensive picture of the experiences of infertile women and men.

A future study into the experience of infertility should take into account contextual factors such as medical factors and sociocultural context, particularly differences in the experiences of infertile people based on the cause of the infertility.

Another recommendation relates to the focus of research. It would be valuable to explore whether infertility has positive effects on couples, and whether couples can learn to cope with their situation together in partnership as couple dyads. A few studies have paid attention to such positive aspects as enhanced dyadic adjustment, and have shown that infertile couples can achieve a closer partnership and greater harmony. Therefore, a future review will focus on the positive experiences of infertile people.

Implications for health care providers

As identified in the review, infertile couples, both men and women, are experiencing a stressful situation in their married life. A better understanding of the experiences of infertile couples from the perspective of gender may enable health care providers to design a tailored intervention. Therefore, an intervention should be developed to support the couples in their coping with the impact of infertility as a dyad. In particular, it should aim to strengthen the partnership of the couples and enhance their mutual support, which is essential to mediating the stress felt by both men and women of infertile couples.

2.6 Conclusion

In this review the variables related to infertility were classified into five domains: existential stressors, physical stressors, emotional stressors, interpersonal stressors, and the moderators of stress. Their impacts on the experiences of infertile couples were identified from the perspective of gender. Overall, infertile women had a more negative experience than men, while both men and women were subject to a stressful married life. Partner support was also reported to be an important element of coping with infertility. Therefore, research needs to be conducted on a supportive intervention for infertile couples, targeted at both females and males, especially one that focuses on the enhancement of their partnership.

Chapter 3

LITERATURE REVIEW (II)

Infertile couples' emotional reactions to In Vitro Fertilization treatment*

* The content of this chapter was published:

Ying, L., Wu, L. H., & Loke, A. Y. (2016). Gender differences in emotional reactions to in vitro fertilization treatment: a systematic review. *Journal of assisted reproduction and genetics, 33*(2), 167-179.

Introduction

It is estimated that 1.9% and 10.5% of women aged 20-44 worldwide suffer from primary and secondary infertility, respectively (Mascarenhas et al., 2012). In their journey of seeking treatment, about 3% of infertile couples resort to assisted reproductive technology (ART), of which In Vitro Fertilization (IVF) accounts for more than 99% (Sullivan et al., 2013). Fertilization with Intra Cytoplasmic Sperm Injection (ICSI) is used to treat sperm-related fertility problems. The success rate (delivery rate) of IVF treatments is low at 16.6 - 20.2% (for fresh aspiration and frozen embryo transfers respectively) (Sullivan et al., 2013). While infertility is a long-lasting source of stress that affects couples in their existential, physical, emotional, and interpersonal domains(Ying, Wu, & Loke, 2015a) , IVF treatment is likely to cause anxiety with its torturous nature in terms of bodily discomfort, and to evoke depression with the uncertainty of the treatment's outcome (Verhaak et al., 2007).

The psychological reactions of infertile women have received much attention in the literature, since women endure the majority of IVF procedures (Holter, Anderheim, Bergh, & Möller, 2006; Verhaak, Smeenk, van Minnen, Kremer, & Kraaimaat, 2005; Volgsten, Svanberg, Ekselius, Lundkvist, & Poromaa, 2008; Wang et al., 2007). A systematic review of 27 studies focusing on the emotional adjustment of women to different stages of IVF treatment was conducted in 2007. The review indicated that women undergoing IVF reported a higher level of emotional distress than normal fertile women, and that the oocyte retrieval and the waiting period before the pregnancy test were the most stressful times of the IVF cycle (Verhaak et al., 2007). It should be noted that more than half of the studies in the review (55.6%) had been conducted before the

year 2000, only three studies (11.1%) were conducted in Asia, and that the emotional adjustment of men was not addressed in this review.

The emotional reactions of infertile couples and the effect that they have on each another has been recognized (Chiaffarino et al., 2011) . Although men were usually less involved in infertility treatment procedures, they also suffered from the IVF treatment together with their female partner as an infertile dyad. Studies on the psychological status of men before, during, and after the IVF cycle, have also been presented in a number of studies (Ismail, Menezes, Martin, & Thong, 2004; Volgsten et al., 2008; Yassini, Khalili, & Hashemian, 2005). As the socialization process and expected gender role of men are different from those of women, one would expect there to be differences between genders in response to IVF treatment. However, there is no review that compares the differences of the journey between men and women undergoing IVF treatment. The psychological well-being of men is often neglected and also deserves attention.

The aim of this systematic review is to extend the abovementioned review (Verhaak et al., 2007) in providing a comprehensive picture of men and women's emotional reactions to infertility treatment (IVF), and to identify any differences between the genders. This will provide a better understanding of the emotional reactions of couples, and offer health care professionals the information that they need to help infertile couples to go through a vulnerable stage in their life. It might also lead to future research in related fields.

Methods

Literature search strategy

A systematic literature search was performed using the following databases: PubMed (1966+), CINAHL (1982+), PsycInfo (1806+), EMBase (1974+), CBM (Chinese BioMedical Literature Database, 1978+), and CAJ (China Academic Journal Full-text Database, 1915+). MeSH terms, key words, and free words such as “infertility” AND “fertilization in vitro” OR “sperm injections,” “intracytoplasmic” AND “psycholog*” OR “anxiety” OR “depression” OR “emotions” OR “stress” were used to conduct the search. Studies that were published in English or Chinese from the years 2000 to 2014 were included. Four selected searching strategies were listed in Appendices Table 3-1. The references of the articles selected for review and other related systematic reviews were also screened to retrieve additional relevant articles.

Inclusion and exclusion criteria

The criteria for inclusion in this review were: studies that focused on infertile individuals or couples as the study population; those that examined the psychological effects of IVF treatment on infertile couples; and for articles in Chinese, inclusion in the Chinese Science Citation Database (CSCD). The exclusion criteria were: studies involving psychological responses relating to intrauterine sperm insemination (IUI); couples undergoing IVF with a surrogate, and studies that only explore the psychological impact on couples who became pregnant after IVF. The selection procedures for this study are presented in Figure 3-1.

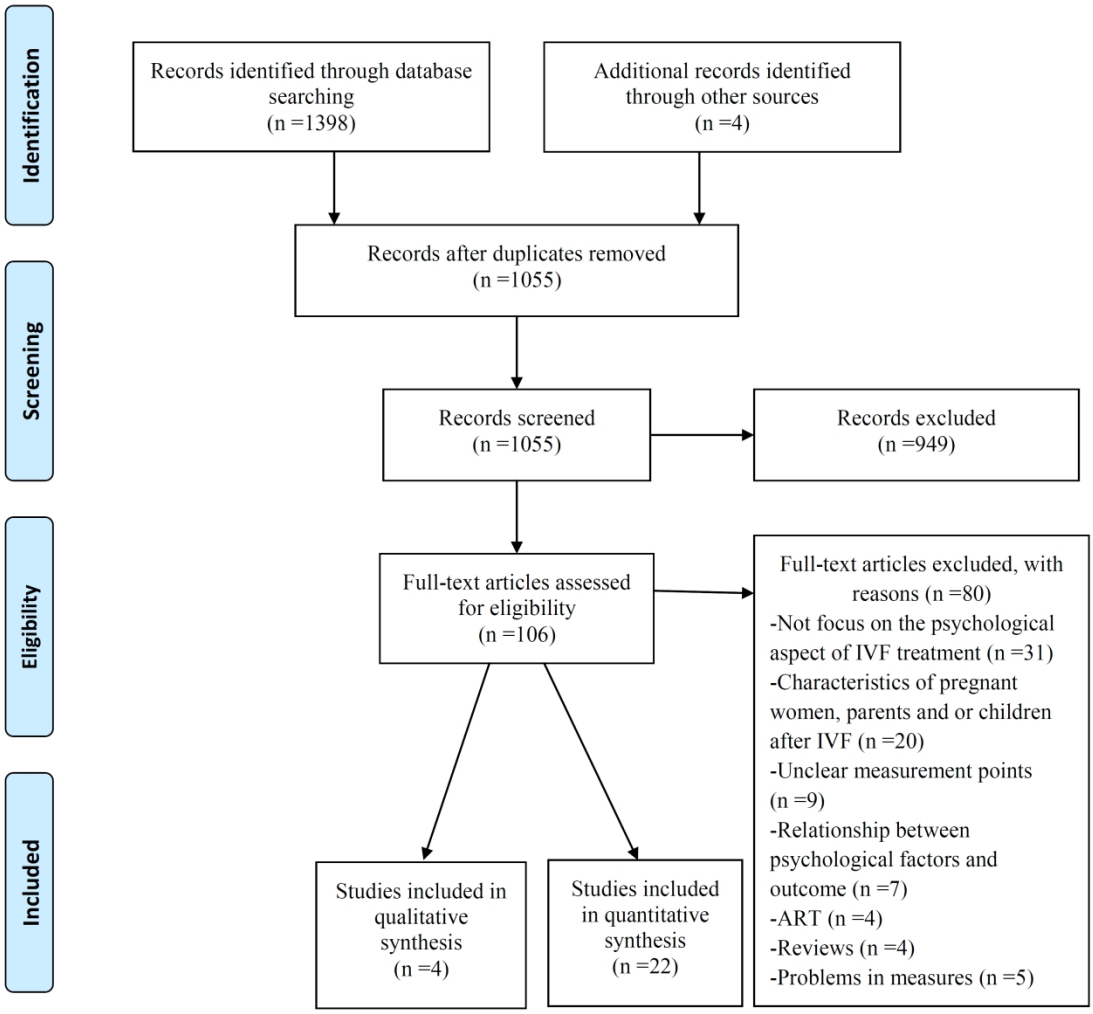

Figure 3-1. The flow diagram on identifying the literature

Quality assessment of the reviewed papers

Two reviewers independently reviewed the included studies, and then conducted the quality assessment using the Joanna Briggs Institute Critical Appraisal Checklist for Descriptive/ Cohort/ Qualitative Studies (Institute, 2014). There are nine or ten items (for qualitative studies) used to assess the quality of different studies. Each item can be evaluated as “yes”, “no”, or “unsure”, in which “yes” refers to the low risk of bias

(Furlan, Pennick, Bombardier, & van Tulder, 2009). Although the item can be scored (yes = 2; no = 0; unsure = 1), there is no priori cut-off score suggested by JBI for study selection. The scores are for reference in this review.

Results

General Information of the Studies

The comprehensive literature search yielded a total of 1398 citations, with 4 additional records identified through a hand search. After duplicate entries were removed, 1055 articles remained. The abstracts of these publications were screened and 949 papers that did not meet the inclusion criteria were excluded. The remaining 106 articles were further assessed for eligibility, and 80 were excluded: not focused on the psychological aspect of IVF treatment (n = 31), characteristics of pregnant women, parents and or children after IVF (n =20), unclear measurement points (n =9), relationship between psychological factors and outcome (n =7), ART including IUI (n =4), reviews (n =4), and problems in measures (e.g., not using established instruments) (n =5). As a result, a total of 22 quantitative and 4 qualitative studies were included in this review.

Of the total of 26 studies that were included, the majority had been conducted in Europe (n=11) and Asia (n=11), followed by North America (n=3), and Oceanic countries (n=1). Two of the studies were published in Chinese.

Of the 22 quantitative studies, 11 were cross-sectional, 9 were longitudinal descriptive, and 2 were cohort correlational studies. The studies focused on infertile couples (n=8), women of infertile couples (n=13), and men of infertile couples (n=1). These studies had

an average sample size of 292 (range, 37-1,731), with a mean age of 33.45 years for females (range, 30-35.45 years old), and 34.46 years for males (32.41-36.30 years old). Five studies provided information on the cause of the infertility, with less than one-third involving female factors (28.73%, range: 23.0%-32.5%), almost 40% male factors (37.11%, range 30.7%-42.7%), combined factors (about one out of four couples, 23.46%, range: 8.0%-35.3%), and the rest involved unknown causes (10.72%, range 2.5%-29%). The approaches adopted in the qualitative studies were grounded theory (Lee, Choi, Chan, Chan, & Ng, 2009), interpretative phenomenological analysis (Cipolletta & Faccio, 2013), thematic analysis (Widge, 2005), and content analysis (Volgsten, Skoog Svanberg, & Olsson, 2010). Sample sizes of these four studies ranged from 14 to 22.

Methodological quality and risk of bias of the included studies

The results of the quality assessment indicated that the average scores on the quality of the included studies were 13.5 (range: 11-16; maximum possible score 18) for the quantitative studies, and 14 (range: 12-16; maximum possible score 20) for the qualitative studies. The two reviewers held a discussion meeting to resolve any disagreements. Although it was clear that the studies had methodological limitations, such as unclear inclusion criteria for the samples, a lack of objective outcome criteria, and insufficient descriptions of the subject groups in the studies, both reviewers considered all of the studies to be of good quality and suitable for inclusion in this review.

Data extraction

The key components of the 22 quantitative studies were extracted and tabulated according to a standard format: authors, country of the study, participants, instruments, and significant findings. In these studies, anxiety and depression were the two main indicators of the couples' emotional reactions to IVF treatment. This is attributed to the fact that the two indicators were regarded as sensitive to the stress-induced activation of the hypothalamic-pituitary-adrenal (HPA) axis (Sandi & Richter-Levin, 2009). The gender differences in depression, anxiety, and other forms of distress are presented in this review. The findings of these studies are grouped and presented according to three treatment periods: pre-, during, and in the long-term following IVF treatment.

3.1 Pretreatment emotional reactions

A total of nine out of the 22 studies reported the psychological effects (depression and anxiety) of infertility in the pre-IVF treatment period, with four of the studies focusing on women, one on men, and four on the couples. The findings of these studies are presented in Appendices Table 3-2.

Depression

The depression levels of women and/or men were investigated in the nine studies using a variety of instruments: the Beck Depression Inventory (BDI) (Kee, Jung, & Lee, 2000; Wichman, Ehlers, Wichman, Weaver, & Coddington, 2011; Yassini et al., 2005), the Symptom Check List (SCL-90) (Salvatore et al., 2001; Wang et al., 2007), the Self-Rating Depression Scale (SDS) (Dong, Yang, & Sun, 2013), the Psychological General Well-Being Index (PGWB) (Holter et al., 2006), the Patient Health Questionnaire-9

(PHQ-9) (Lewis, Liu, Stuart, & Ryan, 2013), and the Lubin's Depression Adjective Checklist Scale (DACL) (Merari, Chetrit, & Modan, 2002).

The depression levels of women before proceeding with IVF treatment were presented in seven studies. Five of these studies revealed that compared with fertile women, infertile women reported more depressive symptoms (Kee et al., 2000; Merari et al., 2002; Salvatore et al., 2001; Wang et al., 2007), or a higher prevalence of moderate and severe depression (BDI $\geq$10, IVF vs. ICSI vs. control=48% vs. 52% vs. 12%) (Yassini et al., 2005). A study that analyzed the pretreatment data after the results of the pregnancy test had been disclosed did not identify significant differences in depression levels between women who finally succeeded in conceiving and those who failed (Merari et al., 2002). However, one of the seven studies found no significant difference in depression scores between infertile and normal women (subscale of PGWB, m=15.4 vs. 15.3) (Holter et al., 2006), with the measurement point at 2-4 weeks before treatment. Contradictory findings were presented in a study conducted in the United States, indicating that incidences of major depressive disorders (MDD) and other depressive disorders (ODD) among IVF women were lower than among the primary care population (PHQ-9, MDD: 1% vs. 10%; ODD: 2% vs. 6%) (Lewis et al., 2013), where the PHQ instruments were first developed and published (Spitzer, Kroenke, Williams, & Group, 1999). A possible explanation for this finding proposed by the author was that the PHQ might not be an appropriate/sensitive measure of distress for women at the pre-IVF treatment period (Lewis et al., 2013).

Two of the four studies that examined the depression status of infertile men also showed that these men exhibited more symptoms of depression than fertile men (Dong et al., 2013), or a higher incidence of moderate and severe depression (BDI ≥10, IVF vs. ICSI vs. control=44% vs. 26.7% vs. 24%) (Yassini et al., 2005). However, a study that examined the depressed mood of men 2-4 weeks prior to treatment showed that they were less depressed than other men, indicated by the higher mean scores in subscale of PGWB (m=16.3 vs. 15.8) (Holter et al., 2006).

Another study, analyzing the pretreatment data after the results of the pregnancy test had been disclosed, revealed that the depression score of men in couples who succeeded in conceiving was not different from the score of normal men (DACL, m=10.0 vs. 8.5). Indeed, those men in couples who failed to conceive even showed a lower level of depression than was the norm (DACL, m=7.3 vs. 8.5) (Merari et al., 2002). Thus, the depression levels of infertile men were not significantly higher than the norm. It may also be worth noting that some of these men had children from a previous marriage, which might result in more men who did not feel stressed for not having a second child (Merari et al., 2002).

Of the nine studies that were identified, only one included statistical testing for gender differences in pretreatment emotional reactions (Wichman et al., 2011). This study, consisting of 160 infertile couples, reported that women had a significantly higher score than men in symptoms of depression (BDI, m=4.0 vs. 2.7) (Wichman et al., 2011).

Anxiety

The anxiety levels of women and/or men of infertile couples were assessed in eight studies that adopted different inventories: the State Trait Anxiety Inventory (STAI) (Kee et al., 2000; Merari et al., 2002; Wichman et al., 2011; Yassini et al., 2005), the Symptom Check List (SCL-90) (Salvatore et al., 2001; Wang et al., 2007), the Self-Rating Anxiety Scale (SAS) (Dong et al., 2013), and the Psychological General Well-Being Index (PGWB) (Holter et al., 2006).

A total of six studies measured the anxiety levels of females during the pre-IVF treatment period. Five studies revealed that infertile females reported higher levels of anxiety than fertile counterparts (Holter et al., 2006; Merari et al., 2002; Salvatore et al., 2001; Wang et al., 2007), or higher rates of moderate and severe anxiety (STAI ≥40, IVF vs. ICSI vs. control=88% vs. 76% vs. 44%) (Yassini et al., 2005). However, a study conducted in Korea revealed that females of infertile couples scored higher only in trait anxiety than fertile women at the time when the infertile females were entering the IVF program (STAI-T, m=46.23 vs. 43.56), but there was no difference in the score of state anxiety(Kee et al., 2000) .

Four studies examined the levels of anxiety in men at the pre-IVF treatment period. Two studies identified differences in anxiety, with men of infertile couples demonstrating higher levels of anxiety than fertile men (subscale of PGWB, m=23.1vs. 24.5; SDS, m=44.0 vs. 41.88) (Dong et al., 2013; Holter et al., 2006). Two studies showed that there were no differences in the prevalence of anxiety prior to the initiation of treatment between the IVF or ICSI group and fertile men (Yassini et al., 2005), and in the scores for state anxiety between infertile males and normal males (Merari et al., 2002). The

levels of trait anxiety in men at the pretreatment period were not higher than the norm (Merari et al., 2002).

A study that compared the men and women of 160 couples before they proceeded to undergo IVF treatment, found that women scored significantly higher than men in state anxiety (STAI-S, m=32.8 vs. 30.4) and perceived stress (PSS, m=11.2 vs. 9.9) (Wichman et al., 2011).

In summary, the studies that examined the emotional states of individuals and couples at the pre-IVF treatment period revealed that women experienced higher levels of depression and anxiety. Men in general also had elevated depression levels, while the results on the level of anxiety were inconsistent, with some showing elevated levels of anxiety and others reporting no differences between infertile men and their norm groups.

3.2 The emotional reactions and psychological distress of infertile couples during the treatment cycle

A total of 12 out of the 22 studies measured the emotional reactions (Appendices Table 3-3) and psychological distress (Appendices Table 3-4) of infertile women and/or men during the IVF treatment cycle. Eight of the 12 studies focused on females, and four on the couples.

Depression

Eight studies examined the depression suffered by women and/or men during the cycle of IVF treatment by employing a variety of instruments: the Zung Self-Rating

Depression Scale (ZDS) (Chiaffarino et al., 2011; Jin et al., 2013), the Center for Epidemiologic Studies Depression Scale (CES-D) (Romano et al., 2012; Wu, Zhang, & Cong, 2008), the Mean Affect Adjective Check-List (MAACL) (Ismail et al., 2004; Yong, Martin, & Thong, 2000), the Self-rating Depression Scale (SDS) (Li, Xu, & Gao, 2012), and the Primary Care Evaluation of Mental Disorders (PRIME-MD)(Volgsten et al., 2008).

For women, the prevalence of depression was high on the day of the oocyte retrieval (ZDS≥40, 14.8%; PRIME-MD, major depression: 10.9%) (Jin et al., 2013; Volgsten et al., 2008), or within two hours after the embryo transfer (SDS˃41, 12.3%) (Li et al., 2012), while the highest incidence of depression was detected 20 days after the embryo transfer (CES-D, 47.2%) (Wu et al., 2008). Compared with the stress level of that measured at baseline, women also scored higher in depression at the time of the β-HCG dosage (the pregnancy test) (ZDS, m=34.62 vs. 33.40) (Chiaffarino et al., 2011).

Two studies that measured depression levels at three different time points: pretreatment (T1), before the embryo transfer (T2), and before the pregnancy test (T3), revealed that women scored higher in T3 (MAACL, T1:T2:T3, m=51.7 vs. 50.6 vs. 61.9; m=45.21 vs. 45.21 vs. 57.12) (Ismail et al., 2004; Yong et al., 2000). However, one study that adopted repeated measures ANOVA to analyze the level of depression at three different time points: pretreatment, at the end of the gonadotropin administration period, and before the pregnancy test, showed that there were no significant differences between women with either explained infertility (CES-D, T1:T2:T3, m=31.36 vs. 34.43 vs. 35.71)

or unexplained infertility (m=31.73 vs. 34.81 vs. 34.41), while the higher scores were also present in T2 and T3 (Romano et al., 2012).

Three studies measured depression in men of infertile couples with IVF treatment. No difference was detected between the time points of the baseline and the β-HCG dosage (the pregnancy test) (ZDS, m=29.78 vs. 29.51) (Chiaffarino et al., 2011), while the incidence of major depression was about 5.1% on the day of the oocyte retrieval (Volgsten et al., 2008). Men also reported similarly higher levels of depression as women before the pregnancy test compared with pretreatment or before the embryo transfer (MAACL, T1:T2:T3, m=54.6 vs. 50.3 vs. 61.8) (Ismail et al., 2004).

Anxiety

Women and/or men's anxiety was explored in ten studies using different instruments: STAI (Mahajan et al., 2010; Romano et al., 2012; Turner et al., 2013), the Zung Anxiety Scale (ZAS) (Chiaffarino et al., 2011; Jin et al., 2013), MAACL (Ismail et al., 2004; Yong et al., 2000), SAS (Li et al., 2012; Wu et al., 2008), and PRIME-MD (Volgsten et al., 2010).

The incidence of anxiety in women was high on the day of the oocyte retrieval (ZAS≥40, 33.3%; PRIME-MD, anxiety disorder: 14.8%) (Jin et al., 2013; Volgsten et al., 2010), within two hours after the embryo transfer (SAS˃40, 38.5%) (Li et al., 2012), and 20 days after the embryo transfer (SAS>40, 25.9%) (Wu et al., 2008). The mean anxiety score for women was higher at the time of the β-HCG dosage (the pregnancy test) than

at pretreatment (ZAS, m=32.64 vs. 31.95) (Chiaffarino et al., 2011). No differences in anxiety level were detected between women who had received the first cycle and those who had undergone a repeated cycle of IVF treatment (Turner et al., 2013).

Only three studies examined men's anxiety during the IVF cycle. The findings revealed that the anxiety levels of men at the time of the β-HCG dosage (the pregnancy test) (Chiaffarino et al., 2011), or before the embryo transfer and the pregnancy test were similar to those at baseline (Ismail et al., 2004). The prevalence of anxiety disorder on the day of the oocyte retrieval was 4.9%, which was evaluated by the instrument PRIME-MD (Volgsten et al., 2008).

Although the scores for levels of anxiety on the day of the oocyte retrieval (T2), before the embryo transfer (T3), and before the pregnancy test (T4) were all higher than at baseline (T1), there were no differences between the three time points (STAI-S, T1<T2=T2, m=44.00 vs. 46.41 vs. 46.72; MAACL, T1<T3=T4, m=60.00 vs. 77.26 vs. 71.51) (Mahajan et al., 2010; Yong et al., 2000). Four of the studies reported that anxiety levels (or the prevalence of anxiety (Wu et al., 2008) in T4 were higher than at pretreatment, but the differences were not significant (Ismail et al., 2004; Romano et al., 2012; Turner et al., 2013). One study also reported that the state anxiety of women in T1, one day before the oocyte retrieval, and T4 was higher than in normal people (STAI-S, m=41.45 vs. 41.63 vs. 42.06 vs. 35.20) (Turner et al., 2013). To conclude, women were more likely than men to show a higher level/incidence of anxiety at the time of the oocyte retrieval, pre- and post-embryo transfer, and before the pregnancy test.

Psychological distress

Apart from depression and anxiety, the psychological distress of infertile couples, including positive and negative affect, and general psychological impacts and reactions, were assessed in five studies using different instruments: MAACL (Ismail et al., 2004; Yong et al., 2000), the Positive and Negative Affect Schedule (PANAS) (Mahajan et al., 2010), the Effects of Infertility Questionnaire (EIQ) (Holter et al., 2006), and the Daily Record Keeping Chart (DRK) (Boivin & Lancastle, 2010).

A study was conducted to explore the psychological impacts of IVF treatment on infertile couples using the 14-item EIQ (e.g., anger, frustration, anxiety, depression, powerlessness) (Holter et al., 2006).The results revealed that both men and women had higher overall scores at one hour before the oocyte retrieval than in pretreatment (EIQ, men: m=32.0 vs. 30.8; women: m=34.2 vs. 33.5). Compared with men, women reported significantly higher scores on psychological impacts before the oocyte retrieval (EIQ, m=34.2 vs. 32.0) (Holter et al., 2006).

Two studies indicated that the positive affect scores of women during treatment before the pregnancy test were significantly lower than in the pretreatment period (MAACL, m=37.2 vs. 40.8; m=35.34 vs. 39.45) (Ismail et al., 2004; Yong et al., 2000). A study examining the negative affect (NA) of women showed that the mean NA scores before the embryo transfer and oocyte retrieval were higher than that in the pretreatment period (PANAS, m=31.89 vs. 29.75 vs. 26.44) (Mahajan et al., 2010). It was reported that the men reacted in the same psychological pattern as their wives(Ismail et al., 2004) .

A study adopted the Daily Record Keeping (DRK) chart to monitor the course of women's affective reactions (e.g., anxiety, depression, and positive affect) to different stages of IVF treatment (Boivin & Lancastle, 2010). The results revealed that in the last seven days of ovarian stimulation, women reported a positive affect with a lower level of anxiety. During the last seven days before the pregnancy test, they became increasingly anxious and depressed, while the scores for positive affect were almost unchanged. However, after the pregnancy test a returned negative result, depression was the predominant emotion of women.

In summary, both women and men reported lower levels of positive affect and higher negative affect during the cycle than at the pre-IVF treatment period. A gender difference in the psychological effects of treatment was also identified, with women reporting more negative impacts than men. The treatment had a significant impact on the emotional and psychological distress of women, especially during the period prior to the disclosure of the results of the pregnancy test.

Experiences of couples undergoing IVF

The results of the two qualitative studies that explored the experiences of couples undergoing IVF provided a more in-depth understanding of the couples. The studies revealed that couples were affected psychologically and in their sexual relationship. During each reproductive cycle, couples go through an emotional roller-coaster of hope, expectation, and despair (Widge, 2005). Women reported a diminished self-image because they felt that their bodies were treated as a tool for the embryo (Cipolletta & Faccio, 2013). Couples expressed difficulty in handling their sexual life, which had been

compromised to meet the schedule required because of the IVF treatment (Widge, 2005). The unpredictable outcome of the treatment usually gives rise to feelings of anxiety and worry during the waiting period (Cipolletta & Faccio, 2013; Widge, 2005).

It can be concluded that during the course of the IVF cycle, the stressful time points for women are the time of the oocyte retrieval, the embryo transfer, and the period prior to the pregnancy test. Men only reported feeling a higher level of depression before the pregnancy test, with anxiety levels being generally similar across the cycle.

3.3 Long-term emotional reactions after the IVF failure

Two quantitative and two qualitative studies explored the long-term emotional impact after the IVF failure in women and couples. The findings of the quantitative studies are presented in Appendices Table 3-5.

A longitudinal descriptive study identified gender differences in terms of the psychological adjustment of couples 6 months after the IVF treatment (Verhaak et al., 2005). Women scored higher both in depression (BDI, m=1.5 vs. 2.3) and state anxiety (STAI, m=37.3 vs. 39.0) after an unsuccessful cycle, and lower in depression and anxiety after a successful cycle (STAI, m=36.7 vs. 34.2; BDI, m=1.5 vs. 0.5) than at pretreatment. However, the difference in men was only found in those with pregnant wives, with such men reporting significantly lower levels of depression (BDI, m=0.7 vs. 0.4).

Another study examined the psychological adjustment of women four to nine years after failing to conceive after IVF treatment (Bryson, Sykes, & Traub, 2000). The findings showed that compared with the women who became parents, those women who remained childless had a higher level of stress (Perceived Stress Scale, PSS, m=14.88 vs. 18.44) and depression [The Anxiety and Depression subscale of the Minnesota Multiphasic Personality Inventory (MMPI), m=1.71 vs. 4.56], and less satisfaction with life [The Satisfaction With Life Scale (SWLS), m=26.29 vs. 21.58].

A qualitative study conducted in Sweden revealed that the grieving process for both men and women was unresolved even three years after unsuccessful IVF (Volgsten et al., 2010). Women were more likely to express grief than their husbands, who tended to assume the supportive roles and suppress their own feelings. However, positive experiences were revealed as well. In a qualitative study in Hong Kong, infertile couples with ineffective IVF reported gains in positivity, in personality, or knowledge, in relationships with their partners, children, parents, friends, colleagues, and fellow patients, and in transpersonal relationships (e.g., spirituality) (Lee et al., 2009).

In short, women in couples who had experienced a failed cycle felt greater stress than those with successful cycles, had higher levels of anxiety and depression, and lower self-esteem and satisfaction with life even years after the treatment. In contrast, for men, there were no significant differences in anxiety and depression pre- and post-treatment. Couples were together experiencing unresolved grief in the long term after the IVF failure.

Discussion

In the present review of the literature, the emotional reactions of infertile couples to IVF treatment were explored from the perspective of gender. The findings from the literature were organized into three categories: pre-, during, and long-term after IVF treatment.

Pretreatment emotional reactions of infertile couples

Before the start of IVF, women reported higher levels of depression and anxiety than fertile women. In general, our findings are consistent with those in the previous review, in which the authors concluded that women who started the treatment were emotionally distressed compared with fertile women, although the disparity was slight (Verhaak et al., 2007). Such findings are to be expected, considering the physical, social, and emotional pain that they suffer. Women in the modern society still regard motherhood as an important role and a respected identity, although they now have other ways to find value in life (Loke et al., 2012). In their desire to fulfill their dream of motherhood, infertile women are exposed to the majority of IVF procedures, including injections, medications, blood tests, and scans (Beckmann, 2014a). IVF offers them new hope of having a baby, but it also adds a great psychological burden on women because of its poor success rate of 16.6 - 20.2% (Sullivan et al., 2013). Therefore, it is not surprising to note that infertile women reported psychological distress even prior to the IVF treatment.

Infertile men also experienced depression before the IVF treatment, while the effects on their anxiety levels were inconsistent. Men, as well as women, suffered from the fact of

being infertile, and were more likely to experience depression. However, men suffered less from the procedures of the IVF treatment, and their anxiety levels were less affected.

Emotional reactions of infertile couples during the treatment cycle

Compared with the pretreatment stage, infertile women presented higher levels/incidences of depression and anxiety at the time of the oocyte retrieval, the embryo transfer, and before the pregnancy test. These findings are supported by the results of a previous review(Verhaak et al., 2007) . Men of infertile couples reported a higher level of depression only during the time that couples were waiting for the outcome of the IVF treatment. A study also found that, compared with the pretreatment period, both men and women had lower scores on positive affect before the pregnancy test.

When entering the cycle, infertile couples, especially women, suffer from painful procedures including routine injections and tests. The oocyte retrieval was regarded as the most tortuous procedure (Widge, 2005), which was accompanied by abdominal cramping, bloating, and general fatigue. The period of embryo transfer, although less painful, saw the couples worrying about the quality and quantity of the embryos, or the loss of the transferred embryo(s). Some women suffered from a disturbance to their self-image, feeling that their body was being instrumentalized for the embryos. During the waiting period before the pregnancy test, both women and men reported psychological distress. In a qualitative study conducted in China, a participant actually described this period as facing ‘an impending death sentence’(Ying, Wu, & Loke, 2015b). The outcome of the IVF treatment is unguaranteed and uncontrollable. The couples find

themselves powerless to do anything but wait for the results, knowing that their chance of conceiving is only one fifth (Sullivan et al., 2013). It is understandable that the couples would experience psychological distress before the pregnancy test.

Although both men and women reported psychological distress, gender differences existed during the treatment. Women of infertile couples usually had higher levels of anxiety and depression, while men only exhibited higher levels of depression. The anxiety levels of men were similar across the cycle. Apart from the involvement of fewer men than women in the treatment procedures, the socialization processes of men might also play a role in the interpretation of the results. During their life cycle, men are usually expected to be strong and to suppress their emotions when encountering adversity, which might contribute to a higher prevalence of depression and hardly any changes in anxiety level (Beevers, Wenzlaff, Hayes, & Scott, 1999).

Long-term emotional reactions after IVF failure

The study showed that women who had a successful cycle reported lower negative emotions than at pretreatment (Verhaak et al., 2005). Women who remained childless four to nine years after unsuccessful IVF treatment reported less satisfaction with life than those who finally became parents (Bryson et al., 2000). The results indicated that it is the unsuccessful outcome of IVF instead of IVF itself that would have long-term psychological consequences (Verhaak et al., 2005). Infertile couples who had failed cycle experienced unresolved grief three years after treatment (Volgsten et al., 2010). The findings of this review are consistent with the statement that the grieving process in the IVF cycle is often long (Alesi, 2005).

It was interesting in this review to note that there was a difference between the persistence of infertile couples in the West from those in China. A study in the USA showed that about 34% of insured patients who underwent IVF would terminate their treatment cycle after one or two unsuccessful trials (Domar et al., 2010). However, infertile couples in China were more persistent, and not many couples were willing to drop out of treatment until the desired pregnancy was achieved. The repeated IVF treatments would result in a long-lasting negative impact on the couple's emotions, and would also hinder them from moving on to a childfree life or from adopting a child (Jin et al., 2013; Lau et al., 2008; Wang et al., 2007).

Methodological issues of the reviewed studies

There are methodological shortcomings to the studies that were included in this review. First, it is noteworthy that the studies only compared the pretreatment psychological status of infertile individuals prepared to undergo IVF treatment with their fertile counterparts or the general population as the norm, but not with other infertile patients who are not undergoing IVF treatment. Therefore, the impact of infertility vs. the impact of the IVF treatment cannot be distinguished. Moreover, anxiety and depression were assessed using various instruments, including general and fertility-specific measures of depression, which might have influenced the interpretation of the findings. The assessment points also varied in the studies, ranging from two to four weeks to immediately before the treatment, and the waiting period was not defined, which might also have influenced the levels of emotional reactions. In future studies, researchers

should consider these matters, including the selection of a reference group, instruments, and measurement points.

Limitations

Several limitations in the present literature review should be considered. First, only articles published in English and Chinese were included. This resulted in biases in publications and sources. However, the published papers were generally regarded as being of better quality than grey literature. Another limitation is that there were far fewer studies identified on the emotional reactions of men to IVF than on women, which might led to some biases in our conclusion. A further exploration of the psychological reactions of men is needed to confirm the results.

Recommendations for future research/program

This review provided some starting points and insights for future research in related fields. First, when examining the pretreatment emotional responses of infertile couples, the reference groups selected in these studies were mostly fertile couples or the normal population. There is a need to compare these couples with those involved in first-line infertility treatments before IVF. It is in comparing two equivalent groups with infertility but with or without treatment that the impacts of pre-IVF treatment can be accurately depicted. Also, the personal factors, such as personality, individual coping strategies, social economic status, and social support, should be considered.

Second, infertility-specific instruments are more sensitive than other instruments in assessing the emotional states of infertile couples and should be adopted. Third, as this

review has shown that a considerable number of infertile couples experienced emotional distress when undergoing IVF treatment, a screening system to identify those at risk for emotional disturbances and a support program should be developed and provided. Finally, since it was revealed that IVF treatment affects both men and women as couples, and the negative emotions of one affected the other in the couple, the emotional reactions to IVF treatment of both men and women should be attended to.

Clinical implications

The better understanding of the impacts of IVF treatment on infertile couples has significant clinical implications for health care providers. From the beginning, clinicians should clarify to couples the fact that elevated negative emotions in women are natural under the circumstances and will not affect the pregnancy rate (Boivin et al., 2011). The couples should also be provided with information and support, which will give them a better understanding of the process, more realistic expectations about the outcome of the treatment, and the strength to go through the treatment.

During the cycle, psychological support should be provided on the day of the oocyte retrieval, the embryo transfer, and especially during the stage leading up to the pregnancy test. As both men and women experienced elevated levels of depression, such support should target the couple as a dyad. Men of infertile couples should also be encouraged to express their feelings and demands. The support could include information on the procedures, relaxation skills, and coping strategies.

Counseling or therapy should be made available, particularly for couples with failed

cycles. It has been found that unsuccessful treatment will not only lead to immediate heartbreak but also to long-term unresolved grief (Volgsten et al., 2010). Counselors should help the couples to accept and adjust to the undesirable outcomes. Advice and counseling should be given on whether the couple should proceed with the next treatment.

It is recommended that a support program should be developed, aimed at enhancing the partnership in couples undergoing IVF treatment. It has been reported that both women and men of infertile couples experience a stressful married life (Ying et al., 2015a), and those seeking IVF treatment are more likely to have an unstable marital relationship because of the prolonged nature and demands of the treatment (Newton, 2006; Wang et al., 2007). However, a supportive marital relationship can play a protective role for couples during the period of the IVF cycle (Lowyck et al., 2009a), especially when the woman is not adapting effectively to IVF (Chochovski et al., 2013). An intervention program aimed at enhancing the partnership in couples, helping the couples to support each other while undergoing IVF treatment, is needed.

3.4 Conclusion

Although both men and women experienced psychological distress during IVF treatment, gender differences existed. Compared with their fertile counterparts, women of infertile couples had higher levels of anxiety and depression, while men usually had a higher level of depression. Women had higher anxiety and depression prior to the treatment, and became even worse on the day of the oocyte retrieval, the pre- and post embryo transfer, and during the waiting period before the pregnancy test. Before the treatment,

men of the infertile couples reported elevated depression scores, which rose further during the time that couples waited to learn the outcome of the IVF treatment. Both men and women had lower positive affect scores before the pregnancy test. A failed IVF cycle had long-term negative psychological consequences for both spouses. A couple-based support program aimed at improving the psychological well-being and marital relationship of infertile couples should be provided.

Chapter 4

LITERATURE REVIEW (III)

Psychosocial interventions for patients undergoing In Vitro Fertilization treatment*

* The content of this chapter was published:

Ying, L., Wu, L. H., & Loke, A. Y. (2016). The effects of psychosocial interventions on the mental health, pregnancy rates, and marital function of infertile couples undergoing in vitro fertilization: a systematic review. *Journal of assisted reproduction and genetics*, *33*(6), 689-701.

Introduction

It has been widely recognized that infertility affects a couple physically, emotionally, and socially (Ying et al., 2015a) . When couples start seeking infertility treatments, there will be added suffering because of intrusive medical inquiries and procedures (Pasch & Christensen, 2000). About 3% of such couples will receive a recommendation to undergo assisted reproductive technologies (ARTs), and more than 99% of these recommendations will be for In Vitro Fertilization (IVF) (Ishihara et al., 2015). Infertile couples usually resort to IVF treatment only after they have exhausted other options. Although IVF provides new hope to these couples, it also brings a great burden because of the low success rate of IVF, at 18.4% - 20.3% (for frozen-embryo transfer and fresh aspiration respectively) (Ishihara et al., 2015) .

In terms of the effects of infertility at the level of the individual, it has been reported that women undergoing IVF treatment experienced elevated levels of anxiety and depression during the pre-IVF treatment period, on the day of the retrieval of oocytes, during the transfer of embryos, and in the two-week period of waiting for the results of the treatment (Verhaak et al., 2007; Wang et al., 2007; Yong et al., 2000). The men of infertile couples also reported elevated levels of depression before the treatment and during the period of waiting for the results of the pregnancy test (Dong et al., 2013; Ismail et al., 2004; Yassini et al., 2005), although they were usually less involved or affected by the IVF cycle (Volgsten et al., 2008; Wichman et al., 2011; Yassini et al., 2005).

Studies have also explored the effects of the mental status of infertile couples on the outcome of their IVF treatments. Two systematic reviews with a meta-analysis of the predictive effects of psychological stress on the outcome of IVF treatments were inconclusive (Boivin et al., 2011; Matthiesen et al., 2011). In the first review, 31 prospective studies from 1978 to 2010 involving a total of 4,902 participants were examined. It was concluded that there were small but significant associations between pre-treatment stress/distress and reduced pregnancy outcomes (Matthiesen et al., 2011). The other review of 14 prospective studies from 1985 to 2010 involving a total of 3,583 infertile women found no association between pre-treatment anxiety or depression and the pregnancy outcomes of IVF treatment (Boivin et al., 2011). Nevertheless, the relationship between psychological stress and the pregnancy outcomes of IVF treatment deserves further exploration.

With regard to the effects of infertility at the couple level, studies have revealed that infertile couples have lower levels of marital satisfaction (Onat & Beji, 2012a; Sultan & Tahir, 2011). Specifically, couples undergoing IVF reported much poorer marital quality than fertile couples (Wang et al., 2007). A study reported that regulars (couples who had received treatment for infertility for more than two but less than five years) and persisters (couples who had undergone treatment for five or more years) were less happy with their marriage than beginners (couples in the first two years of treatment) (Gerrity, 2001b). It was also reported that there were significant differences among infertile couples in different stages of medical treatment with regard to psychological distress and marital stress, including couples in the phases of pre-diagnosis, beginning treatment, receiving regular treatments, persisting in treatment, and concluding the treatment [14].

Reviews of Psychosocial Interventions

A variety of psychosocial interventions have been conducted for infertile women / couples receiving IVF treatment in an attempt to improve their mental health, pregnancy rates, and marital function. Four systematic reviews were conducted in 2003, 2005, 2009, and 2015 to examine the effects of various psychosocial interventions on infertile patients undergoing fertility treatments (Boivin, 2003; De Liz & Strauss, 2005; Frederiksen, Farver-Vestergaard, Skovgård, Ingerslev, & Zachariae, 2015; Hammerli, Znoj, & Barth, 2009). The four reviews included studies targeting infertile patients across different stages of infertility treatments, from first-line treatments to ARTs. The four reviews also included quasi-experimental controlled trials, and three of the reviews included studies with no comparison groups (Boivin, 2003; De Liz & Strauss, 2005; Frederiksen et al., 2015). The conclusions derived from these reviews were inconsistent. The two more recent reviews reported contradictory results on the effects of interventions on emotional distress and pregnancy outcomes, but both reported some effects, although non-significant, on interpersonal or marital function (Frederiksen et al., 2015; Hammerli et al., 2009).

As RCT is the gold standard of research, allowing one to ascertain that results of a study are due to the intervention (Hoffmann et al., 2014), the shortcoming of these reviews was their inclusion of non-RCT studies. Thus far, there has not been a review focusing exclusively on RCT studies in exploring the efficacy of psychosocial interventions on patients/couples undergoing IVF treatment.

The purpose of the present review is to examine the effects of RCT studies of psychosocial interventions on the mental health, pregnancy rates, and marital function of patients/couples undergoing In Vitro Fertilization. The findings of this review may provide healthcare professionals and researchers with information on the effectiveness and effect size of psychosocial interventions, and on the implications for clinical practice and future research studies. The results will also inform the direction of the development of an intervention aimed at improving the experiences of infertile couples when undergoing IVF treatment.

Methods

Literature search strategy

Using the electronic databases PubMed (1966+), EMBase (1974+), Cochrane Library (1968+), CINAHL (1982+), PsycInfo (1806+), and CAJ (China Academic Journal Full-text Database, 1915+), a systematic literature search was conducted in the second week of July 2015. No language or time restrictions were set for this search. MeSH terms, key words, and free words such as “infertility”, “fertilization in vitro”, “sperm injections, intracytoplasmic”, “psychotherapy”, “intervention”, “program”, “anxiety”, “depression”, “pregnancy rate”, “marital relationship”, and “marital function” were used to identify potential studies. The full search histories were listed in Appendices Table 4-1. References of the articles selected for review and other related systematic reviews were also screened to further check for relevant articles.

Selection of studies for review and inclusion and exclusion criteria

The comprehensive literature search yielded a total of 1,613 citations, with 3 additional records identified through a hand search. After duplicate entries were removed, 1,182 articles remained. The abstracts of these publications were screened and 1,130 papers that did not meet the inclusion criteria were excluded. The remaining 52 articles were further assessed for eligibility.

The criteria for studies to be included in this review were: the use of randomized controlled trials (RCT); a target population of infertile patients/couples planning to undergo/ undergoing IVF/ICSI treatment who had received a psychosocial intervention; and published in English or Chinese in a peer-reviewed journal. The articles published in Chinese must be included in the Chinese Science Citation Database (CSCD). In this review, psychosocial interventions refer to any intervention that focuses on psychological or social factors rather than biological factors (Ruddy & House, 2005). The criteria for exclusion were: studies involving patients undergoing Intrauterine Sperm Insemination; studies that do not provide detailed information on the duration and number of sessions of interventions; and studies that were published in conference supplements or proceedings.

A total of 32 were excluded for the following reasons: not a psychosocial intervention study (n=3), a report of a study protocol only (n=2), published in conference supplements or proceedings (n=4), published in a language other than English or Chinese (Iranian, n=2), not involving randomized controlled trials (n=12), not targeted at infertile patients/couples undergoing IVF (n=4), a repeated report on the same population as that of another study (n=3), and no full text of the study available (n=2).

As a result, a total of 20 RCT studies on psychosocial interventions for patients/couples who underwent In Vitro Fertilization were included in this review. The selection procedures for this study are presented in Figure 4-1.

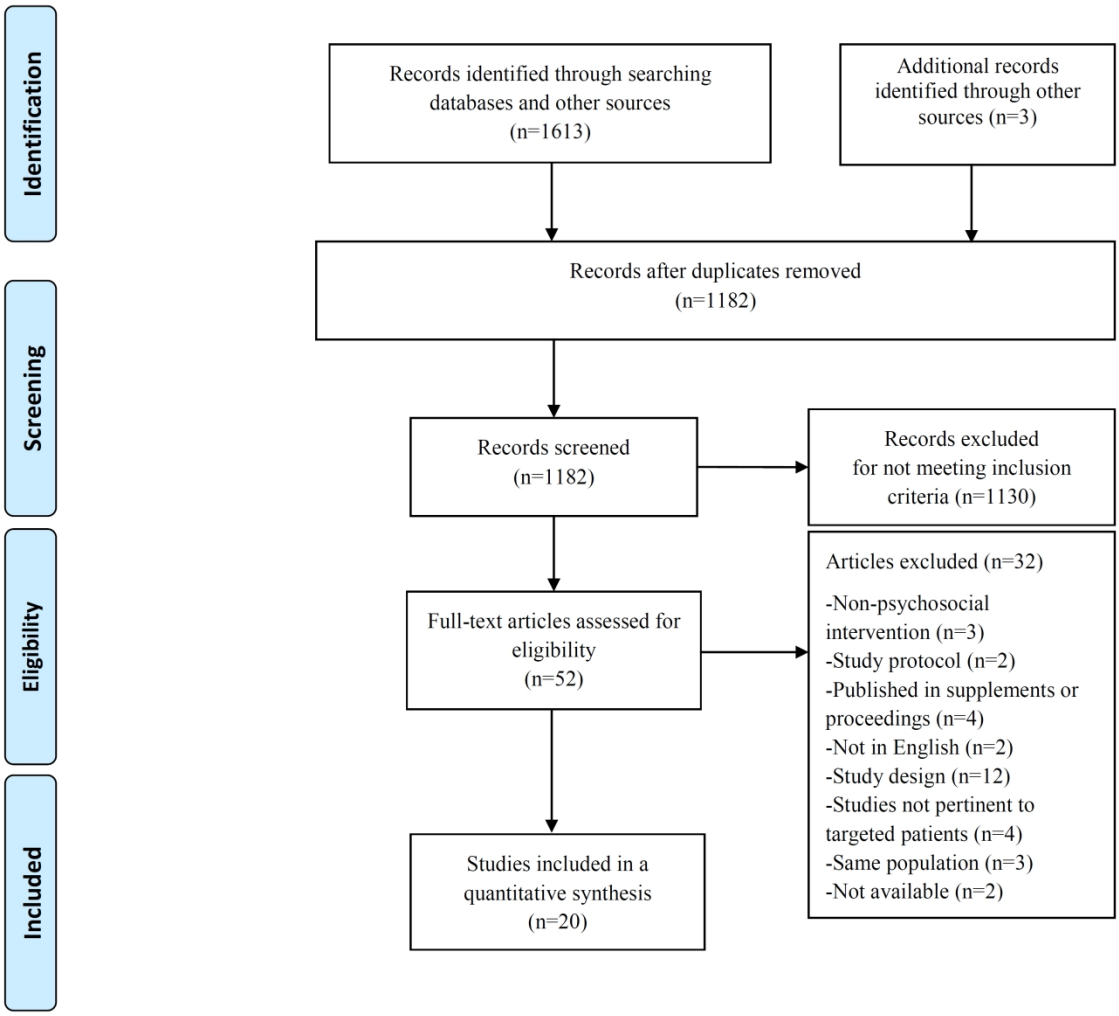

Figure 4-1. The flow diagram on identifying the literature

Assessment of the quality of the reviewed papers

The quality of these studies was assessed using the risk of bias assessment tool developed by the Cochrane Back Review Group (Furlan et al., 2009). The tool consists of 12 items, presented in Appendices Table 4-2. Each item can be evaluated as "yes", "no", or "unsure", with "yes" referring to a low risk of bias (Furlan et al., 2009). A study

can be regarded as being of “a low risk of bias” when six or more items are rated as “yes” and no fatal flaws are identified (Furlan et al., 2009). In this review, two reviewers independently assessed the quality of the studies according to the appraisal checklist.

Data Extraction

The following key components of the included studies were extracted and tabulated by the same two reviewers: (1) general information: first author, year of publication, and country of origin; (2) number of couples, males or females; (3) characteristics of the intervention: types, timing, numbers and duration of sessions, duration of intervention, format, persons responsible for delivery, and measurement points; (4) the efficacy of the interventions (outcome measures): anxiety, depression, stress, other psychosocial findings, pregnancy rate, (see Appendices Table 4-3). In the case of significant results, estimates of effect size (Cohen’s *d*) are presented. The senior corresponding author met with the two reviewers to resolve any disagreements between the latter. Descriptive analysis was adopted to synthesize the results.

Results

General information of the studies

The 20 studies included in this review were published between 1993 and 2014 and conducted in 14 different countries or regions. Half of the studies had been conducted in Europe (n=10): including the Netherlands (n=3), United Kingdom (n=2), Denmark (n=1), France (n=1), Greece (n=1), Italy (n=1), and Switzerland (n=1); five in Asia: Hong Kong (n=2), Mainland China (n=1), Taiwan (n=1), and Iran (n=1); and the others in the United States of America (n=3), Brazil (n=1), and South Africa (n=1). Among the 20

studies that were included, only the study conducted in Mainland China had been published in Chinese (Zhu, Hu, & Qiao, 2010).

Characteristics of the participants

Five studies focused on infertile couples as dyads, with an average sample size of 113 couples (range, 40-200) and a mean age of 32.9 years (32.0-34.4 years old). Fourteen studies focused on women of infertile couples, with a mean sample of 144 (range, 31-377) and a mean age of 33.7 (30.3-36.0), with the women in the study from Hong Kong being the oldest, at a mean age of 36.0 years (Chan, Ng, Chan, Ho, & Chan, 2006). The fourteen studies also provided information on the duration of the diagnosis of infertility, ranging from 1.5 to 6.2 years (mean, 3.92 years). One focused on individual women or men of infertile couples, with a total of 82 participants, with a mean age of 33.17 years (range, 23-43) (Matthiesen et al., 2012).

Methodological quality and risk of bias of the included studies

The outcomes of the quality assessment for the 20 RCT studies are presented in Appendices Table 4-2. The methodological quality of these studies was reasonably good. All but one of the studies met at least six criteria and were considered as being of “low risk of bias” according to the Cochrane assessment tool (Furlan et al., 2009). The one study with five items in the appraisal checklist that were rated “yes”, conducted by Connolly et al. in the UK (Connolly et al., 1993b), was the only study that had been published in the 1990’s, but it met the criteria for inclusion.

The method of randomization was adequately described in 12 studies. The concealment of the allocation was appropriately described in nine studies. Due to the nature of the intervention, the blinding of the participants, care providers, and outcome assessors was only adopted in five, four, and seven studies, respectively.

The drop-out rate was described and deemed to be acceptable in 13 of the included studies. The reasons for refusing to participate in the study or for dropping out included: medical reasons (poor treatment response, zero embryos transferred, or treatment cancellation), no need for further counseling, excessive time commitment, dislike of study tasks, financial considerations, and spontaneous pregnancy or adoption. Only five studies reported that all of the participants randomized in trials had been analyzed by intention to treat. No trial was suggestive of selective outcome reporting. All of the studies reported similarities between the intervention and control groups in baseline characteristics. The majority of the studies (19 studies) mentioned that co-interventions or similar interventions were avoided. Among the 20 studies included, 14 studies only delivered the routine care to the control groups, two studies provided same amount of contact time for the control groups, and four studies delivered comparable interventions to the control groups. The compliance of the participants was acceptable in 14 studies. All of the trials reported a similar timing between the groups in the measurement of outcomes.

4.1 Characteristics of the interventions

A total of 14 different types of interventions were adopted in the 20 RCT studies included in this review. They can be classified into five categories: Cognitive Behavioral

Therapy (CBT) (n=3), Mind Body Intervention (MBI) (n=3), Counseling (n=4), positive reappraisal coping therapy (n=2), and other psychosocial interventions (n=8). These other psychosocial interventions included hypnosis, Internet-based interventions, crisis interventions, expressive writing, harp therapy, written emotional disclosure, telephone emotional support, and group psychotherapy. The interventions were conducted at different time-points in the IVF treatment cycle, including six studies at the wait-listed period, two during embryo transfer, four at the two-week waiting period before the pregnancy test, and eight throughout the whole treatment cycle.

The number and duration of the sessions for each intervention varied. For CBT, the number of sessions ranged from five to 15 (mean 10.7 sessions) over five weeks to four months, with each session lasting for one to two hours per session. MBI ranged from four to ten sessions (mean six sessions), with two to three hours per session and over four to ten weeks. Counseling ranged from one to three sessions (mean 2.3 sessions), and each session lasted for one to one-and and-a-half hours for one to 28 days. Coping therapy was by means of reading cards for at least twice a day for 14 days. Disparities in terms of numbers and duration of sessions were also seen in the other psychosocial interventions also showed (details are given in Appendices Table 4-3).

Most of the interventions were delivered face to face (n=13). The rest were self-administered activities (expressive writing, n=2; reading cards, n=2), emotional support through telephone and video viewing (n=2), or delivered through the Internet (n=1). The 13 face-to-face interventions included females in a group intervention (n=5), females on an individual basis (n=3), couples in dyads (n=3), and couples in a group intervention

(n=2). Apart from the five self-administered or internet-based interventions, the 15 interventions were delivered by psychologists (n=4), practitioners trained in MBI (n=3), music therapists (n=1), counselors (n=3), social workers (n=2), embryologists (n=1), and hypnotists (n=1).

Intervention components

The main components of the psychosocial interventions included in the 20 studies were psycho-education, skill training, emotional support, and cognitive restructuring (Appendices Table 4-4).

The psycho-education refers to the provision of information about medical treatments and the reciprocal influence between physical and psychological status. Five intervention studies included a psycho-educational element (Gorayeb, Borsari, Rosa-e-Silva, & Ferriani, 2012; Lee, 2003; Tarabusi, Volpe, & Facchinetti, 2004; Tuil, Verhaak, Braat, de Vries Robbé, & Kremer, 2007; Zhu et al., 2010), although in other studies this is usually conveyed as routine care. Training in a variety of skills was provided, including instruction in stress reduction techniques (Chan et al., 2012; Chan et al., 2006; Mosalanejad, Koolaee, & Jamali, 2012), relaxation techniques and exercise (Chan et al., 2012; Chan et al., 2006; Domar et al., 2011; Gorayeb et al., 2012; Lee, 2003; Mosalanejad et al., 2012; Zhu et al., 2010), communication skills (Mosalanejad et al., 2012; Zhu et al., 2010), coping strategies (Lancastle & Boivin, 2008; Ockhuijsen, Hoogen, Eijkemans, Macklon, & Boivin, 2014), and problem-solving techniques (Mosalanejad et al., 2012). The emotional support that was employed mainly focuses on emotional expression and sharing in couples. Participants were encouraged to talk or

write down their feelings, thoughts, expectations, or difficulties (Connolly et al., 1993b; de Klerk et al., 2005; Emery et al., 2003; Matthiesen et al., 2012; Panagopoulou, Montgomery, & Tarlatzis, 2009; Skiadas et al., 2011; Zyl, Dyk, & Niemandt, 2005), or share in groups (Mosalanejad et al., 2012; Tarabusi et al., 2004; Tuil et al., 2007; Zhu et al., 2010), and support was provided flexibly according to the needs of the patients (Connolly et al., 1993b; de Klerk et al., 2005; Emery et al., 2003; Skiadas et al., 2011; Tuil et al., 2007; Zhu et al., 2010; Zyl et al., 2005).

A total of five studies adopted cognitive restructuring to deter negative thoughts, and to establish positive thoughts or beliefs (Domar et al., 2011; Gorayeb et al., 2012; Mosalanejad et al., 2012; Tarabusi et al., 2004; Zhu et al., 2010). Other components such as health behavior modification was also adopted in one intervention study (Domar et al., 2011). Other psychotherapies, such as hypnosis (Catoire et al., 2013) and harp therapy (Murphy et al., 2014) were used to improve the psychological status and clinical outcomes of IVF patients.

4.2 Efficacy of the interventions

A variety of outcomes were measured to evaluate the efficacy of the interventions, including anxiety, depression, stress, other psychological outcomes, pregnancy rates, and marital function. Among all, anxiety and depression were regarded as the two indicators most sensitive to the stress-induced activation of the hypothalamic-pituitary-adrenal axis (Sandi & Richter-Levin, 2009).

Anxiety

Of the 20 RCTs, 15 examined the effects of interventions on the anxiety levels of infertile patients who had undergone IVF treatment. The anxiety levels of patients/couples were measured using the State-Trait Anxiety Inventory (STAI) (Catoire et al., 2013; Chan et al., 2012; Chan et al., 2006; Connolly et al., 1993b; Emery et al., 2003; Lee, 2003; Murphy et al., 2014; Panagopoulou et al., 2009; Tuil et al., 2007; Zhu et al., 2010), the Hospital Anxiety and Depression Scale (HADS) (de Klerk et al., 2005; Ockhuijsen et al., 2014), the Beck Anxiety Inventory (BAI) (Zyl et al., 2005), the short-form Depression Anxiety Stress Scale (DASS-21) (Mosalanejad et al., 2012), and the Symptom Rating Test (SRT) (Tarabusi et al., 2004).

Only four RCT studies reported significant positive effects from the interventions when compared to the control group (Chan et al., 2012; Chan et al., 2006; Murphy et al., 2014; Zhu et al., 2010). All four of these studies were targeted at women. A study conducted in Hong Kong, reported that women who had received a four-session, three-hour Integrative Body-Mind-Spirit intervention during the waiting period before the cycle had significantly lower levels of state anxiety on the day of ovarian stimulation (T1) and embryo transfer (T2) (state anxiety, T1: d=0.59, T2: d=0.46; trait anxiety, T1: d=0.29; T2: d=0.29) (Chan et al., 2012). Similar findings were reported in another study conducted by the same authors that adopted an Eastern Body-Mind-Spirit intervention (Chan et al., 2006). It is worth noting that both studies did not follow up on the effects of the intervention on anxiety levels at the period of pregnancy testing.

A study conducted in China indicated that women who attended a six-session, three-week Group Psychotherapy program during IVF treatment reported experiencing lower

levels of anxiety at the end of intervention (*d*=0.46) (Zhu et al., 2010). However, the time-point of post-test was not clearly reported. It is unclear whether the pregnancy results were disclosed at post-test (Zhu et al., 2010). Another study involving 180 American women undergoing embryo transfer revealed that the women had significant lower levels of state anxiety after a 20-minute session of Harp Therapy (*d*=0.457). There was no effect on trait anxiety (Murphy et al., 2014).

Apart from the above four studies, the effects on anxiety within the intervention group have been described in two studies in which Cognitive Behavioral Therapy (*d*=0.95) and Counseling (*d*=0.34) were adopted (Mosalanejad et al., 2012; Zyl et al., 2005). Another study revealed that there was no significant difference between the effects of hypnosis and diazepam on anxiety levels in women undergoing embryo transfer (Catoire et al., 2013). The remaining eight studies showed no effects on the anxiety levels of patients undergoing IVF treatment (Connolly et al., 1993b; de Klerk et al., 2005; Emery et al., 2003; Lee, 2003; Ockhuijsen et al., 2014; Panagopoulou et al., 2009; Tarabusi et al., 2004; Tuil et al., 2007).

In short, four out of 14 studies (28.6%) showed a medium effect size (range, 0.46-0.59) on the level of state anxiety. However, none of these intervention studies examined anxiety levels during the two-week waiting period for a pregnancy test, recognized as the most difficult period for infertile couples (Verhaak et al., 2007) . It is also important to note that men of infertile couples were not included in these intervention studies.

Depression

Nine of the 20 RCT studies measured the effects of interventions on depression. Depression was measured using the Hospital Anxiety and Depression Scale (HADS) (de Klerk et al., 2005; Ockhuijsen et al., 2014), Beck's Depressive Inventory (BDI) (Emery et al., 2003; Zyl et al., 2005), Zung's self-administered depression scale (Z-SDS) (Lee, 2003), the Self-rating Depression Scale (SDS) (Zhu et al., 2010), the short-form Depression Anxiety Stress Scale (DASS-21) (Mosalanejad et al., 2012), the Profile of mood states-bipolar form (POMS) (Connolly et al., 1993b), and the Symptom Rating Test (SRT) (Tarabusi et al., 2004).

None of these nine studies showed that the interventions had significant effects on the depressive symptoms in IVF patients compared with those in the control group (Connolly et al., 1993b; de Klerk et al., 2005; Emery et al., 2003; Lee, 2003; Mosalanejad et al., 2012; Ockhuijsen et al., 2014; Tarabusi et al., 2004; Zhu et al., 2010; Zyl et al., 2005). One of these studies with a small sample size of 31 women reported that the 15-session CBT intervention lasting for four months, had a demonstrated effect (d=1.64) on the depression level within the intervention group (Mosalanejad et al., 2012), although the difference between the intervention and control groups did not reach statistical significance.

Stress

Stress was measured in five RCT studies using the IVF stress inventory (SI) (Connolly et al., 1993b), the Fertility Problem Stress Scales (FPSS) (Matthiesen et al., 2012), the short-form Depression Anxiety Stress Scale (DASS-21) (Mosalanejad et al., 2012), the Infertility and Strain Scale (ISS) (Panagopoulou et al., 2009), and the Perceived Stress

Scale (PSS) (Skiadas et al., 2011). These studies explored the effect of interventions on the stress levels of patients undergoing IVF treatment (Connolly et al., 1993b; Matthiesen et al., 2012; Mosalanejad et al., 2012; Panagopoulou et al., 2009; Skiadas et al., 2011), but in no study was a significant difference in stress level demonstrated between infertile patients in the intervention and control groups. Two of these studies adopting CBT and Expressive Writing Intervention showed positive effects (CBT: *d*=1.92; EWI: *d*= 0.46) on the stress level within the intervention group, while no significant difference was found when compared with control groups (Matthiesen et al., 2012; Mosalanejad et al., 2012). It is worth noting that only 31 participants were analyzed in these two studies (Intervention group: n=15, Control group: n=16) (Matthiesen et al., 2012; Mosalanejad et al., 2012).

Other psychological outcomes

Apart from the above-mentioned outcomes that were measured, a total of 14 other psychological outcomes were measured in the included studies. Four studies showed interventions that had positive effects on five different measures, including the decreased importance of childbearing (post-test: *d*=0.41, follow-up: *d*=0.59) (Chan et al., 2012), reduced negative affect (follow-up: *d*=0.35) (Chan et al., 2012), improved positive affect (follow-up: *d*=0.20; group by time interaction: *F [*1,2652]=16.15) (Chan et al., 2012; Ockhuijsen et al., 2014), enhanced hardiness (*d*=4.99) (Mosalanejad et al., 2012), and increased dispositional optimism (helpfulness: *d*=0.69; suitability: *d*=0.71; confidence: *d*=0.66; enduring effects: *d*=0.71; feeling positive: *d*=0.83; future plans: *d*=0.73; sustained coping: *d*=0.70) (Lancastle & Boivin, 2008). The interventions that were adopted were the Integrative Body-Mind-Spirit intervention (Chan et al., 2012), the

Positive Reappraisal Coping intervention (Lancastle & Boivin, 2008; Ockhuijsen et al., 2014), and Cognitive Behavioral Therapy (Mosalanejad et al., 2012).

However, eight studies reported no significant differences between the intervention and control groups regarding 11 measured outcomes. These measures included negative affect (Ockhuijsen et al., 2014; Panagopoulou et al., 2009), positive affect (Panagopoulou et al., 2009), the use of coping strategies (Lee, 2003; Zyl et al., 2005), psychological uneasiness (Tarabusi et al., 2004), general psychological state (Connolly et al., 1993b), self-esteem (Connolly et al., 1993b), mood state (Connolly et al., 1993b), distress (de Klerk et al., 2005), patient empowerment (Tuil et al., 2007), psychological responses (Lee, 2003), and infertility-related concerns (Panagopoulou et al., 2009).

Pregnancy rates

Ten studies examined the effect of psychosocial interventions on the pregnancy outcome of women who had undergone IVF treatments. Only two studies reported positive effects (Domar et al., 2011; Gorayeb et al., 2012). The study involving 188 couples found that after five sessions of brief CBT, the pregnancy rate was much higher (d=0.43) in the intervention than in the control group(Gorayeb et al., 2012). Another study using Group Mind Body Intervention (MBI) for infertile women before they had started their first IVF cycle indicated that the pregnancy rates of MBI participants were higher in the second IVF cycle (d=0.82) than those for the control group(Domar et al., 2011). However, the high rates of attrition for the samples, 34% for brief CBT and 32.2% for MBI, might have affected the interpretation of the results in the two studies.

The other eight studies reported no significant difference in pregnancy rate between the intervention and control groups (Catoire et al., 2013; Chan et al., 2012; Chan et al., 2006; Murphy et al., 2014; Ockhuijsen et al., 2014; Panagopoulou et al., 2009; Tuil et al., 2007; Zhu et al., 2010). Moreover, in one of these six studies, ironically the non-participants of the RCT study reported significantly higher pregnancy outcomes when compared with those participating in the written emotional disclosure intervention and those in the control group (Panagopoulou et al., 2009).

Although the differences between groups did not reach statistical significance, three of these eight studies (Chan et al., 2012; Panagopoulou et al., 2009; Tuil et al., 2007), have been regarded as having positive and promising effects on pregnancy rates in a recent review (Frederiksen et al., 2015). The effect sizes of these interventions, including MBI, Written Emotional Disclosure, and Internet-based intervention, have also been pooled using meta-analysis (Frederiksen et al., 2015).

In summary, among the ten studies, only two (25%) indicated significant effects on the pregnancy rate, with effect sizes ranging from 0.43 to 0.82 (Cohen's *d*), by adopting brief CBT and MBI, respectively.

Marital function

Only one of the 20 RCTs included marital function as an outcome measure. Marital function was measured using the Kansas Marital Satisfaction Scale (KMS) (Chan et al., 2012). The Integrative Body-Mind-Spirit intervention study indicated that women in the intervention group reported higher marital satisfaction than those in the control group at the one month follow-up (on the day starting ovarian stimulation) (d=0.29), while there

was no significant effect at post-treatment (Chan et al., 2012)(. The components of the intervention were thought to be responsible for such an outcome. They included group sharing about effective marital communication and discussions among the couples about their values and expectations of treatment. It should be noted that the men of these infertile couples were not recruited to take part in the study.

Overall effects of psychosocial interventions

It is concluded that, overall, these interventions had positive outcomes for patients undergoing IVF treatment, including improved anxiety, other psychological outcomes, pregnancy rates, and marital function. However, none of these interventions demonstrated positive effects on the anxiety and depression of patients or couples during the time that they were waiting for the pregnancy results of their treatment. More studies are needed to explore the evidence on the effects of these interventions on pregnancy outcomes and marital function. The other psychotherapies, including harp therapy and hypnosis, were effective in reducing anxiety levels specifically during the procedure of embryo transfer. Coping therapy could be used to enhance the positive effect during the waiting period before the pregnancy test.

Discussion

The results of this review indicate that CBT, MBI, counseling, and coping therapy are the most frequently adopted psychosocial interventions for infertile women and men of infertile couples. Generally speaking, no positive effects on outcome measures have been reported for simple counseling interventions. Coping therapy found to be effective only in improving the positive emotions of couples. The approaches of CBT and MBI

showed some positive effects on anxiety, pregnancy rates, or marital function in four studies. However, there were methodological or practical issues in these studies relating to measurement points and attrition rates that must be dealt with, before there can be any assurance about the effects of the psychosocial interventions.

The timing of outcome measures is one aspect that one should be cautious about when interpreting the results of these interventions. Two studies that adopted the MBI approach, reported that it was effective at reducing anxiety at the start of the period of ovarian stimulation (post-test assessment) (Chan et al., 2012; Chan et al., 2006), when patients usually exhibit only slightly higher anxiety than normal (Verhaak et al., 2007). However, the two-week waiting period for the pregnancy test, regarded as the most difficult time of the IVF treatment, was not examined (Verhaak et al., 2007). There is similar concern about the effect of the intervention on the marital function of couples who were assessed on the day that the embryo was transferred (Chan et al., 2012). At this time-point, couples have not yet received the result of the pregnancy test, which could be a challenge to the marital satisfaction of the couples. It is concluded that the effects of MBI on the anxiety and marital function of infertile couples during IVF treatment cannot be confirmed.

Another aspect to be cautious about when interpreting results is the high attrition rate in these intervention studies. Two studies reported that pregnancy rates were enhanced by adopting the brief CBT and MBI (Domar et al., 2011; Gorayeb et al., 2012). However, only 70% of couples had attended at least two out of five group sessions of CBT (Gorayeb et al., 2012), and only 9% of the participants had taken part in at least one-half

of the MBI sessions at the start of cycle 1 (76% at cycle 2) (Domar et al., 2011). One of the eight studies that examined pregnancy outcomes reported that the women who had refused to participate the study had a higher pregnancy than those in the intervention and control groups (Panagopoulou et al., 2009). No conclusion can be reached on the efficacy of CBT and MBI on pregnancy outcomes.

This review of studies revealed several areas in need of improvement in future psychosocial interventions for infertile couples, namely: the target sample, components, and timing of the interventions, the time-point of outcome measurements, and the therapists involved the interventions.

First, supportive interventions should target infertile couples at the dyad level instead of at the individual level of men or women. A systematic review has revealed that couples who underwent IVF treatment suffered from the stressful experience as dyads (Ying, Wu, & Loke, 2016b). Also, the depression score of men has been identified as an independent predictor of a reduced likelihood of clinical pregnancy (Quant et al., 2013). However, 13 out of the 20 (65%) RCT studies in this review neglected the men of infertile couples.

Second, interventions should include a component to enhance the marital function of the couples. Although the relationship between two partners and the support that they give to each other play an important role in the way that couples cope with IVF treatment (Ying et al., 2015b) , only one study in this review included the enhancement of marital

satisfaction in the intervention (Chan et al., 2012). All other intervention studies neglected this important aspect of couple support.

Third, a psychosocial intervention should also be provided to infertile women and men who have undergone IVF, after the disclosure of a negative pregnancy result. Studies have reported that when IVF treatments are unsuccessful, heartbreak, shock, and psychological trauma can be long-lasting for the couples (Volgsten et al., 2010; Ying et al., 2015b). However, none of the interventions in the included RCT studies provide support to ease the psychological distress of couples after the disclosure of a negative pregnancy result.

Fourth, the time-points for measuring outcomes of interventions should be carefully selected. None of the included studies measured the psychological outcomes of interventions during the hardest two-week waiting period of IVF. Also, the outcome measured at the end of the treatment cycle could be affected by a positive pregnancy result. One of the studies included in this review reported that women had a lower level of anxiety at the end of the three-week intervention (Zhu et al., 2010). However, at this time-point, some women might already have been informed of a positive result from their pregnancy test, and therefore had a lower level of anxiety (Beckmann, 2014a).

Lastly, as the professional group that closely cares for the couples throughout the IVF treatment, nurses should be aware of their responsibility to provide the psychological support that the infertile couples need. This review showed that none of the interventions in the included studies were delivered by nurses.

To conclude, the abovementioned issues need be addressed before the efficacy of interventions can be confirmed. Interventions should be developed to fill the gaps identified in this systematic review.

Similarities and differences of the findings of this and previous reviews

As mentioned, there were four reviews conducted previously prior to this review. However, the four included also studies on infertile patients across different stages of infertility treatments, and quasi-experimental control trials or without comparison groups (Boivin, 2003; De Liz & Strauss, 2005; Frederiksen et al., 2015; Hammerli et al., 2009). The conclusions of the four reviews were inconsistent.

The two reviews, published in 2003 (Boivin) and 2005 (de Liz and Strauss), reported of a beneficial effect of intervention on psychological distress, whereas the result in terms of pregnancy rates was equivocal (Boivin, 2003; De Liz & Strauss, 2005). The review in 2003 derived the findings from eight controlled studies and concluded that there was no clear efficacy for pregnancy rates (Boivin, 2003). It was suggested that high quality studies are needed in order to delineate specifically the effectiveness of psychosocial interventions (Boivin, 2003).

The review published in 2009 was the only review that included controlled studies exclusively, but the efficacy of the psychosocial interventions for improving mental health in infertile patients, or for increasing pregnancy rates for women receiving ART were not confirmed (Hammerli et al., 2009). This was supported by the result of a meta-

analysis of psychosocial studies that pretreatment emotional distress was not related to the outcome of ART treatment (Boivin et al., 2011).

Inconsistent with three previous reviews, the most recent one published in 2015 reported positive efficacy of interventions in improving psychological distress and in increasing pregnancy chances of couples undergoing infertility treatment (Frederiksen et al., 2015). However, a closer look of the findings of the review revealed that there were no statistically significant effects of the interventions on the infertility stress and marital function of infertile couples. After adjusting for potential publication bias, no significant effects were found on the levels of depression and state anxiety for men and women. The effect size of pregnancy outcomes in RCTs was smaller than that in non-RCTs, while the possible moderating influence of medical treatment (e.g. IVF/ICSI versus no IVF/ICSI) has not been explored (Frederiksen et al., 2015).

The findings of our present review also revealed that the effects of various interventions on the levels of depression, anxiety, stress, pregnancy rates, and marital function of infertile individuals/couples undergoing IVF treatment could not be confirmed, consistent with that reported in previous reviews.

Recommendations for future research

The findings of this systematic review provide directions and insights for healthcare professionals and researchers seeking to provide a supportive psychosocial intervention for couples undergoing IVF treatment. As there were no convincing outcomes in these

studies to demonstrate the efficacies of the intervention approaches that were adopted, a new intervention should be developed.

Since IVF couples experience psychological stress in their marriage, it would be desirable to develop a complex intervention focusing on both the mental health and marital function of couples. In a concept analysis of "partnership" in the context of infertility, it has been revealed that couples can expect to achieve marital benefits and improvements in their psychological well-being (Ying & Loke, 2016). A qualitative study among infertile couples also confirmed the importance of partnership and support for the psychological well-being of couples (Ying et al., 2015b). It is concluded that it is desirable to develop an intervention targeting females and males of infertile couples as dyads, and to integrate the enhancement of partnership in couples as a component in the intervention program.

Attention should be paid in the intervention to the two difficult periods for couples undergoing IVF treatments – the time spent waiting for the result of the treatment and after the disclosure of a negative result from the pregnancy test. Accordingly, the time-points for measuring outcomes should be on the day before the pregnancy test and after the disclosure of the result of the treatment (e.g., one month later), in order to exactly examine the effects of the intervention.

Clinical nurses working with infertile couples could be trained to conduct such psychosocial interventions. Once the efficacy of the program has been proven, it could

be integrated into nursing routine care, which currently focuses merely on information education in general (Ying et al., 2015b).

Also, the high attrition rates identified in the studies included in this review, which might have affected the reliability of the intervention results, should be addressed. Some possible strategies can be used to reduce attrition rates, such as communication, incentives, and assistants for establishing rapport.

Recommendations for clinical practice

This review provides some implications for healthcare providers who work with infertile couples undergoing IVF treatment. The studies indicated that psychotherapies such as harp therapy could be used to reduce anxiety, specifically during the procedure of embryo transfer. With respect to the dreaded two-week period of waiting for the results of the pregnancy test, the efficacy of psychosocial interventions on anxiety, depression, and stress could not be established. Nevertheless, the self-administered Positive Reappraisal Coping intervention was found to be effective at enhancing the positive affect or dispositional optimism, which could make the waiting period more tolerable for infertile couples.

Limitations

There are limitations in this review. Unlike previous systematic reviews, this study adopted the methodology of descriptive analysis. However, the considerable heterogeneity among the interventions that were adopted, including the type, timing, number of sessions, duration, format, and delivery person, would inevitably affect the

achievement of a reliable conclusion drawn from a meta-analysis. This might have contributed to the inconsistent or even contradictory conclusions derived from the four earlier reviews (Boivin, 2003; De Liz & Strauss, 2005; Frederiksen et al., 2015; Hammerli et al., 2009). Second, grey literature, uncontrolled studies, and controlled studies relating to this topic were not included. Thus, it is possible that some promising interventions with a non-RCT design might have been neglected. Nevertheless, it was decided to only include RCT studies because the RCT is considered the best design to establish cause and effect (Hoffmann et al., 2014). There is also a limitation in that only papers written in English or Chinese were included due to language barriers. (Ying et al., 2015b)

4.3 Conclusion

This review indicated that the effects of various interventions on the anxiety level, pregnancy rates, or marital function of infertile individuals/couples could not be confirmed due to methodological issues. None of studies reviewed showed efficacy in improving the depression or stress levels of the individuals or couples undergoing IVF treatment. The mental health of the couples during the time that they were waiting for the result of their treatment was not tackled or measured in the included studies. Therefore, a new complex intervention, based on sound evidence, should be developed targeting both females and males of infertile couples undergoing IVF treatment, particularly during the stressful period of waiting before the result of the pregnancy test is revealed and after failed cycles. This program could focus on improving the mental health and marital function of the couples, which can probably be achieved by enhancing the partnership of the couples.

Chapter 5

The phenomenon of couples undergoing IVF treatment and reserch gap (Summary of the literature reviews and identification of research gaps)

5.1 Main findings

5.2 Research gaps identified

5.3 Conclusions and methodology clarification

The three literature reviews presented in previous chapters were conducted to obtain a better understanding of the couples' experiences with infertility, with IVF treatment, and to identify the effects of randomized controlled psychosocial interventions studies on patients/couples who were undergoing IVF treatment. The findings of these reviews identified the research gap in the area and the direction for this study.

5.1 Main findings

Infertile couples' experience with and adjustment to infertility (Chapter 2)

Infertile and its treatment affected a couple as dyads in existential, physical, emotional, and interpersonal aspects, though there were gender differences in many realms. Infertile couples experienced stress in their married life, with lower marital and sexual satisfaction than fertile couples.

The coping and support are regarded as two essential factors that mediate the impact of infertility on infertile couples. Women tended to adopt coping strategies of escape and avoidance, and to seek social support and positive reappraisals to a greater extent than their partners. Females adopted a less emotionally detached coping style than males, which was linked to depression. Support from friends had no correlation at all with the stress experienced by both infertile men and women. The social and family support was related to stress in females but not in males. For both men and women, partner support was negatively related to infertility stress.

Infertile couples' emotional reactions to In Vitro Fertilization treatment (Chapter 3)

Before the initiation of the IVF treatment, infertile women showed higher level of depression and anxiety than fertile women. Men of infertile couples reported elevated depression levels than fertile men, while there was no difference in the level of anxiety.

In the course of IVF cycle, the oocyte retrieval, embryo transfer, and the two-week wait (2WW) period before pregnancy test are the most stressful period for women. Men of infertile couples reported higher level of depression before pregnancy test than pretreatment, while the anxiety levels were similar across the cycle.

After the disclosure of IVF treatment outcome, women in couples with failed cycle were more stressful, and had higher level of anxiety and depression than pretreatment. Couples together experience unresolved grieving long-term after IVF failure.

Psychosocial interventions for patients undergoing In Vitro Fertilization treatment (Chapter 4)

There were reports of positive effects on the anxiety levels, pregnancy rates, or marital function of infertile couples in six studies that adopted different psychosocial approaches, including Mind Body Intervention (Eastern body-mind-spirit, Integrative body-mind-spirit, and Mind/body intervention), Cognitive Behavioral Therapy, Group Psychotherapy, and Harp Therapy. However, there were methodological or practical issues related to measurement points and attrition rates in these studies.

None of these interventions were found to be efficacious in relieving the depression or stress of individuals or couples undergoing IVF treatment. None of the included studies

tackled or measured the mental health status of the couples during the most stressful time of waiting for the pregnancy results of their treatment. None of the studies examined the effects of interventions on the psychological distress of the couples after the disclosure of the outcome of the treatment. The review also found that only one study included the enhancement of marital satisfaction in the intervention. Most of these studies targeted mainly on infertile women, and male partners were mostly neglected in the interventions.

5.2 Research gaps identified

The reviews of literature revealed that although various interventions for infertile people undergoing IVF treatment have been conducted, most of these interventions had limitations:

(1) Both female and male partner of infertile couples as dyads suffer from intertility and IVF treatment, but males were often neglected in studies;

(2) although the relationship between two partners and the support that they give to each other play an important role in the way that couples cope with IVF treatment, few studies included the enhancement of marital satisfaction in the intervention;

(3) although failed IVF cycle had long-term negative psychological consequences on both spouses, there is a dearth of interventions providing support to ease the psychological distress of couples after the disclosure of a negative pregnancy result;

(4) the time-points for measuring outcomes of interventions were not carefully selected in most studies. Thus, the psychological outcomes of interventions during the hardest two-week waiting period of IVF were not measured; and

(5) most of the studies were conducted in western countries. There is a lack of couple-based intervention for Chinese infertile couples.

5.3 Conclusions and methodology clarification

The review of literature, focusing on psychosocial interventions for couples undergoing IVF treatment, revealed that the effects of various interventions on levels of depression, anxiety, stress, stress, pregnancy rates, and marital function could not be confirmed. It is concluded that a complex intervention, based on sound evidence, is needed for couples seeking IVF treatment.

The three reviews also provided some constructive suggestions and recommendations on the development of the complex interventions for infertile couples undergoing IVF treatment. First, the interventions should target infertile couples at the dyad level instead of focusing only on women at the individual level, as both the men and women of infertile couples were affected by infertility and the IVF treatment. Second, the programme should be aimed at enhancing the psychological well-being and marital relationship of infertile couples, as they experienced emotional distress and a stressful married life as dyads. Third, the intervention could focus on improving the couples' coping strategies and partner support, as it has been suggested that these are two important mediators of infertility-related stress. Finally, the timing of the interventions

should cover the period during which couples are awaiting the outcome of the IVF treatment, and also when a negative pregnancy result has been disclosed.

It is the aim of the present study to develop, deliver, and evaluate a complex intervention: 'Partnership and Coping Enhancement Programme (PCEP)' aiming at improving psychological well-being and marital benefit of couples undergoing In Vitro Fertilization treatment in China. The Medical Research Council (MRC) framework was adopted to guide the development and evaluation of this Partnership and Coping Enhancement Programme (PCEP).

In the Stage I of developing the PCEP, three extensive literature reviews, a concept analysis, and a qualitative study were conducted to identify the evidence base. The analysis of the concept of partnership was carried out to obtain a better understanding of the dyadic dynamics of the couples' responses to infertility and its treatment. The evidence base identified from the literature was substantiated through a qualitative study, which was conducted to explore the experiences of Chinese couples undergoing IVF treatment. A preliminary Endurance with Partnership Conceptual Framework (P-EPCF) for couples undergoing IVF treatment was proposed to guide the development of the PCEP and the selection of outcome measures.

In the Stage II of piloting, a feasibility study was conducted to examine the acceptability and preliminary effects of PCEP, including the determination of the recruitment and retention rate, and the calculation of effect size. In this study, the quasi-experimental controlled study design was adopted. It was decided to use this method because it can

meet the study aims at: (a) to determine the acceptability and feasibility of the PCEP according to the recruitment and retention rate during the whole study periods; and (b) to examine the preliminary effects of PCEP on improving psychological well-being and marital benefit of couples undergoing IVF treatment.

To conclude, guided by the MRC framework, the findings from the literature and qualitative study were applied into the development of PCEP (stage I), which was piloted by a feasibility study with quasi-experimental controlled study design (stage II).

Chapter 6

STUDY I IDENTIFYING THE KEY CONCEPT OF PARTNERSHIP FROM LITERATURE

An Analysis of the Concept of Partnership in Couples Undergoing Infertility Treatment*

* The content of this chapter was published:

Ying, L., & Loke, A. Y. (2016). An Analysis of the Concept of Partnership in the Couples Undergoing Infertility Treatment. *Journal of Sex & Marital Therapy*, *42*(3), 243-256.

6.1 Introduction

The concept of “partnership” was first used in the context of business. As enacted in the Uniform Partnership Act of the U.S.A., it is an association of two or more persons as co-owners of a for-profit business (Lichteuberger, 1914). The key components in this relationship are that partners assume an equal share of the profits and losses, as well as participate equally in management. Each partner must treat the other co-partner/s in a sincere manner. From the business perspective, the focus of the “partnership” is inevitably on the economic relationship.

The term “partnership” has since been extended to the field of health and social care, with the emphasis shifting from care providers acting in the role of experts to taking on the role of partners of their clients(Gallant, Beaulieu, & Carnevale, 2002). The term here refers to “a shared commitment, where all partners have a right and an obligation to participate and both will benefit from the partnership”. The use of the term “partnership” in this arena can be attributed to the emergence of democratic thinking in Western society, the respect for human rights in the process of delivering health care, and the need felt by clients to be involved in their own health care (Carnwell & Carson, 2008). At the end of the 20th century, the emphasis is on forming partnerships in the health service providers, health care professionals, and clients, to meet the health needs of the clients (Lawrence, 2004). A three-way partnership between health care providers, social service providers, and clients has been proposed to respond to the needs of clients in their own social context (Carnwell & Carson, 2008).

There are other definitions of “partnership” in different fields, with the concept of partnership differing according to context, type, and partner (Gallant et al., 2002). The term “partnership” has also been adopted in the husband-wife relationship as a result of the emergence of matrimonial covenants. The elements of a partnership of couples who are going through different crises in life, such as undergoing treatment for infertility, has yet not to be clarified in the literature or well understood.

Infertility, the inability to conceive after one year or longer of unprotected intercourse (Medicine, 2013), is a stressful experience for infertile couples. About 50% of infertile individuals would seek medical treatment to fulfill the desire for parenthood, leading to additional suffering (Greil et al., 2010). With respect to marital relationship, some couples may benefit from the joint hardship during the initiation stage of treatment, while many others were subject to a stressful married life (Güleç et al., 2011; Sultan & Tahir, 2011).

“Partnership” has been recognized as an important buffer in a couple’s response to infertility and its related treatments (Kleanthi, 2012). Regardless of the origin of the infertility, in facing the crisis of being unable to bear a child, the partners are affected as a unit. Couples may retreat from their social networks to avoid the stigma attached to infertility (Pasch & Christensen, 2000). The existence of a supportive relationship between a couple is a protective factor. Studies have shown that, for women, the perception that they are receiving support from their husband was negatively related to stress from infertility; and support from one’s partner was inversely linked to stress for both women and men (Martins et al., 2014).

When couples start seeking treatment for their infertility, there is a need for both partners to communicate in order to reach a consensus on the type of treatment that they will choose or at what point in time they will terminate the treatment. The medical counseling and treatment procedures may require intrusive inquiries about their marital life, including sexual functioning and frequency of intercourse. In some situations, the partner without the fertility problem will also need to undergo a wide range of medical procedures to complement the treatment received by the infertile partner, such as females who receive Intra-cytoplasmic sperm injection (ICSI) treatment (Pasch & Christensen, 2000).

The “partnership” of the infertile couples is important if they are to cooperate to achieve the goal of bearing a child. Given the nature of the marital relationship and the type of infertility involved, it is reasonable to anticipate that the characteristics of a “partnership” in the context of infertile couples seeking treatment may differ from the concept of a “partnership” in the business and health care arenas. However, the elements of a partnership in this context are not well understood, and remain unspecified in the literature.

6.2 Objective

The purpose of this study is to identify the attributes, antecedents, and consequences of “partnership” of couples undergoing infertility treatment by using Rodger’s evolutionary method(Rodgers, 2000). Further, to develop a theoretical definition for this concept. The analysis of the concept of “partnership” will provide those in the health professions who

serve infertile couples with a better understanding of the dyadic dynamics of coping in the infertile couples. In addition, researchers will benefit from a clearly defined concept of “partnership” that will enable instruments to be developed to measure the presence of “partnership” in the infertile couples undergoing treatment, and to identify the presence of the prerequisites (antecedents) of “partnership.” Based on the characteristics that have been identified of the concept of “partnership,” counselors may design interventions to strengthen the bonds of partnership in these couples to enhance positive outcomes (consequences).

6.3 Method

Concept Analysis Method

Rodger’s evolutionary method was chosen to conduct a concept analysis of the concept of “partnership” (Rodgers, 2000). The concept of “partnership” was analyzed in the context of “infertile couples undergoing infertility treatment.” Unlike the concept analysis method of Walker and Avant (Walker & Avant, 2005), which aims to identify the unchangeable essence of a concept, Rodger’s evolutionary method holds that concepts are contextual, changing, and discipline-dependent (Rodgers, 2000). The seven steps involved in Rodger’s method are to: identify and name the concept of interest; identify surrogate terms and relevant uses of the concepts; identify and select an appropriate sample; identify the attributes, references, antecedents, and consequences of the concept; identify a model “real” case of the concept; identify concepts that are related to the concept of interest; and conduct interdisciplinary and temporal comparisons (Rodgers, 2000). It should be noted that these activities can be conducted simultaneously rather than sequentially.

Sources

An extensive search for studies published between years 2000-2014 that explore or discuss the concept of "partnership" was performed using the databases PubMed, CINAHL, PsycInfo, OVID, and Scopus. The search terms that were used were "infertile" and "couple" and "partnership OR relationship OR communication OR satisfaction" and "treatment." The studies that were included were those that had been published in English for which the full text was available. The literature search yielded a total of 260 citations. Eight additional records (including two books) were identified from the reference lists of the identified studies.

Study Selection

The criterion for inclusion in this review was articles that explored or studied the concept of partnership within the context of couples undergoing treatment for infertility. Editorials, commentaries, book reviews, and conference abstracts were excluded. The procedures for selecting the articles for this analysis are presented in Figure 6-1. A total of 32 articles were included.

The process of analyzing the data was conducted following the inductive procedure of thematic analysis, which includes extracting and clustering the relevant terms and phrases from the articles, and categorizing them into themes. These themes eventually constituted the elements of the antecedents, attributes, and consequences of partnership (Rodgers, 2000). In the process, a standardized data extract matrix table, consisting of references, antecedents, attributes, and consequences, was compiled by one reviewer.

Each data column was examined and constantly compared to identify themes for antecedents, attributes, and consequences. The emerged themes were then labeled with selected words to describe each aspect of the concept of partnership. In the process, a log was used as audit trailing to record thoughts, decisions, perceptions, and insights of the data. The other reviewer double-checked the table and the process of data analysis. The two reviewers then resolved any disagreements through discussion and reached a consensus on the final results.

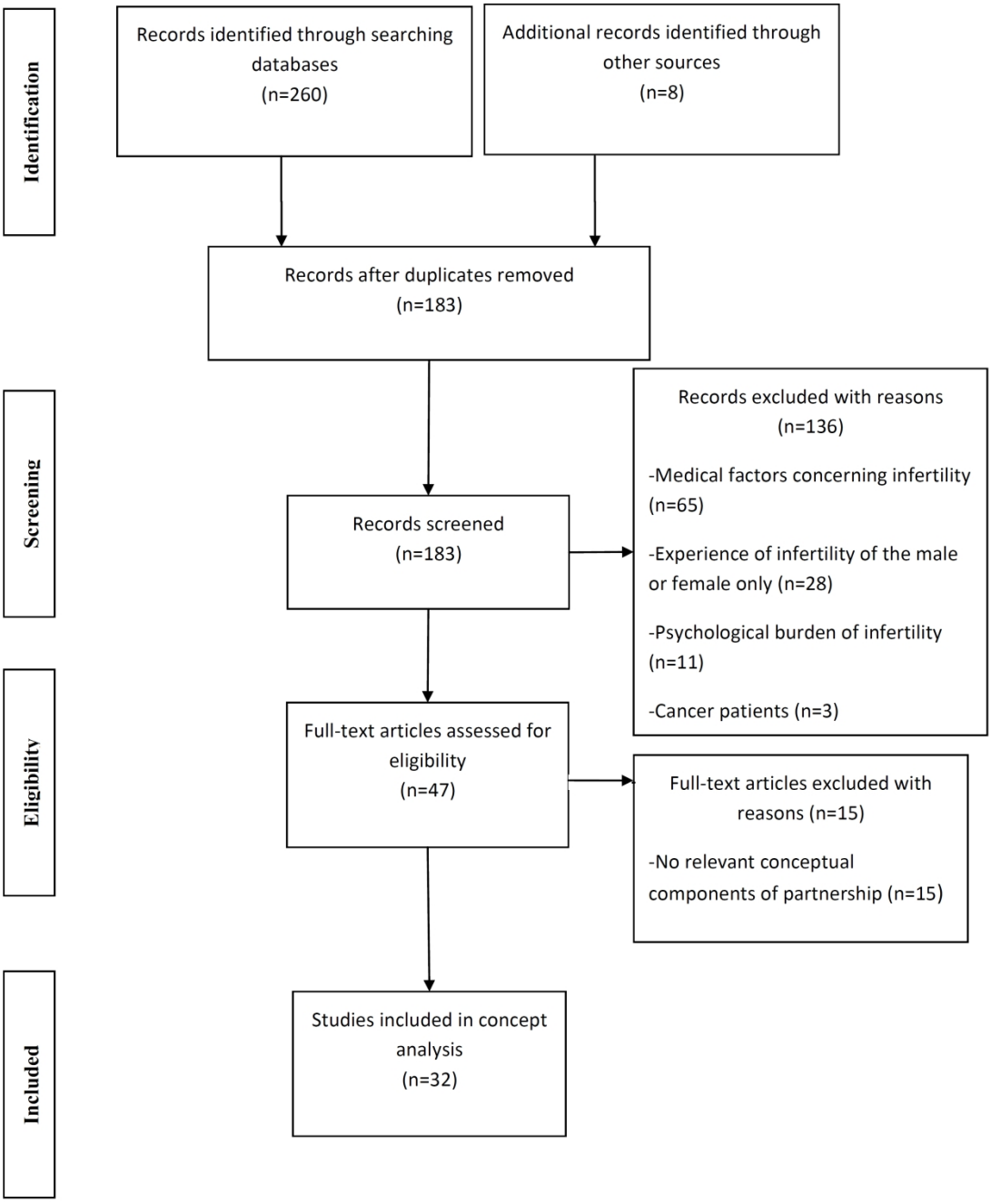

Figure 6-1. The flow diagram on identifying the literature

6.4 Results

6.4.1 Attributes

Based on the review of the included literature, four defining attributes of "partnership" in the infertile couples undergoing treatment were identified: a process of joint hardship, sharing, intra-couple communication, and mutual support (Appendices Table 6-1).

A Process of Hardship

The very first attribute that defines the partnership of couples undergoing fertility treatment is "a process of joint hardship." In fulfilling the desire for parenthood, infertile couples may go through a long period of treatment, from the phases of pre-diagnosis, beginning treatment, receiving regular treatment, persisting in treatment, to concluding the treatment (Gerrity, 2001b). In this process, both partners suffer physically, mentally, socially, and financially (Daniluk, 2001).

Confronting infertility and treatments is a joint hardship for the couples (Chachamovich et al., 2010; Daniluk, 2001; Güleç et al., 2011; Pasch et al., 2002; Peterson & Eifert, 2011; Peterson, Newton, & Rosen, 2003; Repokari et al., 2007; Tao, Coates, & Maycock, 2012). In the phase of pre-diagnosis, women undergo a wide range of check-ups, ranging from a non-invasive physical examination, an ultrasound examination, and X-ray tests to invasive blood tests, a hysterosalpinogram, a hysteroscopy, and a laparoscopy. Although men do not have to undergo as many tests, the male partner also undergoes a physical examination and a sperm analysis. Men may also be required to go through a testicle biopsy. All of these procedures cause discomfort as well as humiliation for both infertile women and men.

When treatment begins, the couples endure a variety of torturous treatments, from medication and/or surgery to assisted reproductive technologies. Pursuing treatment is also time-consuming, involving an average of 125 hours over an 18-month period of treatment (Wu, Elliott, Katz, & Smith, 2013). Treatment appointments, medications, and injections can greatly disturb a couple's daily routines and work. The side-effects of hormone-altering medications, such as depression, reduced sexual desire, irritability, and fatigue, are also additional stressors on women (Pasch & Christensen, 2000). During each menstrual cycle, couples go through an emotional roller-coaster together as "partners," experiencing hope, anxiety, grief, disappointment, and anger (Alesi, 2005). Socio-culturally, infertile couples are often considered incapable of fulfilling their familial and marital roles, and often experience a great deal of pressure from their family members, relatives, and friends (Pasch & Christensen, 2000).

Sharing

Sharing is another attribute of partnership, whereby couples share and understand each other's feelings, and achieve emotional fusion with their spouse as a dyad (Drosdzol & Skrzypulec, 2009; Holter et al., 2006; Newton, 2006; Salvatore et al., 2001). It is an important interaction between spouses when dealing with fertility difficulties (Onat & Beji, 2012b; Repokari et al., 2007).

There are several aspects of this attribute, including the sharing of responsibility, decisions, feelings, and stress. Shared responsibility signifies that couples function as a unit to cope with infertility, with joint accountability and investment (Pasch et al., 2002). During the process of undergoing treatment for infertility, partners attend consultation

sessions and make decisions jointly (Güleç et al., 2011; Newton, 2006; Pasch et al., 2002). Couples talk openly with each other (Cousineau et al., 2004; Daniluk, 2001; Glover, McLellan, & Weaver, 2009), to share their feelings and disappointments about the situation of infertility (Holter et al., 2006; Pasch & Christensen, 2000; Peterson et al., 2003). Sharing also refers to engaging in the other person's suffering and sharing the infertility-related stress (Peterson & Eifert, 2011; Salvatore et al., 2001).

Intra-couple Communication

The third attribute of partnership is communication between partners about their infertility (Drosdzol & Skrzypulec, 2009; Repokari et al., 2007; Robaina, Río, & Rosset, 2008). In coping with their joint hardship, infertile couples spend time talking with each other about the treatment, and express their thoughts in an open way (Cousineau et al., 2004; Holter et al., 2006; Pasch & Christensen, 2000). There are several forms of communication: affective, verbal, and problem-solving (Newton, 2006). For infertile couples, intra-couple communication is essential for expressing support, making decisions, solving problems, and mutual reassurance (Glover et al., 2009; Onat & Beji, 2012b). Open and positive communication is linked to marital benefits, while unsatisfactory communication between spouses is related to infertility-related stress (Daniluk, 2001; Schmidt et al., 2005) and conflicts between partners (Schanz et al., 2011; Wischmann, Stammer, Scherg, Gerhard, & Verres, 2001). When communicating with each other, couples are expected to be aware of how their partner's psychological response towards infertility and strategy for coping with infertility differs from, or is similar to, their own response and strategy (Drosdzol & Skrzypulec, 2009; Newton, 2006).

Mutual Support

Mutual support is an essential attribute of partnership in the couples in the context of being treated for infertility (Drosdzol & Skrzypulec, 2009; Holter et al., 2006; Newton, 2006; Peters, Jackson, & Rudge, 2011; Peterson & Eifert, 2011; Tao et al., 2012). It involves providing emotional support and demonstrating supportive behaviors(Newton, 2006). When confronted with infertility, couples act and react as a unit in understanding, comforting, and supporting each other to overcome difficulties (Chang & Mu, 2008; Peterson et al., 2003). This is especially crucial in cases where the fertility treatment has been unsuccessful (Onat & Beji, 2012b). Couples are expected to adjust to the physical and psychological sufferings and the multiple roles generated by the treatment (Chang & Mu, 2008; Newton, 2006), and attend to the needs of their partner and their relationship (Newton, 2006). Each is the other's main source of support, since both individuals are usually reluctant to tell outsiders about their infertility problem (Kleanthi, 2012; Matsubayashi et al., 2004; Peterson & Eifert, 2011). Consequently, those infertile couples who are able to share their emotions, understand the other person's feelings, and express love and encouragement through different stages of the treatment, will have a better marital relationship (Drosdzol & Skrzypulec, 2009; Onat & Beji, 2012b; Peters et al., 2011).

Supportive behavior is primarily described as the partner becoming involved in the treatment (Drosdzol & Skrzypulec, 2009; Matsubayashi et al., 2004; Newton, 2006; Pasch et al., 2002; Schanz et al., 2011; Schmidt et al., 2005; Wischmann et al., 2001). Men are usually the ones who are expected to be supportive during the process, as it is

usually the women who endure the process of undergoing fertility testing and treatment. The spouse gives tangible support by becoming involved in the diagnostics and treatment (Faria, Grieco, & Barros, 2012; Pasch & Christensen, 2000; Pasch et al., 2002), accompanying his/her partner to the clinic, sharing the housework, reminding their partner of the need to take medicine regularly (Onat & Beji, 2012b), and continually agreeing to engage in treatment after encountering failure (Repokari et al., 2007). Occasionally, the couples actively protect each other by assuming responsibility for the infertility and comforting each other, disregarding the actual cause of infertility (Faria et al., 2012).

6.4.2 Antecedents

Antecedents are the preceding causes or the phenomena that must occur prior to the manifestations of partnership. The antecedents of a partnership in the couples undergoing infertile treatment are: love and attraction for each other, agreement on treatment goals, and the possession of interpersonal skills.

Love and Attraction for Each Other

For a “partnership” to form between the couples, it is essential for love and affection between them to have existed prior to the diagnosis of infertility (Faria et al., 2012; Holter et al., 2006; Robaina et al., 2008). The years of dating before marriage, their marital relationship, and the affection that a couple has for each other are positively related to “partnership” during treatment for infertility (Faria et al., 2012; Güleç et al., 2011).

Agreement

Partners should understand each other's attitudes towards reproduction and infertility (Güleç et al., 2011), agree about wanting a child, and make a common decision regarding the extent of treatment (Chang & Mu, 2008; Collier, 2010; Cousineau et al., 2004; Newton, 2006; Onat & Beji, 2012a). Women, in most cases, are more eager to have a biological child than their husband. Women tend to fall in to despair when they are confronted with an unsuccessful outcome in their treatment, but husbands may consider alternatives instead of persisting in seeking treatments. Persuasion on the part of the husband to seek alternatives to treatment, with the intention of protecting his wife from the negative consequences of further pursuing treatment, may stoke disharmony between the couple (Pasch & Christensen, 2000).

Interpersonal Skills

In dealing with the hardship of infertility, partners are expected to possess essential interpersonal skills, providing each other with mutual respect and support, expressing their feelings and emotions, dealing with matters by actively listening, solving problems, and applying conflict management skills (Vizheh, Pakgohar, Babaei, & Ramezanzadeh, 2013). The partners may not be able to understand the differences in their ways of expressing feelings and coping, leading to tension (Drosdzol & Skrzypulec, 2009; Newton, 2006). The diagnosis and treatment of infertility is a life crisis and a burden for both partners, and is an additional source of marital discord. It is important that infertile couples be equipped with interpersonal skills to strengthen their partnership. Developing these may require counseling (Newton, 2006; Vizheh et al., 2013).

6.4.3 Consequences

For couples undergoing treatment for infertility, the outcome of developing a sense of partnership is wellbeing. The specific consequences include: marital benefits, an improvement in psychological wellbeing, and quality of life.

Marital Benefits

There are marital benefits to the development of a sense of partnership in the couples undergoing treatment for infertility. The willingness of men to communicate and be involved in treatment has been shown to increase the perception by women that there can be marital benefits to infertility (Pasch et al., 2002). Communicating with and supporting each other through the joint hardship of infertility was strongly associated with marital benefits (Daniluk, 2001; Kleanthi, 2012; Peters et al., 2011).

Partnership in the marriage can be influenced by socio-cultural context. A sense of partnership of infertile couples may also lead to the dissolution of the marriage in a society where the main purpose of marriage is to produce and raise children (Greil et al., 2010). These infertile partners may choose to dissolve their marriage at times to fulfill the obligation for one's family. This occurs less often in developed countries where infertility is usually treated as medical and psychological issues (Greil et al., 2010).

Improvement in Psychological Wellbeing

The existence of a sense of partnership in the infertile couples undergoing treatment was positively related to the couples' mental health, being associated with a decrease in anxiety, depression, and infertility-related distress (Kleanthi, 2012; Matsubayashi et al.,

2004; Slade et al., 2007). Couples who had problems communicating with their partner were more likely to experience stress related to infertility (Schmidt et al., 2005). Heightened feelings of anxiety and depression in women were significantly related to a lack of support from their husband (Matsubayashi et al., 2004). Depression and anxiety were reported to be related to dropping out from In Vitro Fertilization (IVF) treatment (Smeenk, Verhaak, Stolwijk, Kremer, & Braat, 2004).

Quality of Life

There is also evidence that the effects of infertility and its treatment on a couple's quality of life depend on the quality of the couple's relationship (Onat & Beji, 2012a; Repokari et al., 2007). It was reported that the marital relationship of the infertile couples was positively related to their scores for quality of life (Onat & Beji, 2012a). Marital compatibility also contributes to the quality of life of infertile couples (Onat & Beji, 2012a).

Model Case

The following is a case that illustrates the attributes of "partnership" in couples undergoing infertility treatment, where the presence of antecedents had positive consequences.

Now in their late thirties and married for eight years, Maria and David both began to think of having a child a few years ago. They tried to conceive for years. Two years ago, they were diagnosed with unexplained infertility. Since then, they have undergone numerous tests and treatments for infertility, taken "Clomid" (a medication for fertility), and received four artificial inseminations. During the treatment process, David drove

Maria to and from the clinic, accompanied her as much as possible throughout the treatment, and reminded her to take her medications regularly. Sadly, they were still unable to have a child. The couple comforted and was supportive of each other.

The couple discussed what steps they should take next and whether they should adopt a child. They reached the consensus that they would prefer to have their own biological child and decided to try In Vitro fertilization (IVF) treatment. At the time, during a family gathering, the couple was asked about their plans for a family. Maria was sad when she overheard a relative insinuate that she was unable to bear a child. David did not want to see Maria being blamed for this, and with Maria's agreement he decided to disclose the problem. David openly told their relatives that they were having fertility problems of unknown etiology, had sought infertility treatment, and were moving forward to IVF. The relatives were supportive, expressed good wishes to the couple, and Maria felt relieved.

The couple embarked on the IVF treatment, with David participating actively in Maria's treatment. They shared their thoughts about the possible side-effects of the medication, expressed their feelings, and together prayed for a positive outcome. Unfortunately, none of the eggs were successfully fertilized. The couple was sad, cried, and hugged each other tightly. They started another cycle, which finally resulted in a successful pregnancy. Reflecting on their experience, the couple believed that their relationship had become stronger after they had gone through the hardship together, and that they had strengthened their emotional ties.

Related Concepts

The other concepts that are similar to the concept of "partnership" are "participation" and "collaboration" (Gallant et al., 2002). "Participation" is defined as "the action or fact of having or forming part of something; the sharing of something" (Dictionary, 2004), while lacking an explicitly shared goal or commitment. "Collaboration" has been referred to "a cooperative venture based on shared power and authority, and is nonhierarchical in nature (Carnwell & Carson, 2008). The focus is on the sharing of power and expertise when working together. In a "partnership" the emphasis is on shared risks and profits (Carnwell & Carson, 2008). Therefore, the attributes of each related concept are distinctly different from the concept of "partnership," the latter of which is more appropriate for couples in the context of infertility treatment.

Theoretical Definition of "Partnership" in Relation to Infertile Couples

In analyzing the concept of partnership in the couples undergoing infertility treatment, the phenomenon can be identified as a process of joint hardship in the infertile couples who are enduring infertility through sharing, communicating with each other, and giving each other mutual support. The couples love each other and are attracted to each other, and are in agreement on treatment goals. Both possess interpersonal skills. Through partnership, the couples will achieve marital benefits and experience improvements in their psychological wellbeing and quality of life.

A Middle-range Model for "Partnership" in Relation to Infertile Couples

The concept of 'partnership' of couples in the context of infertility has been analyzed to delineate the elements in this phenomenon. It has been suggested that middle-range

model is appropriate, when lacking an established theory, to depict the nature, scope and consequences of a phenomenon (Meleis, 2012).

According to the assumptive outcomes of this concept analysis, a middle-range model has been depicted (Figure 6-2). This model clarifies the presence of a sense of partnership in the infertile couples, based on the love and affection that the couple has for each other. Being agreed in wanting a child, and equipped with interpersonal skills, the couples can endure the hardships of being infertile, through sharing, communication, and mutual support, to achieve marital benefits, improvements in their positive psychological wellbeing and quality of life.

This middle-range theory proposed has a particular focus, considers a limited number of variables and their relationships, and offers an effective bridge between practice and established theories (Meleis, 2012).

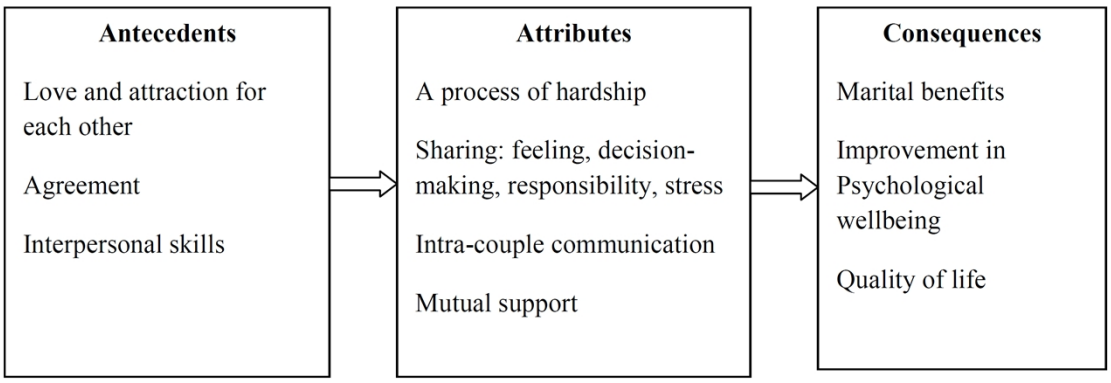

Figure 6-2. Middle-range model of the concept of partnership in the couples undergoing treatment for infertility

6.5 Discussion

This is a concept analysis using the Rodgerian approach to analyze the concept of "partnership" in the couples undergoing treatment for infertility. A theoretical definition was offered and a middle-range model was depicted. The concept as scrutinized in this paper revealed that the key component of "partnership" in the context of business or health services differs from the concept in our context of interest.

Through this concept analysis, the concept of partnership in the context of couples undergoing fertility treatment is defined as "a joint hardship for infertile couples that are borne through sharing, communication and mutual support." The dynamic process of "partnership" in the infertile couples undergoing treatment is preceded by "feelings of love and attraction for each other, agreement on treatment goals, and the possession of interpersonal skills." With partnership, the couples in this context can expect to achieve marital benefits, and see improvements in their psychological wellbeing and quality of life.

The development of this model could provide directions for future research and lead to interventions specifically geared towards this population. This model also suggests ideas for future research agendas, directions for research hypotheses, interventions, and measurements of outcomes in related studies. Studies and interventions to test and refine this middle-range model are needed.

6.6 Implications for Practice

This concept analysis provides health care providers in the field of infertility services ideas for clinical practice, a focus for the development of interventions for this population, and directions for future research on efforts to support infertile couples through the hardship experienced when undergoing treatment.

The implications for health care providers of this concept analysis are evident. It increases the awareness of clinicians of the attributes and antecedents of partnership in the infertile couples, and signals that these considerations should be integrated in their service. Counselors should pay attention to the presence of “partnership” when treating infertile couples, and facilitate the process of partnership (identified as attributes and antecedents) in couples. Tailored-made intervention programs to strengthen a sense of partnership in the infertile couples should be designed to enhance congruence between couples in treatment goals and encourage mutual support through joint participation in the appointments and treatment. The interventions should be targeted at improving interpersonal skills to facilitate effective communication, the provision of mutual support and sharing, and the ability to manage conflicts.

6.7 Implications for Research

This concept analysis also provides directions for developing, evaluating, and researching interventions. The middle-range model can be adopted to guide the development of interventions. It also sheds light on the need to assess the presence, process, and outcomes of “partnership,” such as marital benefits and improvements in the psychological wellbeing and quality of life of couples. Since no instruments

specially for measuring partnership in the infertile couples can be identified, there is a need to develop such an instrument specifically for evaluating partnership in the context of infertility treatment.

The relationship between the elements depicted in the middle-range model should be tested using a mixed-methods study incorporating both quantitative and qualitative approaches. The relationship can be confirmed if the process of joint hardship, sharing, intra-couple communication, and mutual support (attributes); mediated through the love and attraction that the couples have for each other, their agreement on treatment goals, and their possession of inter- and intra- personal skills (antecedents); have a positive impact on marital benefits and on their psychological wellbeing and quality of life (consequences).

The present analysis has its limitations. First, the grey literature relating to this topic was not included, only those published articles in good quality referee journals were included in this concept analysis. Second, despite the efforts of the researchers to maintain objectivity in the process of identifying the components of partnership, it is possible that personal pre-conceptions might still have affected the process and outcomes of the analysis. Other researchers may identify slightly different attributes, antecedents, and consequences of the concept. Third, readers should note that the concept of partnership in the couples undergoing infertility treatment may be influenced by the temporal, and cultural context, as well as by advancements in fertility technology.

6.8 Conclusion

Infertility is a stressful experience for couples. Given the psychological, physical, and social impacts of infertility, interventions to support infertile couples through this hardship are needed. The elements of the concept of partnership depicted in this paper provide researchers and clinical practitioners with an understanding of the phenomenon, which can be used to develop interventions aimed at enhancing a sense of partnership in the couples, and shed light on the process and outcomes of partnership. It is hoped that developing interventions to enhance partnership will result in improvements in the psychological status, marital relationship, and quality of life of infertile couples undergoing reproductive treatment.

Chapter 7

STUDY II SUBSTANTIATING THE IDENTIFIED EVIDENCE BASE FROM REVIEW OF LITERATURES

The Experience of Chinese Couples Undergoing In Vitro Fertilization Treatment: Perception of the Treatment Process and Partner Support*

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7.1 Introduction

It is estimated that, worldwide, the primary infertility rate of women aged 20–44 years is 1.9%. The prevalence of infertility varies in different countries. In China, about1.3% of women of reproductive age are affected (Mascarenhas et al., 2012). To fulfill the desire for parenthood, 50% of infertile couples would seek medical treatment, which could initially include medication and/or surgery (Greil et al., 2010). If these first-line treatments do not work or are deemed inappropriate, about 3% of these couples will be recommended to undergo assisted reproductive technologies (ARTs). In Vitro Fertilization (IVF) comprises more than 99% of ARTs, with a success rate of 16.6-20.2% (Sullivan et al., 2013).

When treatment begins, the couples have to endure a variety of treatments, including ovarian stimulation, regular monitoring, oocyte retrieval, embryo transfer, and progesterone supplementation (Beckmann, 2014a). The treatment appointments, investigations, and injections can greatly disturb a couple's daily routines (Pasch & Christensen, 2000) . It can therefore be expected that couples, as a unit, suffer from the stressful experience of infertility, as they endure the painful treatment and the fear that that it will fail.

It has also been revealed that couples seeking IVF treatment are more likely than non IVF couples to report that their relationship has become unstable, due to the prolonged nature and the demands of the treatment (Newton, 2006; Wang et al., 2007). It has been shown that the marital and sexual satisfaction of infertile couples can deteriorate because of infertility treatments, and that couples can manifest marital maladjustment even three

years after the treatments have ended (Newton, 2006). Another study revealed that both men and women reported a lower level of satisfaction with their marital relationship after three cycles of infertility treatments that did not lead to a successful pregnancy (Schmidt, 2006). Couples expressed difficulty in handling their sexual life, which had been compromised to meet the schedule required because of IVF treatment (Widge, 2005) . The toll on the couples' relationship as a result of infertility has been reported as the major source of stress leading to the termination of IVF treatment (Domar et al., 2010). On the other hand, the marital relationship can also be a protective factor for couples enduring the different stages of the IVF cycle (Lowyck, Luyten, Corveleyn, D'Hooghe, & Demyttenaere, 2009b), especially for women with unsuccessful IVF outcomes (Chochovski et al., 2013).

The relationship of the partners and the support that they give each other will affect their experience during the treatment. Studies have explored the experiences of women/couples relating to IVF treatment. These have mainly focused on the impact of social context on infertility (Widge, 2005), specifically on the two weeks spent waiting for the results on the pregnancy following the embryo transfer(Lampley, 2010), the support from other IVF patients via the Internet (Isupova, 2011), and life after unsuccessful or terminated treatment (Johansson & Berg, 2005; Lee et al., 2009; Su & Chen, 2006). However, the experience of such couples with regard to mutual support of partners and their unmet support needs have not been explored or well understood.

7.2 Objective

This is a qualitative study intended to explore Chinese couples' experience of IVF

treatment, especially their perceptions of the treatment process and the support between marital partners. The results of this study will shed light on the needs of these couples, so that a supportive program can be developed.

7.3 Methods

Design and setting

The study adopted a qualitative descriptive approach to obtain a better understanding of the experiences of couples undergoing IVF treatment. This approach is appropriate when straight descriptions of a phenomenon are desired (Sandelowski, 2000). Data collection was conducted through in-depth interviews of individual couple-dyads because of the sensitive nature of infertility. The male and female partner of a couple was interviewed together to gain a clear picture of their interaction, shared experiences, and support for each other.

Sampling and data collection

The study targeted infertile couples who have undergone at least one cycle of IVF treatment in the past twelve months. Convenience sampling was used in recruiting participants, and until data saturation was reached.

The participants were recruited from a reproductive medical center at a university hospital in the city of Hangzhou, the capital and largest city of the Zhejiang province, at the east coastal of China. Participants were referred through nurses of the clinic. Interviews were conducted in a quiet room of the outpatient clinic whenever it was convenient for the informants. There was no one else present during the interview. Each

interview lasted for 60 to 90 minutes, and was conducted by first author, a female PhD student, with experience in qualitative interviewing. All of the interviews were conducted in Chinese, audio-taped, and transcribed verbatim within two weeks after the interviews. The participants consented to have their interviews recorded.

Prior to interview commencement, the researcher introduced herself and the reasons for doing this study. The participants then were invited to express their feelings, thoughts, and insights relevant to their experiences with IVF treatment, especially their perceptions of the treatment process and the support they offered or received from each other. Interview guide was drafted by the authors. It has then been carefully revised based on the critical comments from qualitative scholars and the results of pilot test. The final version of interview guide contained the following open-ended questions: (1) Would you like to briefly describe the fertility treatments you had undergone? (2) Please describe your reactions and the process of decision-making when it was suggested that you undergo IVF treatment. (3) How did your wife/husband cooperate and become involved in the treatment? (4) Please describe your sharing, communication, and support for each other during the treatment. (5) How did this interaction influence your psychological well-being and your relationship with your partner? (6) What do you think about the support that you received from health care providers, parents, friends, and relatives in the course of your IVF treatment? (7) When an undesirable outcome was uncovered, how did you cope and adjust together (for couples with an unsuccessful cycle)? The field notes have been made during and after the interview.

Ethical considerations

Ethical approval was obtained from the Human Subjects Ethics Sub-Committee of The Hong Kong Polytechnic University, and permission to conduct the study was sought from the Affiliated Women's Hospital of Zhejiang University School of Medicine. An explanation was given to the participants of the purpose of the study and its voluntary. The written consent of the participants was obtained before the start of the interviews. Pseudonyms and an indication of their gender, e.g. Fan-F, Xuan-F, Chun-M, were used to protect the participants from being identified, with "-M" and "-F" referring to males and females, respectively. The audio-tapes and narrative transcriptions were kept in a safe place accessible only by the research team via a password. These materials will be destroyed after the completion of this project.

Interviews would be stopped immediately if the participants experienced psychological distress. The hospital had an experienced psycho-counselor available to help the participants if they reported any psychological discomfort during or after the interviews. None of these couples interviewed in the study had to use the service.

Data analysis

Data were analyzed adopting the approach of conventional content analysis, to describe a phenomenon (Hsieh & Shannon, 2005). The information collected from the interviews was transcribed verbatim. Two researchers independently read through the data several times to obtain a general impression of the information. Discrepancies between researchers were resolved by discussion. The units of the analysis were selected and coded, then organized into sub-themes and themes. A further data check of the

interviews was performed to ensure that data have been thoroughly covered and described, and that the themes accurately represent the topic being studied.

7.4 Results

Demographic characteristics

A total of 16 couples were approached in this study, but four couples with unsuccessful outcomes refused to be interviewed. They expressed their unwillingness to recall their psychological trauma. As a result, a total of 12 couples, 3 with failed cycles and 9 with successful outcomes were recruited. Three of 9 couples had previously experienced failed cycles, and 6 couples were successful in their first treatment. The mean age of the female participants was 32.2 years (range, 28-40 years old), while that for the male was 35.6 years (range, 30-44 years old). The participating couples had been married for an average of 5.95 years (range, 3-14 years). Two couples believed in Buddhism, while the others had no religion. The education levels of the men and women were the same, with 33.3% having received a bachelor's degree, 41.7% a junior college degree, and 25% a high school diploma. The cause of infertility among these couples can be attributed to female factors (66.7%), male factors (16.7%), and a combination of factors (16.7%). The couples had received infertility treatments for an average of 4.14 years (range, 2-11 years). The average number of IVF cycles tried was 1.82 cycles (range, 1-5 cycles).

The data from the interviews can be categorized into four themes. The major themes and sub-themes emerging from the analysis of the transcripts included: the process of hardship (physical pain, emotional pain, struggles with the urgency and inflexibility of bearing a child, and the disturbance of daily routines and work); enduring hardship with

a loving relationship, the partnership of the couples (sharing, tangible support, psychological well-being, and an improved marital relationship as outcomes of partnership, lack of partnership); and ambivalence towards social support. A preliminary conceptualization of the overall experiences of infertile couples undergoing IVF treatment was proposed (Figure 7-1).

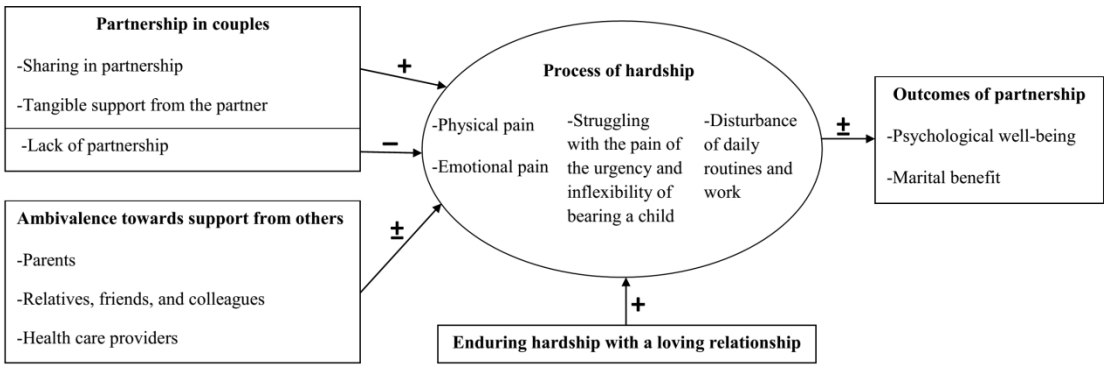

Figure 7-1. A preliminary conceptualization of the overall experiences of infertile couples undergoing IVF treatment

7.4.1 Process of hardship

This theme describes the infertile couples' perception of IVF treatment. After entering the torturous and intrusive treatment cycle, the participants underwent a journey of physical and emotional pain during the treatment process. During period when they awaited the results of the treatment, they experienced fear that the outcome might be unfavorable. These treatments also exacerbated the couples' internal struggles over the issue of bearing a child, and disturbed their daily routines.

Physical pain

The majority of women reported experiencing physical pain in the course of the IVF treatment, including from daily injections, intrusive procedures, and the side-effects of medications. The required injections for conventional treatment protocols include the gonadotropin-releasing hormone (GnRH) agonist to prevent premature ovulation, a follicle-stimulating hormone (FSH) to stimulate the development of follicles, human chorionic gonadotrophin (HCG) to facilitate the final maturation of oocytes, and progesterone to support changes in the endometrium. In order to monitor the ovarian response, frequent blood tests and trans-vaginal ultrasound scans were necessary.

One of the women expressed her feelings about the process:
"The progesterone shot is the worst as it needs to go deeply into muscle and it is oil-based. On top of the numerous injections, there were also blood tests that made me feel like a pin cushion. I would not have wanted this to happen, but I have to bear it as I want to have my own baby." (Ke-F)

One of the husbands could actually "share" his wife's physical pain, stating that:
"The injections of progesterone have already gone on for 72 days after the embryo transfer, and will continue for at least 20 more days. There are more than 400 pinholes in her body. If my wife were skinny, her buttocks would be badly damaged." (Bin-M)

Some women described the oocyte retrieval as the toughest procedure, as it is accompanied by an unexpectedly lengthy period of recovery from cramping, bloating, and fatigue.

"After egg retrieval I had severe vomiting and could not eat anything. The enlarged ovarian was like two water bags hanging, making it difficult for me to turn over in bed." (Chun-F)

"I couldn't get out of bed for the whole week because of bloating in my lower abdomen." (Qin-F)

The side-effects of the medications reportedly included weight gain, chest pain, and liver damage. The participants also expressed their concern about the long-terms risks associated with stimulating the ovaries.

"I suffered from severe liver impairment after use of the follicle-stimulating hormone." (Zhang-F)

"I am concerned about the possibility of breast cancer or premature ovarian failure." (Fan-F, Qin-F)

To conclude, women reported of physical pain due to the frequent injections, invasive procedures, and various medication-induced side effects while undergoing IVF treatment

Emotional pain

All the women experienced emotional pain and suffered from psychological torture, causing sleep disturbances, frustration, disappointment, and anxiety. A woman actually described the process of IVF treatment as climbing a mountain step by step, with each

step being torturous and accompanied by a fear that felt like she was facing an impending death sentence.

“It was really like climbing a mountain; each step was a psychological torture, worse than the physical pain I suffered. To me, waiting for the results of the pregnancy test was like death sentence.” (Chun-F)

Some women reported sleep disturbances with constant worries about losing the embryo that had been transferred.

“I could not fall asleep at night, worrying that I would not get pregnant.” (Jun-F)

“I just stayed in bed except to go to the washroom. One of the women in the ward even took small steps like an ant, for fear of losing the embryo.” (Guo-F)

“I did not dare to move around, but stayed in bed worrying about aborting the embryo.” (Fan-F)

“From the third day after embryo transfer, I became extremely worried because of the repeated negative results of the pregnancy tests that I took by myself, and was having nightmares.” (Ke-F)

The disclosure of a negative pregnancy outcome was also described as the most frustrating and painful disappointment. Some couples refused to recall the failed experience and avoided talking about it. A woman had tears in her eyes when she said:

"I was extremely upset and heart-broken when I had the fifth failed IVF. I don't think other people could understand my feelings. I am reluctant to talk to other women in the same ward who were successful. It makes me even more frustrated and pained." (Ke-F)

One of the husbands, who shared his wife's disappointment and pain, said:

"We were so disappointed about the unsuccessful result after spending so much energy and effort. I can feel the pain that she went through. We started with some hope and ended up with nothing. It was frustrating and we were hurt." (Hong-M)

Struggling with the pain of the urgency and inflexibility of bearing a child

Even as they suffered from physical and emotional pain, the couples expressed the internal struggles that they went through in wanting to have their own biological child. They were mostly inflexible about their state of childless, and would not accept adoption as an alternative. These infertile couples underwent the hardships of treatment because of their internal struggles over bearing a child and their urgency to have a baby.

Women described their urgency to conceive a child because of their age.

"I have already failed five cycles, and I am now 35 years old. There will be a decreased chance for success as the quality of my eggs is getting worse. I really don't have much time, so I cannot wait but must go through the treatment." (Ke-F)

Infertile couples expressed their attitude towards and refusal to accept their childlessness, and insisted on having their own biological child.

"My life will not be complete unless I can have my own child. I will strive and endure whatever physical pain and emotional turmoil I need to go through, and pay whatever price I have to pay." (Fan-F)

Many couples saw no other alternative but to tolerate the physical and emotional pain of the IVF treatment, and were not willing to accept a childless life or to adopt a child.

"To me, adoption is like raising a child for others. I would rather go through the pain to have my own." (Guo-F)

"There is absolutely no alternative. I definitely will not accept adoption as there are too many problems and issues with adopted children. I would rather undergo all the pain to have my own or none." (Bin-M)

In short, couples struggled with inflexibility of childbearing and were unlikely to accept childfree life or child adoption. There was also age-related urgency contributed to the additional stress for women.

Disturbance of daily routines and work

After embarking on In Vitro Fertilization treatment, the women had to adjust their daily life, work, and activities because of frequent treatment appointments, medications, injections, and monitoring, causing disruptions to their daily routines.

Those who were from towns or rural areas far from the reproductive medical center had to stay in a hotel during the entire cycle, leading to a relatively isolated life.

"My hometown is 300 miles away. So, I had to stay in a hotel once I entered the cycle. There was nothing I could do but stay there to wait for the results. There was no way that I could return to my daily life with this treatment." (Li-F)

A woman described how treatment affected her daily routine.

"My daily normal routines were thrown out of the window, especially in the days after the embryo was transferred. I could not, or more accurately, did not even dare to cook a meal for myself. Each time I entered the cycle, my parents came over to my house to do things for us. They took care of me and did all of the housework, as my husband has a highly demanding job." (Ke-F)

The participants stated that the IVF treatment was disruptive to their work. Six women quit their jobs or were reduced to working part time. Other women kept their jobs but frequently took leave for medical appointments. Some described the impact of infertility and the associated treatment on their careers.

"I could only find a part-time job during the four-year period. The process of treatment is too complicated. The hospital has almost become my home as I visit it so frequently. Each time, I have to spend nearly a whole day there, waiting for the doctor's inquiry, the test, and the results." (Jun-F)

A husband also commented on the situation that his wife was in before quitting her job.

"My wife felt guilty and pressured for taking leave so often. It definitely influenced the day-to-day running of the company where she worked. So my wife ended up quitting her job last year." (Hong-M)

Over the course of the IVF treatment, the couples experienced hardship. They considered the process to be an arduous trip marked by physical and emotional pain. The women regarded the oocyte retrieval as the most horrible procedure, worse than the injections, tests, and embryo transfer. The waiting period for the outcome of treatment and a negative pregnancy result were the most stressful events – like a death sentence for the couples. Couples also had to alter their daily life, or even quit their jobs, because of the complex and time-consuming treatment. The couples tolerated this hardship because of their internal struggle over the urgency and inflexibility of bearing a child.

7.4.2 Enduring hardship with a loving relationship

Couples reported that it was their loving relationship that enabled them to endure the hardship. The participants also described the interpersonal skills that they used in their relationship, which helped them to maintain their marriage.

"My husband and I were best friends for two years before we got married. He had confided his fertility problem to me before we got married. I would certainly regard it as a couple's shared responsibility that we should face together." (Gang-F)

Women said that they would express their feelings directly to reduce misunderstandings with their partner.

"Sometimes when I am uncomfortable or depressed, I will tell my husband my feelings and needs. He will respond to me and offer suggestions or merely provide me with emotional support that makes me feel better." (Jun-F)

Women reported that they would avoid or dissolve conflicts through mutual understanding and a gentle way of speaking.

"If I could do things by myself, I would try not to bother him about accompanying me to the clinic. On the other hand, my husband has always said that he would like to go through every tough time with me. The possible conflict has been minimized as we are considerate of each other, which also in turn improves our intimacy." (Zhang-F)

"Sometimes, when I was not satisfied with my husband's response to my needs or requests, I would not get angry but gently tell him about my disappointment and how it hurt. It works quite well with our tender loving relationship." (Chun-F)

Couples reported that they had a loving relationship before the treatment, which played an important role in their ability to endure the hardships of the treatment. They described using interpersonal skills such as explicitly expressing their feelings, achieving mutual understanding, and cultivating a tender loving relationship.

7.4.3 Partnership in couples

The infertile couples perceived that they had a "partnership" in facing the hardships of the IVF treatment. Women reported that the sharing of feelings and the giving of tangible support between the two partners was essential for their psychological well-being and the couples' marital relationship.

Sharing in partnership

Couples described their mutual decision to undergo the hardship of IVF treatment and their sharing of the responsibilities. A woman indicted her willingness to undergo treatment with mutual support in their marriage.

"It was not the decision of one person. It was our mutual agreement to undergo the treatment. After the torturous egg retrieval procedure, we together decided on the maximum number of cycles that we would be willing to try." (Chun-F)

The husbands indicted the role they played in supporting and sharing the decisions of their wives.

"As I suffered from azoospermia, I initially hesitated to start IVF by donor semen. But my wife insisted on having her biological child for us. After a discussion, we come to a mutual decision on the IVF." (Suan-M)

"After so many failed treatments, it was suggested that we adopt a child. We sat down and discussed our thoughts on adoption, and reached the consensus that we would continue treatment instead." (Bin-M)

"Unlike my wife, I am quite flexible on the issue of bearing a child. But I understand her wishes and would support whatever makes her feel better. So we will continue the treatment even after five failed cycles." (Shan-M)

Couples also shared their sorrow and joy with each other about the treatment outcomes.

"The third day after the embryo transfer, the blood test result was not favorable. My wife was so depressed and called me immediately. I comforted her, saying that it does not matter and that we may still have a chance. I then picked her up from the hospital. It turned out that this cycle was successful. We were so happy and celebrated together." (Bin-M)

"We have a shared responsibility to endure the painful aspects of life together since we married. We shared our sorrow over the failed treatment results, but together kept the secret from my parents." (Cheng-M)

Tangible support from the partner

Women reported that they had received tangible support from their husbands, in that their husbands accompanied them to the clinic, assumed some of the housework, and took care of them at home.

"My husband did almost all of the housework, particularly during the two weeks after the embryo was transferred. He told me that since I suffered so much in the treatment he could only do some trivial work to relieve my stress." (Jun-F)

"Last time, I suffered from ovarian hyper stimulation syndrome after being injected with a follicle-stimulating hormone. I was frightened. Fortunately, my husband stayed with me. We talked and comforted each other. It would have been hard to go through these sufferings without his unfailing support." (Li-F)

"I was very well taken care of by my husband during the treatment. I was surprised by his caring attitude. He even washed my hair when I was confined to bed due to cervical cerclage following our successful cycle." (Wei-F)

A husband declared that this was the least that he could do for his wife, who suffered so much in their battle to have a baby.

"As much as possible, I escort my wife to the clinic, where she undergoes the torturous treatment. As we are striving together to achieve a common goal, I cannot leave her to fight the battle alone." (Yang-M)

Psychological well-being and marital benefit as Outcomes of Partnership

In going through the hardship of IVF treatment, women reported enjoying psychological well-being and an improved marital relationship because of their partnership in sharing their feelings and giving support. Women described the partnership with their husband as being related to their psychological well-being.

"My husband has a good attitude. When I felt stressed, he always directed me to think in a positive way. He told me that he was concerned about my physical pain and feelings more than about the outcome of the treatment. He cares about my feelings and emotions, which gives me much relief." (Li-F)

"Whenever I think of his unconditional love and support, I feel strong enough to face the difficulties of the treatment and not be so afraid of the failure of the treatment." (Jun-F)

Through this hardship, some couples reported that their marital relationship had improved.

"Honestly, in the beginning I even complained about his infertility. However, after we went through various hardships together, our love has grown stronger. The intimacy and satisfaction in our marital relationship has increased." (Chun-F)

"During the process of treatment, we supported each other more than we ever had before, which led to personal growth and also enhanced our marital satisfaction." (Jim-M)

Lack of partnership

However, not all the couples were lucky to have the involvement and support of their partners. Some women complained of a lack of involvement or partnership on the part of the male partners, even in the presence of their husbands.

"I think he just did not understand the whole process. I made all of the decisions for the treatment. He has not offered any help or suggestions, but just did what I told him." (Qin-F)

"This treatment process was a psychological trauma that both of us were unwilling to discuss. (Ke-F)

Some men complained of a lack of partnership or emotional support from their wives:

"My wife complained about spending a lot of money because of my fertility problems. She was so angry and kept blaming me when the pregnancy result was negative. She even said that she wanted to divorce me. Although she was not serious, I still felt hurt." (Suan-M)

"I was quite disappointed when the first cycle was unsuccessful. My parents and I stayed with my wife for the whole day and comforted her. However, I in fact felt equally

depressed, and I hoped that they realized my pain as well. But no one seemed to see that I also needed the emotional support." (Hong-M)

The infertile couples reported their perceptions of their partnership during the IVF treatment. Couples described their shared decision, responsibility, sorrow, and joy with each other. Women received tangible support from their husbands. It was reported that partnership interactions between two partners can contribute to the psychological well-being of each partner and improve their marital relationship. However, negative partnerships were revealed in the interviews, including a lack of involvement and partnership on the part of the male partners, and a lack of emotional support for males from their wives.

7.4.4 Ambivalence towards social support

Infertile couples reported that they had received support from parents, relatives, friends, colleagues, and health care providers. They were ambivalent about such support. Some reported that they felt guilty about receiving support from their parents because it seemed to them that they had added to their parents' burden.

"As my husband is busy with his job, my parents helped to do our housework and took care of me during the treatment. Having their support and sharing my feelings with them did a lot to reduce my anxiety." (Guo-F)

"My mom treated me like a queen during the treatment, which became a source of pressure on me as I added to her burdens. Sometimes, I wished that I had kept it a secret

from her and just kept it between my husband and me so as not to cause my mom to worry." (Wei-F)

"In the beginning of my fertility treatment, my mother accompanied me to the treatments. But I later found that my mom was stressed and worried too much, so I decided not to trouble her any more. Instead, my husband and I, as a dyad, are supposed to face the hardship together." (Chun-F)

Some participants intentionally kept their condition and treatment a secret from their friends or relatives, not wanting to hear useless or unintentionally unfavorable comments that would create stress for them. Some even regretted having told others of their treatment and outcomes.

"My wife's manager was very supportive. She allowed my wife to take leave and told her not to worry. After all, we could not afford to lose our jobs. We were also grateful for the manager's recommendations on doctors and folk medicine. But the support also gave us pressure, especially when she constantly asked about the progress of the treatment." (Bin-M)

"The less people know about the treatment the better. We do not want our child to be treated as abnormal, just in case our kid turns out to be abnormal." (Fei-M)

"I received a lot of 'red packets (lucky money)' from friends and relatives after I was told that I am pregnant. But I am still worrying about whether the baby will come to

term. My uncle then told me that babies conceived via IVF have a higher rate of birth defects. I regretted having told him that the baby had been conceived by IVF." (Chun-F)

Women do generally regard the medical information received from health professionals as beneficial. As one woman stated:

"We benefit a lot from the health education from the ART center and the booklets on IVF treatment." (Jun-F)

However, more women complained that during the treatment there was a limited amount of time for inquiries, a lack of involvement in decision making, and a lack of psychological support from health professionals.

"I have to say that the doctors in the clinic are too busy to answer our inquiries. Each time I visit the doctor, I prepare a list of questions to ask, but I do not find time to ask them, or they give me quick answers in the belief that I would not be able to fully understand their explanations." (Li-F)

"Sometimes, we felt like 'puppets' doing what were told by the health professionals. There was no time for us to ask questions to get involved in the decision." (Bin-M)

"I was so nervous when I underwent my first cycle that I think contributed to the failure. I might have been successful in the first cycle if I had received professional psychological support at that time." (Guo-F)

"The doctors or nurses at the clinic do not provide the psychological counseling that we need. We hope that there is a psychological counseling clinic that can provide us with the support that we need in the hospital." (Chun-F)

In general, couples were ambivalent about receiving social support, which might either help or lead to further stress. Couples felt guilty due to the extra burden that they had put on their parents. Couples also expressed concern about the comments on the treatment and about children from relatives, friends, and colleagues. Most couples considered the professional support to be inadequate, particularly the psychological support.

7.5 Discussion

This study focused on the experience that couples had with IVF treatment and their perception of it. Four themes were uncovered: the process of hardship, enduring hardship with a loving relationship, partnership in couples, and ambivalence towards social support. Based on the results, three aspects were identified for discussion: the couples' experience with IVF treatment, the couples' perception of their partnership, and the couples' attitude towards social support.

7.5.1 Couples experienced the hardship of IVF treatment

Not surprisingly, the couples considered the process of treatment as a hardship, which concurs with the results from other studies (Boivin & Lancastle, 2010; Cipolletta & Faccio, 2013; Widge, 2005). Although most of the participants had already undergone numerous investigations, laboratory tests, and even surgical procedures before entering

the cycle (Beckmann, 2014a), they still suffered a great deal from the injections, oocyte retrieval, and the side-effects of medication.

However, the women regarded all of these as bearable compared with the emotional torture of the treatment. Due to the uncertainty of the outcome of the IVF treatment and their inability to influence the results, the participants could only wait to receive the results, which usually resulted in disappointment. A woman actually equated the period before the results of the pregnancy test were released to waiting for a death sentence. The feelings of anxiety and fear continued until a healthy baby was successfully delivered.

Couples in China, as in other countries, usually resort to trying IVF after they have exhausted their options pursuing other less intrusive forms of treatment. Alternatives such as adoption or living a childfree life, are not widely accepted (Jin et al., 2013; Lau et al., 2008). Unlike childless women in Nigeria, who have been found to endure verbal or physical abuse from their husbands or from female members of their husbands' families (Dimka & Dein, 2013),women in China are often pressured by their own expectations or those of their parents. The traditional value of carrying on the family line has been so deeply embedded that women usually regard childbearing as a family obligation (Jin et al., 2013; Wang et al., 2007). All of the women reported suffering emotionally during the waiting period. When the treatment was unsuccessful, this not only led to immediate heartbreak and shock but also to long-lasting psychological trauma. Women who became pregnant still reported suffering from extreme anxiety due

to previous failed attempts at IVF. The finding was supported by a study conducted in Sweden (Volgsten et al., 2010).

Although there are no age restrictions on women seeking IVF treatments in China, the age-related decline in the quality of the oocytes greatly reduces the success rate of the treatment (Chuang et al., 2003). Difficulties are still encountered with the sharing of eggs and the practice is not common in China (Cai et al., 2012). It was understandable that older women would feel the urgency to bear a child. About one third of couples in Western countries would terminate their IVF treatment after one or two failed IVF cycles (Domar, 2004). Some Chinese couples in this study had gone through five cycles, and were still determined to go through another cycle.

Many participants in this study were clearly very inflexible about the issue of bearing their own child struggled. Given the importance of childbearing in traditional Chinese culture (Jin et al., 2013; Wang et al., 2007), couples in China insist on having their biological child who can carry on the family bloodline, and refuse to consider adopting a child or settling for a childfree life. The low level of acceptance of adoption by Chinese infertile couples was also supported by a study conducted in Hong Kong (Loke et al., 2012).

The disturbance to their daily life and work was another burden on couples undergoing IVF treatment. Some women even quit their jobs to pursue the treatments because some working for private companies were unable to take long leaves of absence to make

frequent and time-consuming visits to the clinic and to undergo procedures. Similar findings have been reported in earlier studies (Widge, 2005; Wu et al., 2013).

7.5.2 Couples' perception of partnership when undergoing treatment

It has been reported that the kind of partnership that a couple has can either act as a buffer against or contribute to the hardship of the fertility treatment. The characteristics of partnership that emerged from the data were consistent with those of an analysis of the concept of "partnership" among infertile couples based on a review of the literature (Ying & Loke, 2016). It was reported that "partnership" is a process of joint hardship in that the infertile couples endure the hardship of infertility by sharing their thoughts and feelings and supporting each other. With a partnership, infertile couples would expect to see an improvement in their psychological well-being and marital relationship.

A lack of partnership was observed among some infertile couples. There were complaints of a lack of involvement from male partners. Some women in the present study initiated the fertility treatment and made the decisions themselves, without the involvement of their male partners. The tendency of infertile women to orchestrate the treatment plan was reported in an earlier study (Daniluk, 2001). However, this is different from the "uncooperative husbands" reported in Japan, who perceived the co-treatment as a burden (Asazawa, 2012). In the Japanese study, some women even deliberately reduced the involvement of their male partners for fear that they would feel pressured. Although in a modern society women have other ways to realize their value, Chinese women still regard motherhood as a major role and a respected identity (Loke et al., 2012). Infertile women have a stronger desire to bear a child than men and are more

likely to take responsibility for a couple's infertility (Hjelmstedt et al., 1999). However, if the process of seeking treatment is dominated by the female, this could potentially harm the couples' partnership, and consequently influence their mental well-being and marital relationship.

If not expressed clearly, a partner's ourbursts of anger or sadess may be interpreted as blame by the other partner. Infertility serves to magnify the pain that couples experience during their normal life (Newton, 2006). It has been found that unsatisfactory support between spouses is associated with infertility-related stress (Daniluk, 2001; Schmidt et al., 2005) and conflicts between partners (Schanz et al., 2011; Wischmann et al., 2001). Therefore, it is important that infertile couples learn how to communiate more effectively among themselves and be equipped with conflict-resolution skills.

The men in this study also complained that they lacked emotional support, even as most focused on extending suport to their wives. The lack of support for male partners was also reported in another study(Volgsten et al., 2010) . It has been widely accepted that infertility affects the couple as a dyad and that among infertile couples the man usually takes up the role of supportive partner during the treatment. Men are usually expected to be strong and suppress their emotions when encountering adversity, which might contribute to depression (Beevers et al., 1999). Studies have shown that among IVF couples the men also reported symptoms of depression and their needs were mostly neglected (Dong et al., 2013; Ismail et al., 2004; Yassini et al., 2005). It is concluded that among infertile couples the men need to receive support from their partners and from health professionals.

7.5.3 Couples' attitude towards social support

This study found that, although the parents of infertile couples could offer some help, the couples preferred to keep the hardship to themselves for fear of adding to their parents' burden. The couples in this study reported that the support that they received from friends and relatives was minimal, but could be stressful. A study also indicated that support from friends was not correlated with infertility stress for both men and women (Martins et al., 2014). Some couples intentionally concealed from others the fact that they had resorted to IVF treatment, to prevent their children from being labeled. Therefore, support from parents, friends, and relatives plays a limited role in the couples' efforts to cope with the hardships of IVF treatment.

Support from health care providers was described as inadequate because of the short consultation time in the clinic and the lack of psychological support. As another study revealed, the hectic schedule of a clinic makes it difficult for the clinic to satisfy the information and psychological needs of outpatients (Widge, 2005). This kind of clinic mainly provides information on the medical aspects of infertility and IVF treatment. Counseling or psychosocial interventions are usually not available, and couples have to cope with the difficulties themselves. Research has indicated that support from health professionals is particularly effective at improving the stress and anxiety suffered by individuals who are grappling with the issue of infertility (Brucker & McKenry, 2004). The results of this study suggested that psychosocial support from health care providers is needed and should be provided to couples together, as dyads undergoing IVF treatment.

Limitations

There are some limitations in this study. First, nine of the 12 couples recruited achieved a successful pregnancy during the interviews. Although three of those nine couples were asked to share their experience of failed cycles, the uneven distribution between couples who were ultimately successful and those who were not might have introduced a bias to the interview data. Second, one may also concern about the relatively small sample size. Although data saturation was reached, future research with larger sample size is needed so that other factors that might influence infertile couples' experience can be addressed, and stronger conclusion can be reached. Another limitation is that the couple-based interviews were conducted with the presence of both partners, which might have hindered the free expression of deep feelings. Nevertheless, it was decided to take this approach for the interviews in order to observe the dyadic interaction. The male partners in these interviews usually took a supporting role, in that they were less likely than the female partners to express themselves in the interviews or to confide their sufferings. Future studies should adopt a mixed interview format to explore each partner's feelings and experiences.

7.6 Implications for Practice

Despite the limitations of this study, it has some implications for health professionals who serve infertile couples and for policy makers. The couples in the interviews expressed a need for psychological counseling; thus, a supportive intervention should be made available to infertile couples as part of the infertility treatment. In Austria, there has been a law since 1992 stipulating that psychological counseling is to be provided to

infertile couples (Poehl, Bichler, Wicke, Dörner, & Feichtinger, 1999). Austrian fertility specialists are obliged to offer psychological counseling or psychotherapeutic care to couples unless the couples refuse such services.

7.7 Implications for Research

The themes identified in this study will help health professionals or researchers develop a supportive program for couples undergoing IVF treatment in China. The timing of the supportive intervention is important. The findings of this study suggest that psychological support should be given during the time that couples are waiting for the outcome of the IVF treatment, and also when a negative pregnancy result has been disclosed. Other than providing psychological counseling, the intervention should focus on enhancing the couples' partnership with regard to sharing, support, and communication, and on strategies for increasing the couples' psychological flexibility and acceptance of the uncertainties surrounding the bearing of a child. The intervention should target infertile couples as dyads, including both the male and the female partner in an infertile couple. To be effective, the intervention should include such outcome measures as partnership, psychological flexibility with regard to the issue of bearing a child, psychological well-being, and an improvement in the marital relationship of the couple.

7.8 Conclusion

This study explored the experiences of Chinese couples undergoing IVF treatment, especially their perception of the process and the support between couples. The four themes that were identified were: the process of hardship, the endurance of hardship

with a loving relationship, partnership in couples, and ambivalence towards social support. The findings offer insights into the sufferings of IVF couples and point to the need for a supportive program for infertile couples as dyads to help them get through the hardships of treatment. The findings also provide empirical contributions on the right timing, focus, format, and outcome measures of a tailored program. It is also suggested that policy makers mandate the incorporation of psychological counseling or intervention into infertility treatment. It is hoped that supportive interventions will enhance the partnership of infertile couples undergoing IVF treatment and their flexibility on the issue of bearing a child, resulting in improvements to their psychological well-being and marital relationship.

Chapter 8

STUDY III IDENTIFYING / DEVELOPING THEORY

A Preliminary Conceptual Framework for Couples Undergoing In Vitro Fertilization Treatment: Endurance with Partnership*

* The content of this chapter was submitted:

Ying, L., Wu, L. H., Wu, X., Shu, J., & Loke, A.Y. Endurance with Partnership: A Preliminary Conceptual Framework for Couples Undergoing In Vitro Fertilization Treatment. *Journal of reproductive and infant psychology* (submitted on April 15, 2017).

8.1 Introduction

It is well accepted that, among infertile couples, infertility affects both women and men in the physical, emotional, existential, and interpersonal realms (Ying et al., 2015a). When couples seek In Vitro Fertilization (IVF) treatment, they further suffer from the difficulties of the treatment and the uncertainty of its outcome, often becoming anxious and depressed (Ying et al., 2016b) .Various psychosocial interventions for infertile patients receiving IVF treatment have been employed in an attempt to improve their mental health, pregnancy rates, and marital function. However, a recent systematic review of randomized controlled trials has revealed that the effects of these interventions cannot be confirmed (Ying, Wu, & Loke, 2016a). The review has also pointed to the need for a complex intervention targeting both partners of infertile couples and aimed at improving the psychological well-being and marital functioning of couples undergoing IVF treatment (Ying et al., 2016a).

According to the Medical Research Council (MRC) framework, having a theory or conceptual framework is an important step in developing a complex intervention (Craig et al., 2008). Such a framework should serve as a network of interlinked variables or constructs that together constitute a full picture of a specific phenomenon (Jabareen, 2009). Only a complex intervention that is developed based on the key concepts of a comprehensive framework will address the key concerns and needs of clients with the specific phenomenon.

Back in 1999, a thorough review of infertility-specific theoretical frameworks was conducted in the process of developing a comprehensive handbook for clinicians on

fertility counseling (Burns & Covington, 1999). A variety of established frameworks were presented to explain the impacts of infertility (Burns & Covington, 1999). These included approaches to grief and bereavement (Lukse, 1999), theories on personal identity (Olshansky, 1987), theories on stress and coping (AL & C, 1991), the biopsychosocial model (Taymor & Bresnick, 1979), family systems theory (Burns, 1987), and phase or stage theory (Read, 1995). A theory on stress and coping and the biopsychosocial model, in particular, have been presented as two frameworks related to the health psychology and behavioral medicine approach to infertility counseling (Burns & Covington, 1999).

In 2001, based on the two frameworks – the biopsychosocial model and the principles of stress and coping theory – the biopsychosocial theory of infertility was proposed to specifically address the experiences of individuals suffering from infertility and the adjustments that they have made in response to their condition (Gerrity, 2001a). In the theory, an array of impacts of infertility are classified under the following four stressors: physical stressors, emotional stressors, existential stressors, and interpersonal stressors (Gerrity, 2001a). Support and coping are highlighted as the two most important mediators of the impacts of infertility (Gerrity, 2001a). However, this theory focuses on the level of the individual and does not consider the interaction between dyads suffering from infertility; it also does not address the situation of couples undergoing IVF treatment.

Two literature reviews have emphasized the point that couples face infertility and IVF treatment as a unit, in that the dynamics of mutual support and partner coping play an

important role in the way that they respond to infertility and treatment (Ying et al., 2016b; Ying et al., 2015b). It is reasonable to expect that couples who undergo IVF treatment as the last option to have their own biological child would endure extraordinary stress should the treatment prove to be unsuccessful. Such couples would benefit from a supportive intervention from professionals to address their needs. To develop such an intervention, there is a need to devise a conceptual framework that specifically addresses the process by which infertile couples cope with IVF treatments, as well as the outcomes, focusing especially on the interaction between the marital partners.

8.2 Objective

The purpose of this study is to identify/develop such a framework to help health professionals obtain a better understanding of the experiences of couples who undergo IVF treatment, and to support the development of an intervention tailored to the needs of such couples.

8.3 Methods

Literature search strategy

A systematic search was performed to identify the frameworks adopted in existing studies on supportive interventions for couples undergoing IVF treatment. Using electronic databases, Mesh terms and key words such as “infertility,” “fertilization in vitro,” “IVF,” “psychotherapy,” “intervention,” “program,” “anxiety,” “depression,” “pregnancy rate,” “marital relationship,” and “marital function” were used to detect related studies. Included were studies from the beginning date of the six databases that

were searched (PubMed [1966+], EMBase [1974+], Cochrane Library [1968+], CINAHL [1982+], PsycInfo [1806+], and CAJ [China Academic Journal Full-text Database, 1915+]) to the second week of January 2016. No time restrictions were set for this search. The full search histories were listed in Appendices Table 8-1. The references of the articles that were included and other related systematic reviews were also screened for more relevant articles.

Only psychosocial intervention studies that adopted a framework for couples undergoing IVF treatment were included. In addition only articles published in English or Chinese in a peer-reviewed journal were selected. Studies that were published in conference supplements or proceedings were excluded. Unlike a conventional review, this report will focus on the models or frameworks that were adopted in those studies that were included. The selection procedures for this study are presented in Figure 8-1.

The literature search yielded a total of 3,714 citations, with 5 additional records identified through a manual search. After duplicate entries were removed, 3,167 articles remained. The abstracts of these papers were screened and 3,097 publications that did not meet the criteria for inclusion were excluded. The remaining 70 articles were further assessed for eligibility.

A careful examination of the remaining 70 articles showed that no study met the inclusion criteria. These studies were excluded for the following reasons: they were not an intervention study (n=14), they were not targeted at infertile patients/couples undergoing IVF (n=2), they did not adopt a framework (n=28), there was a framework

for the approach that was adopted but not for IVF patients (n=10), there was a framework for infertile women but not for couples (n=1), the study was published in supplements (n=8), the study was not in English (n=4), the study was a report on the same population as that of another study (n=2), and no full text of the study available (n=1). This process of identifying frameworks adopted in intervention studies confirmed that there is no established framework for infertile couples undergoing IVF treatment.

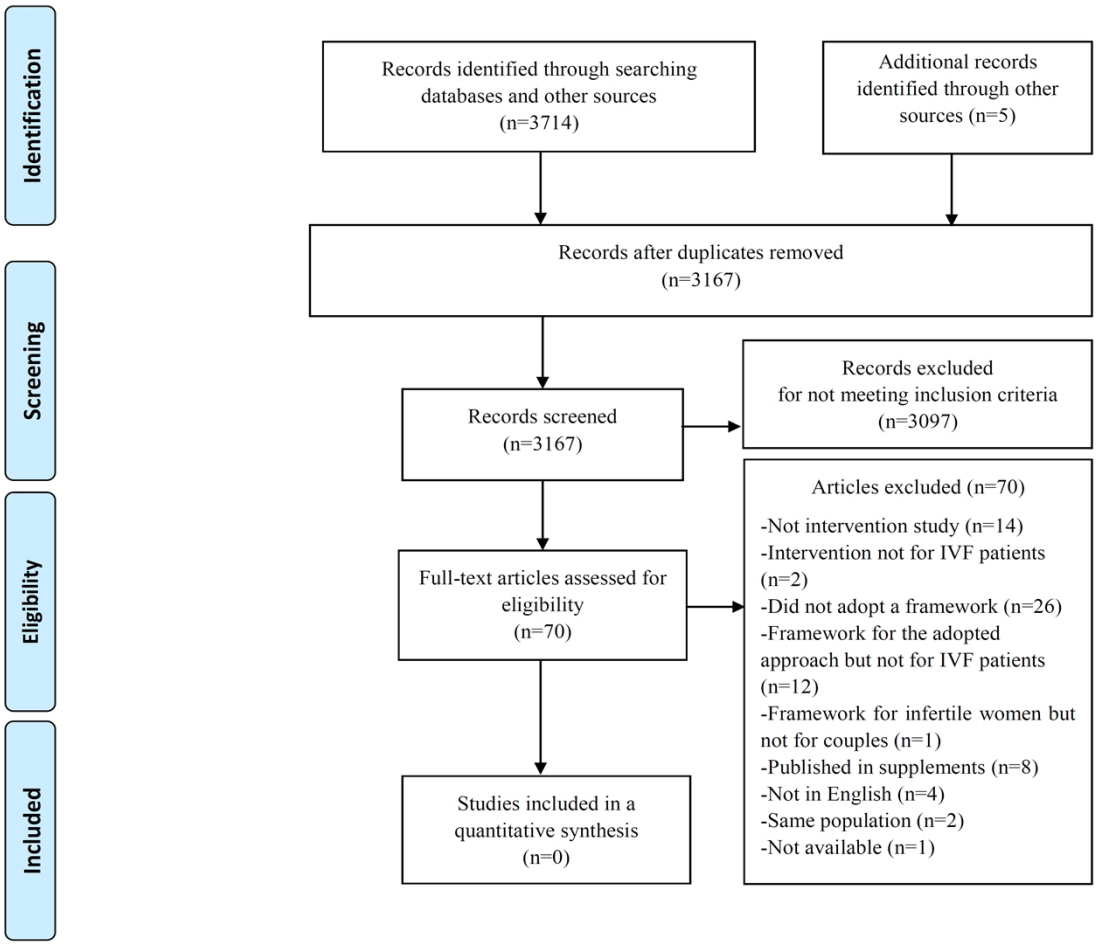

Figure 8-1. The flow diagram on identifying the literature

The process of constructing the conceptual framework

No existing framework could be identified from intervention studies. Accordingly, the researchers decided to take four steps to develop a framework for infertile couples coping with IVF treatment. First, it was suggested that a skeletal framework, identified from previous studies, could serve as the internal structure of a new conceptual framework (Jabareen, 2009; Morse et al., 2008). The researcher would then proceed by "building on these structures or categories, padding them out or giving them flesh and organizing the ways they fit together" (Morse et al., 2008). As described before, the biopsychosocial theory of infertility presents a full picture of an individual's experience with and adjustments to infertility (Gerrity, 2001a). Thus, it is adopted to serve as the skeletal framework for the conceptual framework that we are developing.

Second, in order to extend the biopsychosocial theory to the couple level, an established theory of dyadic coping proposed by Bodenmann (Bodenmann, 2005) was selected and incorporated to address the interaction between each partner's individual efforts to cope with the stressors (infertility) that affect both partners. Third, an analysis of the concept of the "partnership" of the couples undergoing infertility treatment was conducted to explore the dynamics of the interaction of the couples in their provision of mutual support and in partnership in coping. From this, a "middle-range model for partnership" was derived (Ying & Loke, 2016). Fourth, a qualitative study of couples undergoing IVF treatment was conducted to explore the perceptions that couples have of the treatment process and partner support(Ying et al., 2015b), in which a model for the experience of IVF couples was proposed. These steps were adopted to consolidate the concepts that had been identified and to develop the conceptual framework for couples undergoing IVF treatment.

Key constructs or components that had been included in the abovementioned models or theories (Bodenmann, 2005; Gerrity, 2001a; Ying & Loke, 2016; Ying et al., 2015b) were extracted and tabulated into four categories: the impacts of the stressors, the mediators of the stress (which account for the relationship between the predictor and the criterion), the moderators of the stress (which affect the direction and/or strength of the relationship between the predictor and the criterion), and the outcomes. This classification was adopted based on the domains of the skeletal framework – the biopsychosocial theory of infertility (Gerrity, 2001a). The researchers separately examined and synthesized the concepts and variables, and fit the concepts together into a prototype framework. A meeting of the researchers was then held to discuss and resolve disagreements, and to finalize the preliminary framework for infertile couple dyads undergoing IVF treatment.

8.4 Results

The four models/theories from the steps described above are described and discussed below, namely the biopsychosocial theory of infertility (Gerrity, 2001a), the theory of dyadic coping (Bodenmann, 2005), the middle-range model for partnership (Ying & Loke, 2016), and the model of the experiences of IVF couples (Ying et al., 2015b).

8.4.1 The key constructs and components of four selected models/theories

The biopsychosocial theory of infertility

The biopsychosocial theory of infertility, which is a combination of biopsychosocial theory and stress and coping theory, was proposed by Gerrity in 2001 (Gerrity, 2001a).

In this theory, it is pointed out that the impacts of infertility occur in the biological, psychological, and social realms, and are mediated by support and coping strategies. The biological realm refers to the impact that infertility, as a physical stressor, has on the human body. The psychological aspect refers to the mental impacts on infertile patients of emotional stressors, such as depression, anxiety, and stress. With regard to the social aspect, the discussion focuses on the influences of the structures and organizations of society on the experiences and behavior of infertile couples. These have been presented as existential and interpersonal stressors, with impacts on identity, self-esteem, the sense of shame and stigma, the tension in the couple's relationship (marital satisfaction and adjustment, and sexual satisfaction), and social networks (Gerrity, 2001a).

The biopsychosocial theory of infertility also includes support and coping as mediators of the impacts of infertility. The sources of support that infertile couples might have would include partners, health professionals, family members, and friends. For both men and women, partner support is an essential element in dealing with infertility. There are three main categories of coping strategies: emotion-focused, problem-focused, and appraisal or meaning-focused. The mediators of support and coping are both linked to the level of psychological well-being of individuals (Gerrity, 2001a).

The biopsychosocial theory of infertility was selected to serve as the skeletal framework for the development of an IVF couple-specific framework focusing on the impacts of the stressors (physical stressors, emotional stressors, relational stressors) on individuals, the mediators of the stress (support and coping), and the outcomes (psychological well-being). However, it is a theory about individuals who suffer from infertility, and does

not highlight the interaction between couples faced with IVF treatment.

The theory of dyadic coping

The theory of dyadic coping, put forward by Bodenmann in 2005 (Bodenmann, 2005), is selected here to extend the concept of coping in the biopsychosocial theory of infertility from the individual level to the couple level (Bodenmann, 2005). In this theory, the stressor (dyadic stress) was identified as a stressful event that involves both partners of a couple. The process of dyadic coping includes personal coping efforts, the communication of stress in couples, and the coping responses of the partners as a dyad (Bodenmann, 2005).

It is proposed that dyadic coping be classified into positive and negative modes of coping. Positive dyadic coping involves three categories: supportive dyadic coping (e.g., helping with daily work, providing practical advice, or ensuring that a partner has the ability to cope), common dyadic coping (e.g., jointly seeking information, sharing feelings, or making a mutual commitment), and delegated dyadic coping (e.g., taking over the household duties to reduce the other partner's stress). Negative dyadic coping, which one would suppose should be avoided, includes hostile dyadic coping (e.g., providing support with sarcasm or indifference, or deliberately minimizing the severity of the stress felt by the partner), ambivalent dyadic coping (e.g., providing support with reluctance), and superficial dyadic coping (e.g., providing support without sincerity) (Bodenmann, 2005). The outcomes of the positive dyadic coping are a reduction in the level of stress felt by each partner and an enhancement of the functioning of their relationship (Bodenmann, 2005).

The positive process and outcomes of dyadic coping will be partly adopted in the construction of the new framework. Thus, in addition to personal coping efforts, the dyadic dynamics of coping in couples could also be reflected.

The middle-range model of partnership

The middle-range model of partnership emerged from an analysis of the concept of partnership in the couples undergoing infertility treatment (Ying & Loke, 2016). Such a concept can provide a fresh approach to discussions of the concept of support in the biopsychosocial theory of infertility, and can be extended to the couple level. It is proposed that, for couples, partnership is a process of jointly dealing with hardships through sharing, communication, and mutual support – this is its essential attribute. The antecedents of the concept are love and attraction for each other, agreement on goals, and the possession of interpersonal skills. With such a partnership, infertile couples can, as a consequence, expect to see improvements in their psychological well-being, marital functioning, and quality of life (Ying & Loke, 2016).

The three domains will be partially employed in the future framework in the various constructs of moderator, mediators, and outcomes, where the interactions of the two partners in support of each other will be described.

The model of the experiences of IVF couples

A model conceptualized for the experiences of IVF couples emerged from the evidence from a qualitative study of the experiences of infertile couples undergoing IVF treatment

(Ying et al., 2015b), can be used to flesh out the impacts of the stressors. This is also in accordance with the MRC framework, which specifies that the essential step in the development of a complex intervention is that evidence should be used to support the development of a framework (Craig et al., 2008). The model of the experiences of IVF couples consists of four domains: the impact of the stressors (the process of hardship), the mediators (partnership in couples and support from others), the moderator (the couples' loving relationship), and the outcomes (psychological well-being and marital benefits) (Ying et al., 2015b).

In this model, the experience of IVF treatment is depicted as a process of hardship, which is characterized by physical pain, emotional pain, struggling with the pain of the urgency and inflexibility of bearing a child, and disturbance of daily routines and work. The relationship between this hardship and outcomes is mediated/moderated by sharing and tangible support in partnership, support from others (parents, friends, relatives, colleagues, and health care providers), and the couple's loving relationship. The four domains of this model, especially the impacts of stressors, will be considered when developing the conceptual framework for couples undergoing IVF treatment.

8.4.2 Preliminary Endurance with Partnership conceptual framework for IVF couples

Based on the theories and models that were introduced, the researchers propose a preliminary Endurance with Partnership conceptual framework (P-EPCF) to depict the experiences of IVF couples undergoing treatment (Figure 8-2). This framework consists

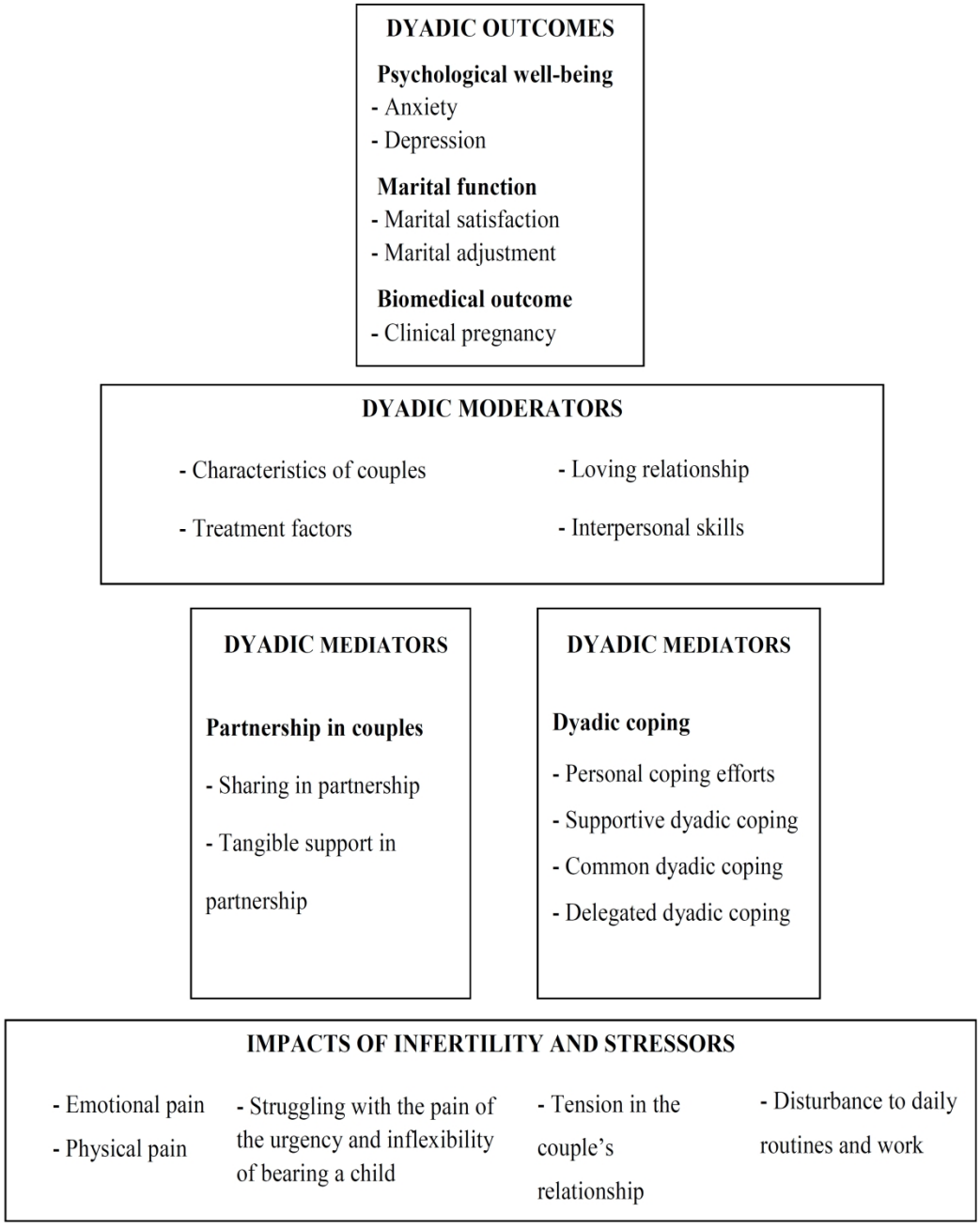

Figure 8-2. Preliminary Endurance with Partnership Conceptual Framework (P-EPCF) for Couples undergoing IVF

of the following four domains: the impacts of infertility and stressors, dyadic mediators, dyadic moderators, and dyadic outcomes.

For our target population, the stressors are infertility and the IVF treatment. According to the biopsychosocial theory of infertility and the model of the experiences of IVF couples, the impacts of stressors refer to physical pain, emotional pain, struggling with the pain of the urgency and inflexibility of bearing a child, the tension in the couple's relationship, and the disturbance to daily routines and work (Gerrity, 2001a; Ying et al., 2015b).

The domain of dyadic mediators, including partnership in couples and dyadic coping, are the main focuses of the framework. Partnership in couples refers to sharing in partnership and the tangible support received from a partnership. It emphasizes the mutual interaction during the treatment, which could promote mutual understanding, reduce the conflict, and improve marital functions of infertile couples. It was proposed that partnership in infertile couples is an important buffer against the hardship of dealing with infertility and IVF treatments (Kleanthi, 2012). Dyadic coping includes personal coping skills, supportive dyadic coping, common dyadic coping, and delegated dyadic coping (Bodenmann, 2005). Personal coping efforts are divided into three forms: emotion-focused coping, problem-focused coping, and appraisal or meaning-focused coping (Bodenmann, 2005). Dyadic coping focused on the process of coping while couples confronted the dyadic stress.

The domain of dyadic moderators, which affects the strength of the relationship between the impacts of stressors and outcomes, consists of the characteristics of couples (e.g., age, education background, and occupation), treatment factors (e.g., the duration of the treatment, the frequency of IVF treatment, and the number of embryos) (Chiaffarino et al., 2011; Hsu & Kuo, 2002; Wang et al., 2007), a loving relationship (Ying & Loke, 2016; Ying et al., 2015b), and interpersonal skills (Ying & Loke, 2016). The latter two variables specifically refer to what the couples possessed before they sought fertility treatment.

The domain of dyadic outcomes consists of the outcomes of positive partnership support and coping, and dyadic moderation. It is conceptualized in three dimensions: psychological well-being (Gerrity, 2001a; Ying & Loke, 2016; Ying et al., 2015b), marital function (Ying & Loke, 2016; Ying et al., 2015b), and biomedical outcome (Matthiesen et al., 2011). Psychological well-being is indicated by the level of anxiety and depression (Gerrity, 2001a; Ying et al., 2016b), which are regarded as sensitive to the stress-induced activation of the HPA (Hypothalamic-Pituitary-Adrenal) axis (Sandi & Richter-Levin, 2009). Marital satisfaction and marital adjustment will be used to reflect the marital functioning of the couples (Gerrity, 2001a). Biomedical outcome is indicated by the result of the clinical attempts to bring about a pregnancy, which is diagnosed by the ultra-sonographic visualization of one or more gestational sacs or by detecting definitive clinical signs of pregnancy (Zegers-Hochschild et al., 2009).

8.4.3 The naming of the conceptual framework and the meaning of the diagram of the framework in Chinese

For easy reference, a short phrase "*Endurance with Partnership*" was proposed as the name of the Preliminary conceptual framework. The word "*endurance*" has been selected because IVF treatment is the kind of stressor over which couples have little control, and the result of which they can hardly influence (Campbell, Dunkel-Schetter, & Peplau, 1991). It is expected that with the power of partnership, the couple will be able to withstand the IVF treatment and its unpredictable outcome. Their "psychological well-being" and "marital function" could also be strengthened, despite this hardship. Thus, this new framework was named the preliminary Endurance with Partnership conceptual framework (P-EPCF).

The diagram of the P-EPCF consists of four domains, as shown in Figure 8-2. The domain of the impacts of infertility and stressors is situated at the bottom of the diagram, and represents the origin of the phenomenon and hardship. At the top of the diagram are the three dimensions of the domain of dyadic outcomes, which are the positive outcomes expected by the IVF couples. In between are the dyadic mediators and dyadic moderators of the infertility stressors, acting as the pillars and buffers for respectively enduring and alleviating the impacts of stressors. Taken together, the diagram of the P-EPCF resembles the Chinese character [忍], meaning to "with-stand." It is hoped that infertile couples will also be inspired to stand strong and endure this difficult time, leading to improvements in their psychological well-being, marital functioning, and biomedical outcomes.

8.5 Discussion

In the present study, the preliminary Endurance with Partnership conceptual framework (P-EPCF), which addresses the experiences and adjustments of IVF couples, was developed. The process of development is in accordance with the suggested procedure for the construction of the conceptual framework. To our knowledge, this is the first conceptual framework that focuses on couple dyads in the context of IVF treatment. The P-EPCF can be adopted to guide the design of a tailored supportive program for couples undergoing IVF treatment. This framework will also provide some insights for future research in related areas, and shed light on the clinical practice for health care professionals who caring for infertile couples.

The process of constructing the P-EPCF

A conceptual framework refers to "a network, or 'plane,' of linked concepts that together provide a comprehensive understanding of a phenomenon" (Jabareen, 2009). It can be conceptualized through a qualitative method, such as grounded theory (Jabareen, 2009), or built on an established related theory or conceptual framework (Jabareen, 2009; Morse et al., 2008). These methods were adopted in present study, in which the biopsychosocial theory of infertility was regarded as the basis for the development of the P-EPCF. The theory of dyadic coping (Bodenmann, 2005) extended it further to the dyadic level for infertile couples. Along with the middle-range model for partnership, which was derived from an analysis of the concept of partnership among couples undergoing infertility treatment (Ying & Loke, 2016) by adopting Rodger's evolutionary method (Rodgers, 2000), the two theories provide a fresh approach to dealing with the problems faced by couples undergoing IVF treatment. The sense of partnership was

further consolidated by evidence from a qualitative study on the experiences of such couples, from which a model for the experiences of IVF couples was conceptualized (Ying et al., 2015b). These processes contributed to the development of the P-EPCF, which has been specifically designed for couples undergoing IVF treatment. Together, the four domains play an integral role in the P-EPCF.

The specific focus of the P-EPCF on couple dyads

As women usually endure the majority of the testing and treatments in IVF, about two-thirds of RCT intervention studies have focused only on women (Ying et al., 2016a). It is not surprising to note that in the early stage of this study a search for relevant literature failed to identify any couple-based conceptual frameworks in intervention studies. Here, an attempt is made to fill that gap by proposing the P-EPCF, which takes into account the experiences of dyads (both men and women) with regard to IVF treatment, the dynamics of partnership support and coping of couples, dyadic moderators, and dyadic outcomes. It specifically depicts the elements of partnership and the dyadic element in couples undergoing IVF treatment, which are regarded as essential to mediating and moderating the impacts of infertility stressors. It is hoped that the P-EPCF will provide researchers with a comprehensive picture of the experiences that couples have with and adjustments to IVF treatment. In addition, it could enable the development of a supportive intervention to help the couples in enduring with this hardship.

The adoption of the P-EPCF to develop a couple-based program

According to the MRC framework guideline, an intervention that was developed with

the guidance of an appropriate conceptual framework is more likely to be effective (Craig et al., 2008). According to the P-EPCF, the impacts of infertility and IVF treatment are mediated by the domains of partnership support and dyadic coping, through dyadic moderation, to benefit marital functions, leading to improvements in the psychological well-being of infertile couples. Based on this P-EPCF, a "Partnership and Coping Enhancement Program (PCEP)" targeting the partnership and coping strategies of couples was developed for couples undergoing IVF treatment. The PCEP focuses on enhancing the partnership of couples (section 1) and dyadic coping (section 2). The moderators in the conceptual framework, such as the characteristics of the couples, treatment factors, and a loving relationship, will be controlled as possible confounding factors. The three dimensions (psychological well-being, marital function, and biomedical outcomes) in the domain of dyadic outcomes are indicators of the effects of the intervention program.

8.6 Implications for practice

The comprehensive picture depicted in the P-EPCP should increase the awareness of health care professionals of the hardships faced by infertile couples, especially their emotional pain, which will help them to identify those at risk of psychological disorders. Nurses working in infertility clinics or reproductive centers should integrate psychologically supportive measures into their routine care of these couples as dyads. Such supportive measures should focus on the enhancement of mutual support, coping strategies, and partnership communication. In addition, factors that could affect the emotional reaction of couples to IVF treatment, such as their age, economic status,

loving relationship, duration of infertility treatments, and frequency of treatments, should also be considered in daily practice.

8.7 Implications for research

Apart from guiding the design of the PCEP, this conceptual framework also provides starting points for future research. During its development, it was assumed that the four domains of the P-EPCP are interrelated, and that the stressors directly or indirectly influence the outcomes of IVF couples through mediators and moderators, established through qualitative approaches such as a concept analysis and a qualitative study. Further research should be conducted to quantitatively affirm the domains of this framework. A quantitative study using structural equation modeling (SEM) analysis could be used to test the relationships and the strength of the relationships of the domains and concepts of the proposed theory,

The domain of dyadic mediators (partnership in couples and dyadic coping) in this P-EPCP is the main focus of the PCEP because it plays an important role in the way infertile couples support each other and cope with the hardships that they face. Another study could focus on the couples' inflexible attitude towards childbearing, for example, by adopting the Acceptance and Commitment Therapy (ACT) to explore whether such an intervention can increase the couples' psychological flexibility on the issue of bearing children (Hayes, Strosahl, & Wilson, 2011).

The domain of dyadic outcomes in the P-EPCP provides indicators of the couples' adjustment to IVF treatment, and measures of the effects of intervention studies.

However, various instruments can be used to assess these outcome variables, majority of which are not fertility-specific. For instance, the anxiety levels of infertile couples were measured using the Hospital Anxiety and Depression Scale (HADS) (de Klerk et al., 2005; Ockhuijsen et al., 2014), the State-Trait Anxiety Inventory (STAI) (Catoire et al., 2013; Chan et al., 2012; Murphy et al., 2014), the short-form Depression Anxiety Stress Scale (DASS-21) (Mosalanejad et al., 2012), the Beck Anxiety Inventory (BAI) (Zyl et al., 2005), and the Symptom Rating Test (SRT) (Tarabusi et al., 2004). This could have affected the interpretation of the findings of the studies. Further study is needed to develop instruments specifically for infertile couples undergoing treatment.

Limitations

In the development of the P-EPCP, there are several limitations that need to be acknowledged. First, the model for the experiences of IVF couples was conceptualized from a Chinese population. This might result in biases, because the socio-cultural context varies in different countries. However, the findings of this qualitative research are supported by studies conducted in other counties (Boivin & Lancastle, 2010; Cipolletta & Faccio, 2013; Volgsten et al., 2010; Widge, 2005; Wu et al., 2013). Second, the relationships among the domains and variables have yet to be tested quantitatively, although the principles of building a conceptual framework were observed. Further testing and reaffirmation is needed for the P-EPCP. There is also a limitation in that no studies were identified in the search for relevant literature, perhaps because only articles written in English or Chinese were searched due to the researchers' lack of familiarity with other languages.

8.8 Conclusion

In the present study, a preliminary Endurance with Partnership conceptual framework (P-EPCF) for IVF couples was proposed. This framework focuses on couple dyads and is tailored for patients undergoing IVF treatment. The P-EPCF is potentially valuable in that it provides guidance for the development of a complex intervention aimed at enhancing the partnership of couples and their coping strategies. It is hoped that such an intervention will result in improvements in the psychological well-being and marital functioning of couples enduring infertility and treatment. Future research is needed to test the framework quantitatively and to develop fertility-specific instruments. It is also proposed that nurses working with these couples provide them with psychological support to enhance their psychological well-being and marital functioning.

Chapter 9

STUDY IV MODELING THE PROCESS AND OUTCOMES

The development of a complex intervention: the Partnership and Coping Enhancement Programme*

* The content of this chapter was published:

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9.1 Introduction

It is well recognized that couples as dyads suffer from the diagnosis of infertility and its treatment (Ying et al., 2015a). These couples experience emotional and physical pain, and tension in their marital lives (Ying et al., 2015a). When the couples pursue IVF treatment, the intrusive procedures and the low rate of success (18.4%-20.3%) adds to their distress (Ishihara et al., 2015).

A systematic review has indicated that during the IVF cycle, women experience elevated levels of anxiety and depression before the treatment, and that these levels rise on the day of oocyte retrieval, the pre-post embryo transfer, and during the period of waiting for the pregnancy test (Ying et al., 2016a). Among infertile couples, the men also reported elevated levels of depression prior to treatment, and even higher levels during the two-week waiting period (Ying et al., 2016a). An unsuccessful IVF cycle tends to result in long-lasting psychological trauma for both spouses (Ying et al., 2016b).

In terms of its impacts on the couple's relationship, studies have reported that infertile couples had a lower level of marital satisfaction than their fertile counterparts (Onat & Beji, 2012a; Sultan & Tahir, 2011). A study conducted in China indicated that women seeking IVF treatment were more likely than fertile women to report that their marriage was unstable (Wang et al., 2007). It was reported that infertile couples who had undergone treatment for over two years were less happy with their marriage than those in their first two years of treatment (Gerrity, 2001b). Study have also shown that a couple's relationship is affected by infertility and its related treatment, and that this is a major reason why couples terminate IVF treatment (Domar et al., 2010). This calls for

health professionals working with infertile couples to turn their attention to the marital functions of these couples.

A variety of psychosocial interventions, such as Cognitive Behavioural Therapy (Gorayeb et al., 2012; Mosalanejad et al., 2012; Tarabusi et al., 2004), Mind Body Intervention (Chan et al., 2012; Chan et al., 2006; Domar et al., 2011), Counselling (Connolly et al., 1993b; de Klerk et al., 2005; Emery et al., 2003; Zyl et al., 2005), and positive reappraisal coping therapy (Lancastle & Boivin, 2008; Ockhuijsen et al., 2014), have been adopted to improve the mental health, pregnancy rates, and marital function of couples who undergo IVF treatment. However, in a review of the literature, the effects of relevant interventions tested in Randomized Controlled Trial studies could not be confirmed due to methodological or practical issues (Ying et al., 2016a). Also, although the couples suffered from the stressful experience as dyads, the men of infertile couples have been neglected in most of the studies (65%) (Ying et al., 2016a). Therefore, it has been suggested that an evidence-based complex intervention be developed for both males and females of couples undergoing IVF treatment (Ying et al., 2016a).

Complex interventions are usually described as interventions that consist of several independent or interacting components (Campbell et al., 2000; Craig et al., 2008), and in which the process and outcomes are modeled (Hawe et al., 2004). The Medical Research Council (MRC) provides guidance on the development and evaluation of complex interventions to improve health (Craig et al., 2008).

9.2 Objective

In following MRC guideline, the research team has conducted a series of interrelated studies since 2014 to identify the evidence, identify/develop a framework, and develop a potentially effective and feasible intervention for couples undergoing IVF treatment. The purpose of this study is to report on the process of developing a potentially feasible and effective complex intervention for couples undergoing In Vitro Fertilization treatment in China.

9.3 Methods

The MRC framework was adopted to guide the development of this Partnership and Coping Enhancement Programme (PCEP) (Campbell et al., 2000; Craig et al., 2008). Four stages are proposed in the framework, from development, feasibility/piloting, and evaluation, to the implementation of a complex intervention. The development stage includes three steps, namely: identifying the evidence base, identifying/developing a theory, and modelling the process and outcomes (Craig et al., 2008). This paper presents the first stage in the development of the complex intervention, PCEP. The studies conducted in each step according to the MRC framework are outlined in Table 9-1. Ethical approval for the qualitative study was obtained from the Human Subjects Ethics Sub-Committee of The Hong Kong Polytechnic University. Permission for access was sought from the relevant hospital in Hangzhou, Zhejiang Province, China.

9.4 Results

The steps taken to develop the Partnership and Coping Enhancement Programme (PCEP) are presented here. The three steps are: (1) identifying evidence by conducting reviews

Table 9-1 The three steps to developing a complex intervention according to the MRC framework and the studies conducted to develop the PCEP

Steps in the MRC framework for developing a complex intervention	Studies conducted to develop the PCEP
Identifying the evidence base	-Three literature reviews related to infertile couple were conducted: • *The Effects of Psychosocial Interventions on the Mental Health, Pregnancy Rates, and Marital Function of In Vitro Fertilization Patients* • *Gender Differences in Emotional Reactions to In Vitro Fertilization Treatment* • *Gender Differences in Experiences with and Adjustments to Infertility*. -Concept analysis of partnership in couples undergoing infertility treatment -Preliminary qualitative study: the experiences of Chinese couples undergoing in vitro fertilization treatment
Identifying/developing a theory	-Proposing a preliminary Endurance with Partnership Conceptual Framework (P-EPCF) for couples undergoing IVF treatment
Modelling the process and outcomes	-Developing and presenting the related contents of the Partnership and Coping Enhancement Programme

of the relevant literature, and carrying out a concept analysis and a qualitative study; (2) identifying / developing a theory – in this case, putting forward a preliminary Endurance with Partnership Conceptual Framework (P-EPCF) for couples undergoing IVF treatment; and (3) modelling the process and outcomes of the PCEP. It should be noted that the literature reviews (Ying et al., 2015a; Ying et al., 2016a, 2016b), the concept analysis (Ying & Loke, 2016), and the qualitative study (Ying et al., 2015b) have been published, and that the preliminary Endurance with Partnership Conceptual Framework

(P-EPCF) (Ying, Wu, Wu, Shu, & Loke, 2016c) has been developed and is under review for publication. The key findings of these reviews and the studies that contributed to the development of this complex intervention are recaptured and presented in this report.

9.4.1 The identified evidence

According to the MRC framework, the first step in developing a complex intervention is to identify the existing evidence through a series of literature reviews, and to conduct a concept analysis and a qualitative study.

Literature reviews

Three extensive reviews were conducted to obtain a better understanding of the couples' experiences with infertility (Ying et al., 2015a) and IVF treatment (Ying et al., 2016b), and to examine the effects of established randomized controlled studies of psychosocial interventions on patients/couples undergoing IVF treatment (Ying et al., 2016a). The findings of the reviews provide some valuable suggestions on developing interventions for couples undergoing IVF treatment.

The findings of the first review indicated that the females of infertile couples had more negative experiences than their male partners, while both females and males were subjected to a stressful married life (Ying et al., 2015a). For both men and women of infertile couples, support from one's partner was inversely related to stress (Ying et al., 2015a). The second review found that the periods prior to the pregnancy test and after the IVF failure in the IVF cycle were the most stressful time points for both men and women (Ying et al., 2016b).

The third review, focusing on relevant psychosocial intervention studies, revealed that the effects of various interventions on levels of depression, anxiety, stress, pregnancy rates, and marital function could not be confirmed (Ying et al., 2016a). The review also found that only one study included the enhancement of marital satisfaction in the intervention. None of the studies examined the effects of interventions on the psychological distress of the couples after the disclosure of the outcome of the treatment. It is concluded that a complex intervention, based on sound evidence, is needed for couples seeking IVF treatment (Ying et al., 2015a; Ying et al., 2016a, 2016b).

The three reviews provided some constructive suggestions and recommendations about the timing of interventions for infertile couples undergoing IVF treatment. First, the interventions should target infertile couples at the dyad level instead of focusing only on women at the individual level, as both the men and women of infertile couples were affected by infertility and the IVF treatment (Ying et al., 2015a; Ying et al., 2016b). Second, the programme should be aimed at enhancing the psychological well-being and marital relationship of infertile couples, as they experienced emotional distress and a stressful married life as dyads (Ying et al., 2015a; Ying et al., 2016b). Third, the intervention could focus on improving the couples' coping strategies and partner support, as it has been suggested that these are two important mediators of infertility-related stress (Ying et al., 2015a). Finally, the timing of the interventions should cover the period during which couples are awaiting the outcome of the IVF treatment, and also when a negative pregnancy result has been disclosed (Ying et al., 2016b).

An analysis of the concept of 'partnership' in couples undergoing infertility treatment

In order to obtain a better understanding of the dyadic dynamics of the couples' responses to infertility and its treatment, an analysis of the concept of partnership was conducted (Ying & Loke, 2016) using Rodger's evolutionary method (Rodgers, 2000).

Through this concept analysis, the attribute of 'partnership' in couples undergoing infertility treatment was identified as a process of joint hardship for infertile couples, which they endure through sharing, communication, and mutual support (Ying & Loke, 2016). The antecedents are love and attraction for each other, agreement on treatment goals, and interpersonal skills. The consequences of 'partnership' are marital benefit and improvements in psychological status and quality of life (Ying & Loke, 2016).

The findings of this concept analysis also shed light on aspects that should be considered when developing the complex intervention, namely: (1) the intervention should focus on the enhancement of partnership to facilitate the process of sharing, communication, and mutual support in couples; (2) the intervention should take into account factors that influence the partnership, such as a couple's love and attraction for each other and interpersonal skills; and (3) the outcomes of the intervention should assess partnership in terms of marital benefit and improvements in psychological well-being (Ying & Loke, 2016).

According to the results of this concept analysis, a middle-range model for partnership was proposed (Figure 6-2). This model, which depicts a number of variables and their

relationships, serves as a bridge between practice and theory in the related field (Meleis, 2012).

A qualitative study – the experience of Chinese couples undergoing IVF treatment

A qualitative descriptive approach was adopted in a study to explore the experiences of Chinese couples undergoing IVF treatment, especially their perceptions of the treatment process and the support between partners. A content analysis of the interviews revealed four themes related to the experience of infertile couples: the process of hardship, enduring hardship with a loving relationship, the partnership in couples, and ambivalence towards social support (Ying et al., 2015b).

Based on the findings, a model on the experiences of couples undergoing IVF treatment was put forward (Figure 7-1). In Figure 7-1, the IVF treatment is conceptualized as a process of hardship involving physical pain, emotional pain, the pain of the urgency and inflexibility of bearing a child, and disturbance of daily routines and work. The partnership in couples is described as involving sharing and the receipt of tangible support from one's partner, which will contribute to the psychological well-being and marital benefit of the couple. Some unfavourable aspects of partner support were also identified, including a lack of involvement or partnership on the part of the male partner, and a lack of emotional support for males. The couples feel ambivalent about receiving support from others, such as family members, friends, and health care providers, and support from others plays a limited role in the couples' efforts to cope with the hardship of infertility and its treatment (Ying et al., 2015b).

The participants in the interviews expressed a need to receive psychosocial interventions as part of the fertility treatment. This qualitative study provided insights for health professionals on the impacts of the IVF treatment on infertile couples, on the development of a framework, and on the development of a supportive programme for these couples.

9.4.2 The proposed theory

According to the MRC framework, the second step in developing an intervention is to identify or develop a conceptual framework (Campbell et al., 2000). As no existing framework specifically for infertile couples undergoing IVF treatment could be identified in a review of the literature, a preliminary endurance with partnership conceptual framework (P-EPCF) was proposed (Ying et al., 2016c).

The P-EPCF was developed on the basis of the biopsychosocial theory of infertility (BTI) (Gerrity, 2001a), and on the established theory of dyadic coping (Bodenmann, 2005), which present a comprehensive picture of how individuals experience and adjust to infertility, and dyadic coping, respectively. The P-EPCF was then extended to include the middle-range model for partnership (Ying & Loke, 2016), and the model for the experience of IVF couples emerged from the qualitative study (Ying et al., 2015b).

The proposed P-EPCF involves four domains (Figure 8-2). At the bottom of the diagram, the domain of the impacts of infertility and stressors represents the origin of the event or phenomenon, which refers to the experience of couples undergoing IVF treatment. The three dimensions of the dyadic outcomes domain are situated at the top of the diagram,

and are comprised of psychological well-being, marital function, and biomedical outcome (pregnancy). In the middle of the diagram, the domains of the mediators of partnership and coping; and dyadic moderators, act as the pillars and buffers for the impacts of infertility and stressors. In particular, the partnership and coping mediators are the main focuses of the framework (Ying et al., 2016c) .

This conceptual framework presents a comprehensive picture of the process by which couples cope with IVF treatment and its outcomes. It provides theoretical guidance on the development of a complex intervention, by including information on the components and dyadic outcome measures of the intervention, and the possible confounding factors.

9.4.3 The developed 'Partnership and Coping Enhancement Programme (PCEP)'

Modelling process and outcomes is the third step in developing the intervention according to the MRC framework. In accordance with the proposed P-EPCF, a Partnership and Coping Enhancement Programme (PCEP) was developed for couples undergoing IVF treatment.

Essential components of the PCEP

The PCEP mainly targets the domain of the mediators of stress in the P-EPCF, including partnership support and dyadic coping. The essential components of this programme were developed based on a handbook for infertility counselling (Covington & Burns, 2006). The PCEP consists of two sections: dyadic partnership and dyadic coping.

According to the P-EPCF, the partnership mediator involves sharing and providing support in partnership. The main focuses of the section on partnership are to facilitate sharing and mutual support between the partners of an infertile couple. The key contents are: (1) awareness of gender differences in psychological status; (2) awareness of the essential elements in infertile couples' sharing; (3) the modification of undesirable sharing behaviours; (4) the facilitation of tangible support between partners; and (5) the development of skills for enhancing mutual support.

The key focuses of the session on dyadic coping are to improve the dyadic coping skills of infertile couples. The key elements are: (1) understanding different coping strategies; (2) promoting stress-antagonistic activities; (3) promoting infertility-specific coping strategies; (3) enhancing positive dyadic coping; and (4) shying away from negative dyadic coping. Details are given in Table 9-2, and include the titles, main focuses, contents, delivery approaches, and duration of the PCEP. The sources from which these elements were drawn are also included.

Intervention approaches

The approaches adopted in this programme are psychoeducation and skill training. Psychoeducation refers to the integration and synergism of the psychotherapy and education provided to individuals and their families, which are usually delivered by professionals (Lukens & McFarlane, 2004). The premise of this approach is that the knowledge, awareness, and strategies that clients and their families receive and act upon will improve the clinical and psychological outcomes of those involved (Lukens & McFarlane, 2004). In this intervention, the primary focus of psychoeducation is on

Table 9-2 Description of the Partnership and Coping Enhancement Programme

Title / main focus	Contents	Delivery and duration	Sources
1.Dyadic partnership: Facilitating infertile couples' sharing and mutual support.	-**Awareness of gender differences in psychological status;** • Gender differences in experiences with and adjustments to infertility; • Gender differences in the emotional reaction to IVF treatment. - **Awareness of the essential elements in infertile couples' sharing;** • Recognition of gender differences; • Soft self-disclosure; • Active listening; • Emotional validation; • Keeping a balance between the partners' need to share. **-Modification of undesirable sharing behaviours;** • Incongruence between the 'pursuer' and the 'distancer'; • Inadequate discussion; • Vague complaints; • Derogatory labels for the partner. -**Facilitation of tangible support between partners;** • Understanding different forms of support; • Being aware of the approaches and effects of tangible support. -**Development of skills for enhancing mutual support.** • Recognition of the stress of oneself and one's partner; • Assertive skills; • Empathic joining skills; • Emotional support for the male partner.	**-Sharing experiences:** couples' experience with sharing and support during the treatment (5min) **-Psycho-education** (with illustrations and examples)**:** (30min) **-Distribution of written supplemental materials;** **-Skills in sharing and practice:** practise soft self-disclosure, active listening, emotional validation, empathic joining, and assertive skills (10min); **-Homework:** practise and implement the effective skills of sharing and support.	-Handbook for infertility counseling (Newton, 2006) -Literature reviews (Ying et al., 2015a; Ying et al., 2016b) -Findings from the qualitative study on the experiences of Chinese couples undergoing IVF treatment (Ying et al., 2015b)

Title / main focus	Contents	Delivery and duration	Sources
2. Dyadic coping: Improving the individual and dyadic coping skills of infertile couples.	-**Understanding different coping strategies;** • Emotion-focused coping; • Problem-focused coping; • Appraisal-focused coping. -**Promoting stress-antagonistic activities;** • Building up a personal repertoire of pleasant events; • Relaxation technique: meditation. -**Promoting infertility-specific coping strategies;** • During the embryo transfer: relaxation music, guided imagery; • During the two-week waiting period and after the disclosure of a negative outcome ▪ Stopping thoughts because of irrational fears; ▪ Laughing more and looking for humour; ▪ Positively appraising the experience of infertility and its treatment; ▪ Having realistic expectations of the treatment outcome; ▪ Sharing experiences in social media-based support groups; ▪ Turning to nature for comfort. -**Enhancing positive dyadic coping;** • Supportive dyadic coping strategies; • Common dyadic coping strategies; • Delegated dyadic coping strategies. -**Shying away from negative dyadic coping.** • Hostile dyadic coping behaviours; • Ambivalent dyadic coping behaviours; • Superficial dyadic coping behaviours.	-**Recalling experiences:** couples' individual and dyadic coping strategies (5min); -**Psycho-education** (with illustrations); **-Distribution of written supplemental materials;** -**Exercises:** • Practise meditation, self-guided imagery (15min); -**Homework:** • Practise positive dyadic coping skills with your partner.	-Handbook for infertility counselling (Covington & Burns, 2006); -Theory of dyadic coping (Bodenmann, 2010); -Literature review (Ying et al., 2016a).

enhancing the awareness of gender differences in psychological reactions to infertility and treatment, and the positive aspects and strategies of sharing, partnership, support, and dyadic coping. Skills training refers to 'the teaching of specific verbal and nonverbal behaviours and the practising of these behaviours' (Dictionary). In this programme, skills training focus on a variety of skills, including couple sharing, mutual support techniques, dyadic coping, and positive coping techniques.

Distributed handout

Written materials containing the essential elements of the intervention programme will be distributed. They supplement the sessions and help infertile couples to reflect upon and reinforce the knowledge and strategies that have been delivered. In particular, it could remind the couples of the approaches that can be used to deal with psychological distress when the negative outcome of the treatment is disclosed.

Measurements

Based on the Preliminary Endurance with Partnership Conceptual Framework (P-EPCF), the expected dyadic outcome measures are: psychological well-being (anxiety and depression) and marital benefits (marital satisfaction and marital adjustment). The Partnership mediator and dyadic coping, and the dyadic moderators, are also measures as independent variables and controlled factors, respectively. These variables will be assessed at three points: baseline (T0: pre-intervention), 10 days after the embryo transfer (T1: waiting period), and 1 month after the embryo transfer (T2: follow-up). The relationship between the measurements and the components of the P-EPCF are listed in Table 9-3.

Table 9-3 Correlation between the measurements of the PCEP and components in the Preliminary Endurance with Partnership Conceptual Framework (P-EPCF)

Variables	Instruments	Correlation with components in P-EPCF
Dyadic Outcomes		
Anxiety and depression	-The 14-item Hospital Anxiety and Depression Scale (HADS)	-Outcomes: Psychological well-being
Marital satisfaction	-The 3-item Kansas Marital Satisfaction Scale (KMS)	-Outcomes: Marital functions
Marital adjustment	-The 14-item Revised Dyadic Adjustment Scale (RDAS)	
Dyadic mediators		
Partnership	-The 18-item Infertility Partnership Scale (IPS)	-Partnership Mediators: Partnership in couples
Dyadic coping	-The 2-item evaluation of the dyadic coping subscale of the Dyadic Coping Inventory (DCI)	-Dyadic Coping
Dyadic Moderators		
Demographic and treatment factors	-The self-reported Background Information Form (self-developed)	-Dyadic Moderators: Personal factors
Loving relationship and interpersonal skills	-The 2-item Likert Scale (self-developed)	- Dyadic Moderators: Couple factors

Psychological well-being will be measured using the 14-item Hospital Anxiety and Depression Scale (HADS) (Zigmond & Snaith, 1983). The three-item Kansas Marital Satisfaction Scale (KMS) will be adopted to assess the level of marital satisfaction

perceived by infertile couples (Schumm et al., 1986). The 14-item Revised Dyadic Adjustment Scale (RDAS) will be utilized to measure the marital adjustment of infertile couples (Crane, Middleton, & Bean, 2000). The partnership meditator in infertile couples will be evaluated using the 18-item Infertility Partnership Scale (IPS) (Asazawa, 2013). The two-item evaluation of the dyadic coping subscale of the Dyadic Coping Inventory (DCI) will be employed to assess infertile couples' global satisfaction with dyadic coping (Bodenmann, 2008).

The couples' dyadic moderators will be measured using the self-reported Background Information Form (BIF) to solicit information on demographic characteristics (age, level of education, duration of marriage, religion) and treatment factors (duration of infertility treatment, infertility diagnosis, previous IVF treatment, current treatment type, number of fertilized embryos). Loving relationships and interpersonal skills will be assessed using the self-developed questions based on relevant literature. The clinical pregnancy outcomes will be confirmed through a medical chart review 35 days after the embryo transfer.

The female and male partner of infertile couples will complete the measurement forms separately at three time points. The questionnaires for Time 1 and Time 2 will be given in two forms: the printed and electronic version. The participants will be asked to return them through express mail, email, or in person, when they come to the hospital for a pregnancy test at 12 days after the ET and for an ultrasonic check at 35 days after the ET. The nurses in the reproduction centre will give a detailed explanation of all of the instruments and assist those couples who are unable to complete the forms.

9.5 Discussion

This paper reported the process of developing a complex intervention for couples undergoing IVF treatment in China. As directed by the MRC framework, three steps for developing the Partnership and Coping Enhancement Programme (PCEP) were presented: identifying evidence, identifying / developing a theory, and modelling the process and outcomes of the intervention (Campbell et al., 2000; Craig et al., 2008).

The systematic approach in developing the complex intervention

According to the MRC framework, sound evidence and an appropriate theory should be adopted in developing interventions (Craig et al., 2008). In the process of developing the PCEP, a series of literature reviews were conducted to identify gaps in evidence and research. Then, the preliminary Endurance with Partnership Conceptual Framework (P-EPCF) specific to couples undergoing IVF treatment was proposed, based on the findings of the reviews, the analysis of the key concept of *partnership*, and the interviews with couples undergoing IVF treatment in a qualitative study. In the third step, the Partnership and Coping Enhancement Programme (PCEP) was developed, guided by the proposed P-EPCF. Therefore, it could be expected that the PCEP would be more acceptable and effective than programmes that are merely based on empirical or practical evidence (Craig et al., 2008).

The focuses of the complex intervention

The PCEP was designed to focus on the partnership mediators and dyadic coping of the infertile couples. According to the P-EPCF, these two variables could mediate the

impacts of the infertility and stressors of infertile couples, moderated by dyadic moderators, and lead to improvements in the domain of dyadic outcomes, including in psychological well-being and marital benefits, and possibly to an enhanced pregnancy outcome.

The evidence has indicated the necessity for supportive interventions focusing on enhancing the partnership and coping strategies of infertile couples. When an undesirable partner relationship has been identified among couples seeking IVF treatment (Ying et al., 2015b), it has been reported that the marital relationship could be a protective factor for interfile couples across different stages of the IVF treatment (Lowyck et al., 2009a), particularly for women with negative treatment outcomes (Chochovski et al., 2013).

The findings of the literature reviews have revealed that positive coping strategies are related to the psychological well-being of women undergoing IVF treatment (Gourounti et al., 2012; Li et al., 2012). It has also been proposed that positive dyadic coping could reduce the stress for each partner and improve the functioning of the relationship of couples coping with stress (Bodenmann, 2005; Bodenmann & Shantinath, 2004). Therefore, it is theoretically and empirically supported that the focuses of this new complex intervention should include the enhancement of partnership in the couples, as well as the improvement of dyadic coping skills.

The components of the Partnership and Coping Enhancement Programme

After determining the focuses of the programme, its detailed components were developed on the basis of established empirical and theoretical evidence. As discussed, various sources were used when developing the PCEP.

First, the handbook for infertility counselling provides the basis for the guideline to facilitate the strategies of sharing and support in couples (Newton, 2006), and provides an introduction to different coping strategies and to infertility-specific coping strategies (Verhaak & Hammer Burns, 2006). The soundness of these strategies has been confirmed by the clinical and empirical literature. Second, the key elements for improving dyadic coping were adapted from Bodenmann's dyadic coping theory, including the enhancement of positive dyadic coping strategies, the shying away from negative forms of dyadic coping, and the promotion of stress-antagonistic activities (Bodenmann, 2005).

Third, meaningful findings from the reviews of the literature have also been incorporated in the intervention. It has been proposed that the marital problems of infertile couples may arise due to gender differences in the couples' reaction to infertility and to incompatible perceptions of the problem of fertility (Pasch et al., 2002; Peterson et al., 2011). Thus, key results of the previous reviews on gender differences were included in the programme (Ying et al., 2015a; Ying et al., 2016b) to enhance the understanding of the differences between couples. Last, the results of the qualitative study that was conducted to explore the experiences of Chinese couples with IVF treatment also contributed to the components of this programme (Ying et al., 2015b). These interviews in the qualitative study has identified the essential elements of

partnership and raised awareness of what constitutes an undesirable partnership in infertile couples. These were integrated into the PCEP to enhance the partnership of infertile couples.

The complete components of the PCEP were finally decided in a discussion meeting that was held by the research team, which consists of medical and nursing specialists from the ART centre, experts on women's health, and a PhD nursing student specializing in infertility psychology. This programme will be further tested in a pilot / feasibility study.

Limitations

This complex intervention has its limitations. First, some difficult time points such as pretreatment and oocyte retrieval are not targeted since the intervention will be delivered on the day of the embryo transfer. However, because a huge disparity exists in the duration from ovarian stimulation to embryo transfer, due to different treatment protocols and the type of embryo transfer (frozen or fresh aspiration), the decision was made to focus only on the two most difficult periods for couples undergoing IVF treatment, namely the two-week waiting period and the disclosure of the outcome of the treatment.

Another limitation is that the provision of treatment-related information has not been integrated into the complex intervention. This is because health information relating to the IVF treatment will be delivered by the staff from the study ART centre to all participants as part of their routine care. Only the psychosocial aspects of the infertile couples are considered in the intervention programme.

9.6 Implications for Research

According to the MRC framework, the following stages in developing a complex intervention are feasibility/piloting, evaluation, and the implementation of the programme. Thus, it is recommended that a pilot/feasibility study be conducted before the full-range randomized controlled trial (RCT) is implemented.

A feasibility study on the effects of the Partnership and Coping Enhancement Programme (PCEP) will be conducted. The aims of that study will be to test the procedure, estimate recruitment/retention, and determine the sample size of the programme.

9.7 Conclusion

This study reported on the process of developing the Partnership and Coping Enhancement Programme (PECP) for couples undergoing In Vitro Fertilization treatment, which was guided by the MRC framework for developing and evaluating complex interventions. This was completed with sound evidence from three reviews of the relevant literature, an analysis of the key concept of partnership, the findings of a qualitative study on IVF couple dyads, and a proposed preliminary Endurance with Partnership Conceptual Framework (P-EPCF). It is recommended that a pilot study be conducted to test the feasibility of the programme, and to model its process and outcomes.

Chapter 10

STUDY V FEASIBILITY / PILOTING THE INTERVENTION

A 'Partnership and Coping Enhancement Programme (PCEP)' for couples undergoing in vitro fertilization treatment: a feasibility study*

* The content of this chapter was submitted:

Ying, L., Wu, X., Wu, L. H., Shu, J., & Loke, A.Y. A 'Partnership and Coping Enhancement Programme (PCEP)' for Couples Undergoing In Vitro Fertilization Treatment: A Feasibility Study. *British journal of health psychology* (under revision, submitted on January 19, 2017).

10.1 Introduction

The diagnosis of infertility and its treatments have affected both females and males of infertile couples as a unit in the physical, psychological, and marital realms (Ying, Wu, & Loke, 2015a). In Vitro Fertilization (IVF), offers nearly the last option for infertile couples to fulfil their desire for parenthood (Beckmann, 2014). However, it also places an extra burden on the dyads due to the torturous procedure and the low success rate of the treatment (Ishihara et al., 2015). The findings of an interview study among infertile couples revealed that the process of IVF treatment is like climbing a mountain, with each step a form of emotional torture accompanied by the fear of failure (Ying, Wu, & Loke, 2015b). A systematic review of the literature indicates that the most stressful time points in the IVF treatment cycle are the two-week waiting period before the pregnancy test and after the disclosure that the treatment has been unsuccessful (Ying, Wu, & Loke, 2016c).

A variety of psychosocial interventions were adopted in studies on interventions for infertile couples, to improve their psychological status and marital functions, and the pregnancy rates of women undergoing IVF treatment, such as counselling (Connolly et al., 1993; de Klerk et al., 2005; Emery et al., 2003), cognitive behaviour therapy (Facchinetti, Tarabusi, & Volpe, 2004; Gorayeb, Borsari, Rosa-e-Silva, & Ferriani, 2012; Tarabusi, Volpe, & Facchinetti, 2004), body-mind interventions (Chan et al., 2012; Chan, Ng, Chan, Ho, & Chan, 2006; Domar et al., 2011), and expressive writing interventions (Matthiesen et al., 2012; Panagopoulou, Montgomery, & Tarlatzis, 2009). However, as was reported in a systematic review of studies involving randomized controlled trials (RCTs) of psychosocial interventions for infertile couples, the effects of these

psychosocial interventions could not be confirmed due to methodological or practical issues (Ying, Wu, & Loke, 2016b). In addition, the men of infertile couples were neglected in the majority (65%) of these studies. One intervention study included the enhancement of the marital function of the couples. None of the interventions examined the psychological distress of the couples after the disclosure of negative treatment outcomes (Ying et al., 2016b). It was concluded that a complex intervention for infertile couples as dyads – one that includes the men – to enhance the partnership and coping of couples undergoing IVF treatment is needed.

The preliminary endurance with partnership conceptual framework

According to the Medical Research Council's (MRC) framework, developing or identifying a conceptual framework is an essential step for developing and evaluating a complex intervention (Craig et al., 2008). Because no relevant existing framework could be identified from a search of existing intervention studies, a preliminary Endurance with Partnership Conceptual Framework (P-EPCF) was developed for infertile couples undergoing IVF treatment (Ying, Wu, Wu, Shu, & Loke, 2016d) (Figure 8-2).

The proposed P-EPCF consists of four domains: the impacts of infertility and stressors, dyadic mediators, dyadic moderators, and dyadic outcomes (Ying et al., 2016d). The impact of infertility and stressors, presented at the bottom of the diagram, represents the origin of the hardship experienced by infertile couples undergoing IVF treatment. The dyadic mediators and dyadic moderators act as pillars and buffers that relieve the impacts of stressors and help couples to endure them, leading to the dyadic outcomes presented at the top of the conceptual framework.

In accordance with the proposed P-EPCF, a Partnership and Coping Enhancement Programme (PCEP) was developed for couples undergoing IVF treatment (Ying et al., 2016a). The dyadic mediators, including the partnership and dyadic coping of couples, are the specific focuses of the PCEP. The ultimate goal of this intervention programme is to improve dyadic outcomes in the three dimensions of psychological well-being, marital functions, and biomedical outcome (pregnancy).

10.2 Research aim

The purposes of this intervention study are: (a) to determine the acceptability and feasibility of the study as evidenced by the recruitment rate and attrition rate of the intervention study; (b) to examine the effects of PCEP on the partnership and dyadic coping (dyadic mediators) of the couples, and (c) the effects on the dyadic outcomes of psychological well-being (anxiety and depression), marital functions (marital satisfaction and adjustment), and pregnancy rates (biomedical outcome).

10.3 Methods

10.3.1 Trial design

This is a quasi-experimental intervention study to examine the acceptability and feasibility of the intervention, and the preliminary effects of a 'Partnership and Coping Enhancement Programme (PCEP)' for couples undergoing IVF treatment.

The participants who were recruited consecutively were non-randomly assigned to the PCEP intervention group or to the routine care control group. Couples in both groups

received three 30-minute sessions of medical information during the IVF cycle, while the PCEP group received an additional face-to-face, couple-based, 90-minute session of PCEP on the morning of the day of an ET scheduled to take place in the afternoon. The main focuses of the PCEP intervention are to enhance the partnership and dyadic coping of the infertile couples, so as to improve their psychological well-being and marital functions, and their chances for a successful pregnancy.

10.3.2 Setting and participants

The study was conducted at a Reproductive Medicine Centre (RMC) in a first-class comprehensive hospital in Hangzhou city, Zhejiang province, China. The target population was infertile couples scheduled to undergo a cycle of stimulated or cryopreserved IVF/ICSI treatment.

The criteria for the inclusion of couples in this study were as follows: (a) Chinese adult married couples (aged 18 years and older); (b) fluent in Chinese (Putonghua – the official dialect in China); (c) scheduled to undergo a transfer of a fresh or frozen embryo; (d) having no biological children; and (e) where both partners agreed to take part in the study. Excluded from the study were: (a) couples who had participated in other psychosocial interventions during the IVF treatment; and (b) couples with male partners who were unable to provide support due to a serious physical or psychological illness.

10.3.3 Interventions

The intervention was the couple-based ‘Partnership and Coping Enhancement Programme’ (PCEP), which was developed based on the Preliminary Partnership and

Coping Conceptual Framework (P-PCCF) for couples undergoing IVF treatment (Ying et al., 2016d). The participants in the intervention group received PCEP and routine care, while the control group only received the routine care.

Partnership and Coping Enhancement Programme (PCEP)

The dyadic mediators in the P-PCCF were the main focuses of the PCEP. The PCEP includes the enhancement of partnership and dyadic coping in infertile dyads. The section titles, main focus, contents, duration, delivery, and sources of PCEP are listed in Table 9-2.

The approaches employed in this couple-based intervention were psychoeducation (Lukens & McFarlane, 2004) and skills training (Dictionary). The researcher, who has received training in couple therapy, was responsible for delivering the programme. The face-to-face intervention, which consisted of the sharing of experiences, psycho-education, meditation exercises, and the practising of skills, lasted for 90 minutes. Each intervention group consisted of one to four infertile dyads who had been recruited, and the couples had to attend together.

The couples also received written materials that contained essential information included in the intervention programme. The main contents of the materials are presented in Table 9-2. The printed materials supplemented the sessions. The couples could refer to them when needed, and reflect upon them, which would reinforce the knowledge and skills that had been delivered. The couples were equipped to cope with their negative

affect, to provide each other with partnership support, and to cope together during the period of waiting that follows an ET and in the periods after the failure of an IVF cycle.

Strategies were implemented to ensure the quality of the study. First, a detailed protocol of the intervention was developed, the key components of which are described in Table 9-2. Second, the interventions were conducted by the researcher to ensure uniformity. Third, a checklist was developed and used to ensure that the interventions were consistently implemented and evaluated by a trained assistant. Furthermore, the intention-to-treat principle was employed when analysing the data to avoid retention bias.

Routine care

Participants in both groups received the routine care provided by the reproductive medical centre. This consisted of three 30-minute sessions of information on the IVF treatment procedure. The information that was provided included an introduction to the IVF treatment (e.g., steps, cost, risks, medicine, success rates), the procedures of egg retrieval and ET, and the laboratory schedule for the IVF treatment. These sessions were delivered by the nurse manager or by the reproductive endocrinologist of the reproductive centre. Infertile couples were required to attend all of the sessions in order to receive treatment, and their attendance was recorded.

Measurements

A questionnaire was compiled to measure the domains of moderators, mediators, and the outcomes of the P-EPCF. These included individual and couple factors; partnership and dyadic coping; psychological well-being (anxiety and depression); and marital functions

(marital satisfaction and marital adjustment). The corresponding measurements with the domains of the P-EPCF are listed in Table 9-3 (Asazawa, 2013; Bodenmann, 2008; Crane, Middleton, & Bean, 2000; Schumm et al., 1986; Zigmond & Snaith, 1983).

Of these five instruments, the Infertility Partnership Scale (IPS) was translated from English for this study. The translation of the IPS into Chinese was conducted by the author. Two nursing scholars and a reproductive specialist, all of whom were competent in Chinese and English, validated the Chinese version of the IPS. The face validity was assessed by three Chinese nursing scholars with a background in reproductive care. The good internal consistencies (Cronbach's $\alpha = 0.953, 0.934$, $n = 100$) of the IPS for females and males respectively were shown in the present study. All other instruments (the Hospital Anxiety and Depression Scale, the Kansas Marital Satisfaction Scale, the Revised Dyadic Adjustment Scale, and the Dyadic Coping Inventory) have been used and validated in the Chinese population.

The questionnaires were to be completed by both partners at three time points: on the day of the ET (Time 0: pre-intervention), 10 days after the ET (Time 1: waiting period), and one month after the ET (Time 2: follow-up).

The data on dyadic moderators, including the characteristics of the couples, their treatment factors, relationships, and interpersonal skills, were collected only at time 0. The outcome of the clinical pregnancy was collected through a review of their medical records. Clinical pregnancy is defined as ‘a pregnancy diagnosed by ultrasonographic

visualization of one or more gestational sacs or definitive clinical signs of pregnancy' (Zegers-Hochschild et al., 2009).

Sample size

No similar intervention study for IVF couples has ever been conducted. The sample size for this intervention study was calculated according to the conventional method for conducting an analysis of power. The sample size for this feasibility study was calculated using G-power 3.0.10 (Faul, Erdfelder, Lang, & Buchner, 2007). After setting a two-side type I error of 5%, with a power of 80%, and a small effect (f=0.15) (Faul, Erdfelder, Lang, & Buchner, 2007), it was estimated that at least 90 couples (45 couples in each group) would be required. In this study, a total of 100 couples were recruited, with 50 couples in each group.

Procedure

Before the commencement of the study, ethical approval was obtained from the Human Subjects Ethics Sub-Committee of The Hong Kong Polytechnic University (Reference number: HSEARS20150616001) and the Ethics Committee of the hospital (Reference number: KY2016001).

Infertile couples who met the criteria for eligibility were approached in the reproductive centre on the morning of the day of the embryo transfer (ET), when both the females and males of the infertile couples were required to be present together. The nurse manager of the reproductive centre introduced the couples to the researcher, who explained the purpose of the study and the contents of the intervention to the couples. Those who

signed the consent form were recruited to take part in the study and completed the first assessment (Time 0: pre-intervention). Both the female and male partners of the infertile couples were asked to complete the questionnaires.

Couples recruited consecutively in the months of March to June 2016 were allocated to the intervention group until the desired sample size was reached. Couples recruited consecutively from June until October 2016 were distributed to the control group. This was done to avoid the contamination of information given to the intervention group shared in the ward when they are waiting for the procedure. Also, this was done for convenience, as the researcher was the sole provider of the intervention during the months of her stay in the city.

The intervention group received the Partnership and Coping Enhancement Programme (PCEP). The 90-minute session of the PCEP was delivered in the teaching room of the reproductive centre on the morning of the day of the ET, which was commonly scheduled in the centre in the afternoon.

The participants were asked to return the printed questionnaires for Time 1 (10 days after the ET) and Time 2 (30 days after the ET) through express mail (with the address on the sheet) or in person. Text reminders were sent to the female participants at Time 1 and Time 2 via We Chat, the popular messaging app in China.

Statistical methods

IBM SPSS Statistics 23.0 was used to conduct the statistical analysis, with the level of significance set at $P<0.05$. The missing data were handled by adopting the method of last observation carried forward (LOCF). The recruitment rates and retention rates were calculated to evaluate the acceptability and feasibility of the programme.

Equivalence of baseline measures were examined using t-tests for normally distributed variables on the interval or ratio levels, and the Chi-Square test was used for nominal variables. Those variables that were not comparable between groups would be considered as covariates.

As there was a mix of one between-subjects factor (group) and one within-subjects factor (time) for the variables in the study, the two-factor mixed-design ANOVA was used to examine differences in outcomes between the two groups over time for the couples. If a significant interaction effect was found from the mixed-design ANOVA, a simple main effect test was used in the next stage. The difference in clinical pregnancies between the groups was examined using a Chi-Square test. In the case of significant results, estimates of effect size (Cohen's *d*) were calculated.

10.4 Results

10.4.1 The acceptability and feasibility of the PCEP

As shown in Figure 10-1, of the 156 couples assessed for eligibility, 46 did not meet the criteria for inclusion. A total of 10 couples declined to take part in the study. The reasons were that they did not need the psychosocial intervention (n = 2), or that they did not want to complete the questionnaire (n = 8). The remaining 100 couples were

recruited into the intervention group (n = 50, recruitment rates 94.3%) and the control group (n = 50, recruitment rates 87.7%), and all of them completed the baseline assessment. There was no significant difference in the recruitment rate between the two groups.

In the intervention group, the retention rates for the T1 and T2 assessment were 88% (n = 44) and 82% (n = 41), while the corresponding retention rates in the control group were 92% (n = 46) and 80% (n = 40), respectively. A total of 19 couples were lost to follow-up due to sadness about the negative results (n = 5), no response (n = 12), hospitalization for a threatened abortion (n = 1), or divorce (n = 1). The PCEP intervention was repeated 37 times to recruit all of the participants, with two to six subjects in each session. There were no significant differences in the retention rates both at T1 and T2 between intervention group and control group.

10.4.2 Baseline comparison between two groups

The baseline information of the couples is shown in Table 10-1. The mean ages for the females and males of the 100 couples were 31.61 (range, 21-44) and 34.11 (range, 24-53) years, respectively. The mean number years that the couples had been living together was 5.81 (range, 1-22), and the mean duration of their infertility treatment was 3.41 years (range, 0.5-16). A total of 79 couples (79%) were undergoing their first IVF / ICSI treatment. The mean number of previous IVF/ ICSI treatments was 0.32 (range, 0-4). The causes of infertility involved female factors (46.5%), male factors (16%), mixed factors (12.5%), and unknown causes (25%).

There was a significant difference between the couples in the intervention and control groups on the type of ET received (P = 0.000). This variable was included as a covariate in subsequent analyses. There were no significant differences between the couples in the intervention and control groups in the other variables (moderators).

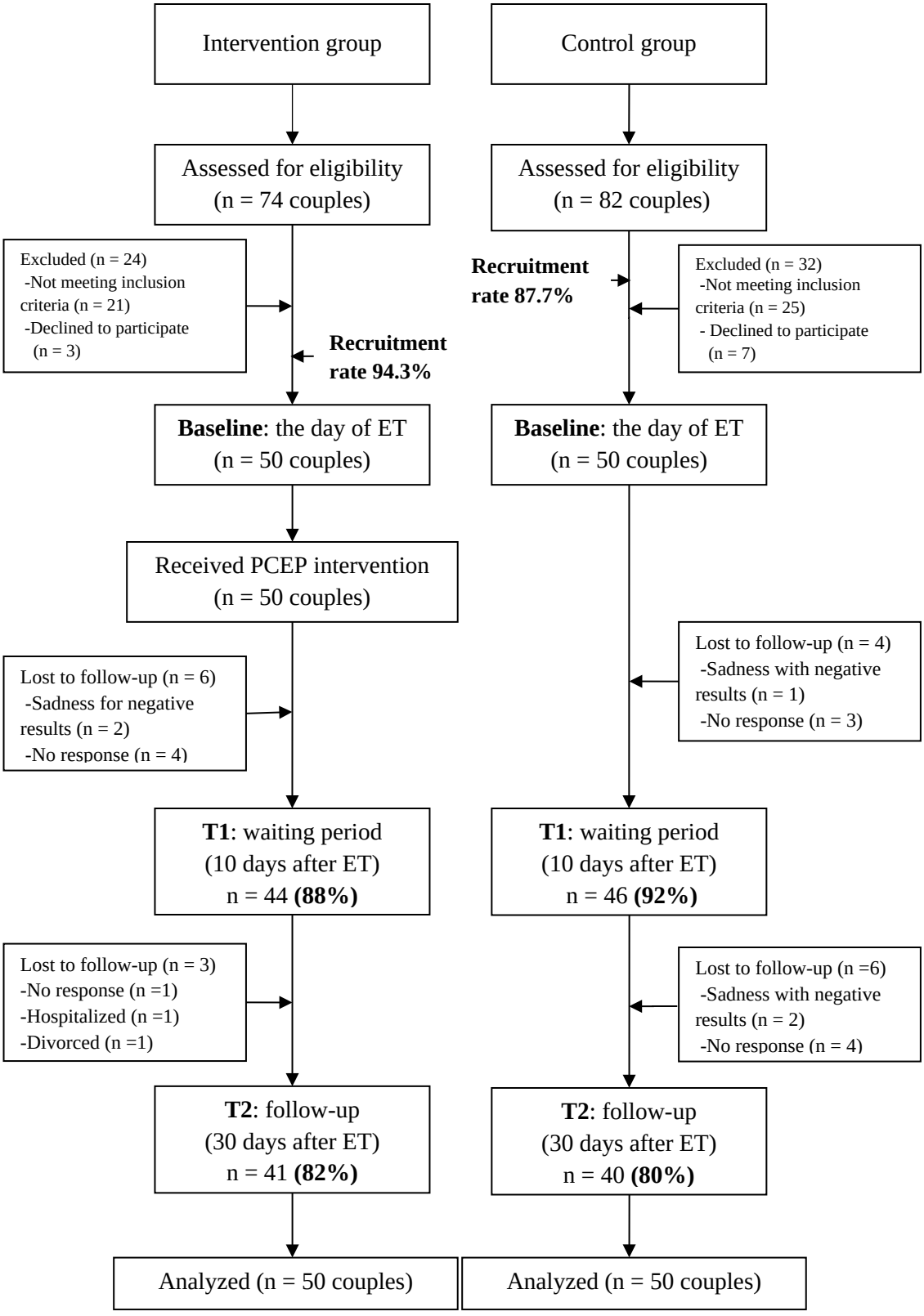

Figure 10-1. Consort diagram illustrating flow of participants into study

Table 10-1 Baseline information of the intervention and control group

Variables	Intervention group	Control group	t / x^2 value	*P*-value
Demographic factors				
Age, m (SD)				
Female	31.62 (3.83)	31.60 (4.24)	0.025	0.980
Male	33.72 (6.12)	34.50(5.49)	0.671	0.504
Years living with partner, m (SD)	5.41 (3.97)	6.20 (3.07)	1.574	0.117
Education level of females, n (%)				
Primary school	1(2)	2(4)	7.180	0.127
Secondary school	10(20)	19(38)		
University and above	39(78)	29(58)		
Education level of males, n (%)				
Primary school	0(0)	3(6)	6.314	0.177
Secondary school	11(22)	14(28)		
University and above	39(78)	33(66)		
Religion of females, n (%)				
No	39(78)	34(68)	2.176	0.337
Buddhism	9(18)	15(30)		
Others	2(4)	1(2)		
Religion of males, n (%)				
No	42(84)	35(70)	4.970	0.174
Buddhism	7(14)	14(28)		
Taoism	0(0)	1(2)		
Others	1(2)	0(0)		
Work status of females, n (%)				
Full-time job	25(50)	22 (44)	7.532	0.274
Part-time job	4 (8)	2(4)		
Quit job	16 (32)	8 (16)		
Sick leave	4 (8)	3 (6)		
Running own business	1 (2)	2 (4)		
Full-time wife	8 (16)	11 (22)		
Farmer	0 (0)	2 (4)		
Work status of males, n (%)				

Full-time job	36 (74)	38 (76)	3.804	0.433
Part-time job	1 (2)	2 (4)		
Running own business	10 (20)	8 (16)		
Unemployed	1 (2)	0 (0)		
Farmer	2 (4)	2 (4)		
Monthly household income, n (%)				
< ¥3000	2 (4)	3(6)	1.683	0.641
< ¥5000	10 (20)	13 (26)		
< ¥10000	13 (26)	11 (22)		
> ¥10000	25 (50)	23 (46)		
Economic pressure, n (%)				
Heavy	3 (6)	4(8)	1.770	0.413
Ordinary	39 (78)	41 (82)		
Light	8 (16)	5 (10)		
Treatment factors				
Duration of treatment, m (SD)	3.20 (2.99)	3.62 (1.93)	1.180	0.239
Causes of infertility, n (%)				
Female factor	26 (52)	22 (44)	7.167	0.067
Male factor	5 (10)	11 (22)		
Mixed factor	5 (10)	7 (14)		
Unknown	14 (28)	10 (20)		
Number of previous IVF, m (SD)	0.32 (0.76)	0.32 (0.76)	0.000	1.000
Current treatment type, n (%)				
IVF	44 (88)	41 (82)	1.412	0.235
ICSI	6 (12)	9 (18)		
Type of embryo transfer, n (%)				
Frozen	39 (78)	49 (98)	18.939	0.000**
Fresh	11 (22)	1 (2)		
Loving relationship, m (SD)				
Females	5.24 (0.74)	5.10 (0.71)	1.556	0.121
Males	5.32 (0.68)	4.14 (0.78)		
Interpersonal skills, m (SD)				
Females	4.53 (0.77)	4.50 (0.74)	0.203	0.840
Males	4.28 (0.76)	4.36 (0.56)		

10.4.3 The preliminary effects of the PCEP

Tables 10-2 and 10-3 present the effects of the PCEP on the dyadic mediators, psychological well-being, and marital benefit of the females and males of infertile couples at T1, T2 compared with T0. The main effects of time and group, and the interaction effects of time by group of these variables were analysed using the mixed-design ANOVA. The type of embryo transfer was employed as covariate in the analyses. For those measures that had a significant interaction effect, the simple main effect test was used to examine differences between the groups at each time point.

Dyadic mediators: partnership and dyadic coping

For the females, at the waiting period (T1) the scores for partnership (d = 0.13) and dyadic coping (d = 0.30) improved compared with those in the control group, but the differences did not reach significance (Table 10-2). More significant improvements were seen for IPS partnership (F = 4.346, P = 0.040) and dyadic coping (F = 4.264, P = 0.042) in the PCEP group than in the control group one month after the ET (T2) (Figure 10-2). The effect size (Cohen's d) of the PCEP was 0.42 for both partnership and dyadic coping.

The males of the infertile couples only reported a more significant improvement in the score for partnership (F = 4.266, P = 0.042) than their counterparts in the control group one month after receiving the intervention (T2) (Figure 10-2). The effect size for partnership was 0.42. There was no significant difference in the score for partnership between the two groups at the waiting period (T1). For dyadic coping, the scores at T1 remained almost unchanged in both groups compared with those at baseline. However, a

small effect size for dyadic coping was observed (d = 0.27) at T2, although the effect was not significant (Table 10-3).

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Dyadic outcomes

Psychological well-being

For the females of the infertile couples, the results revealed a significantly lower level of anxiety (F = 5.163, P = 0.025) in the intervention group at the waiting period (T1) (Figure 10-2). The effect size for anxiety was 0.46. There was no significant effect on the level of depression (F = 0.296, P = 0.588) at T1, although the score was lower than that in the control group (d = 0.11). At one month after the ET (T2), no significant differences were identified in the levels of anxiety and depression between the intervention group and the control group (Table 10-2).

The results for the males indicated that the PCEP had no significant effects on levels of anxiety and depression at the waiting period (T1) and one month after ET (T2). However, the scores for anxiety (d = 0.26) and depression (d = 0.18) were lower in the PCEP group at T1 than in the control group at the same time point (Table 10-3).

Marital functions: marital satisfaction and marital adjustment

For both the females and males of the infertile couples, the PCEP had no significant effects on marital satisfaction and marital adjustment at both T1 and T2. However, some promising improvements in marital satisfaction were seen at T2 for the females (d = 0.14), and males (d = 0.22) of the infertile couples in the intervention group.

Table 10-2 Preliminary effects of the PCEP for the females

Outcomes	Means (Standard deviations)			Means (Standard deviations)			Significance			Time 0 compa-rison	Effect size	
	Intervention group (n = 50)			Control group (n = 50)			Main and interaction effect (*F* value)				Time 1	Time 2
	Time 0	Time 1	Time 2	Time 0	Time 1	Time 2	Time	Group	Time by Group	*F* value	Partial η2	Partial η2
Dyadic mediators												
Partnership (IPS)	74.82 (9.61)	76.04 (8.42)	78.14 (8.56)	74.76 (9.43)	74.92 (10.2)	74.36 (9.54)	**3.789***	0.882	**6.522****	0.001	0.004	**0.042***
Dyadic coping (DCI)	7.62 (1.58)	8.22 (1.53)	8.34 (1.51)	7.60 (1.41)	7.78 (1.46)	7.74 (1.40)	**10.55****	1.696	**4.192***	0.004	0.022	**0.042***
Dyadic outcomes												
Psychological well-being												
Anxiety (HADS)	5.14 (3.02)	6.08 (3.37)	5.04 (3.10)	5.10 (3.07)	7.62 (3.41)	5.22 (2.96)	**37.03****	0.957	**6.836****	0.001	**0.05***	0.001
Depression (HADS)	3.90 (2.54)	4.38(3.02)	4.16 (2.71)	3.84 (2.61)	4.72 (3.23)	4.26 (2.72)	**5.709****	0.061	0.500	0.014	0.003	0.000
Marital benefits												
Marital satisfaction (KMS)	16.90 (2.93)	16.98 (2.71)	17.36 (2.67)	17.00 (2.66)	17.18 (2.85)	16.98 (2.64)	1.033	0.003	2.030	0.032	0.001	0.005
Marital adjustment (RDAS)	51.60 (9.03)	51.44 (9.65)	52.20 (9.23)	51.78 (10.3)	51.38 (10.7)	51.66 (9.89)	0.452	0.006	0.224	0.009	0.000	0.001

*$P < 0.05$, **$P < 0.01$; HADS, the Hospital Anxiety and Depression Scale; KMS, the Kansas Marital Satisfaction Scale; RDAS, the Revised Dyadic Adjustment Scale; IPS, the Infertility Partnership Scale; DCI, the Dyadic Coping Inventory.

Table 10-3 Preliminary effects of the PCEP for the males

Outcomes	Means (Standard deviations)			Means (Standard deviations)			Significance			Time 0 compa-rison	Effect size	
	Intervention group (n = 50)			Control group (n = 50)			Main and interaction effect (*F* value)				Time 1	Time 2
	Time 0	Time 1	Time 2	Time 0	Time 1	Time 2	Time	Group	Time by Group	*F* value	Partial η2	Partial η2
Dyadic mediators												
Partnership (IPS)	76.50 (8.02)	79.10 (7.80)	79.72 (7.34)	76.68 (7.59)	76.98 (8.06)	76.56 (7.94)	**4.865****	1.431	**4.722***	0.013	0.018	**0.042***
Dyadic coping (DCI)	7.76 (1.30)	7.80 (1.09)	8.02 (1.04)	7.72 (1.33)	7.80 (1.21)	7.78 (1.22)	1.414	0.192	0.895	0.023	0.000	0.011
Dyadic outcomes												
Psychological well-being												
Anxiety (HADS)	4.98 (3.30)	5.16 (3.38)	4.78 (3.23)	4.88 (3.13)	6.08 (3.67)	5.02 (3.50)	**7.539****	0.314	3.064	0.024	0.017	0.001
Depression (HADS)	3.22 (2.02)	3.62 (3.02)	3.46 (2.38)	3.30 (2.84)	4.20 (3.31)	3.56 (2.37)	**6.287****	0.263	1.172	0.026	0.008	0.000
Marital benefits												
Marital satisfaction (KMS)	18.14 (2.71)	18.18 (2.97)	18.44 (2.60)	18.08 (1.44)	17.94 (2.71)	17.96 (1.80)	0.292	0.354	0.645	0.019	0.002	0.012
Marital adjustment (RDAS)	51.56 (8.82)	51.50 (9.89)	51.72 (9.88)	51.66 (10.1)	51.26 (8.93)	51.46 (9.32)	0.110	0.006	0.069	0.003	0.000	0.000

*$P < 0.05$, **$P < 0.01$; HADS, the Hospital Anxiety and Depression Scale; KMS, the Kansas Marital Satisfaction Scale; RDAS, the Revised Dyadic Adjustment Scale; IPS, the Infertility Partnership Scale; DCI, the Dyadic Coping Inventory.

Figure 10-2. Significant effects of PCEP for infertile couples

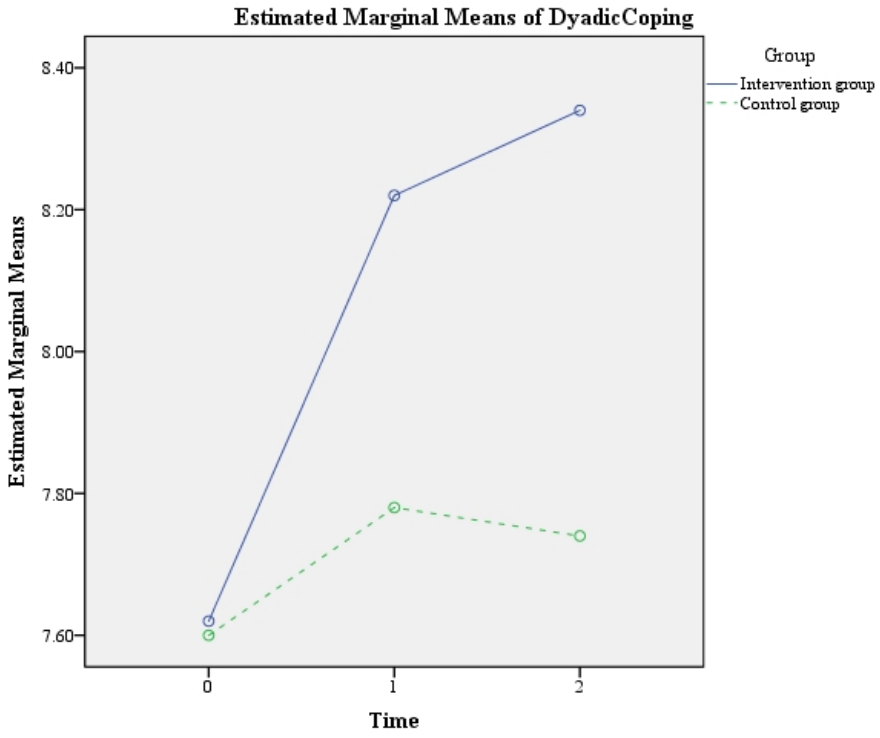

Figure 10-2 (No. 1). Means of Dyadic Coping for Females

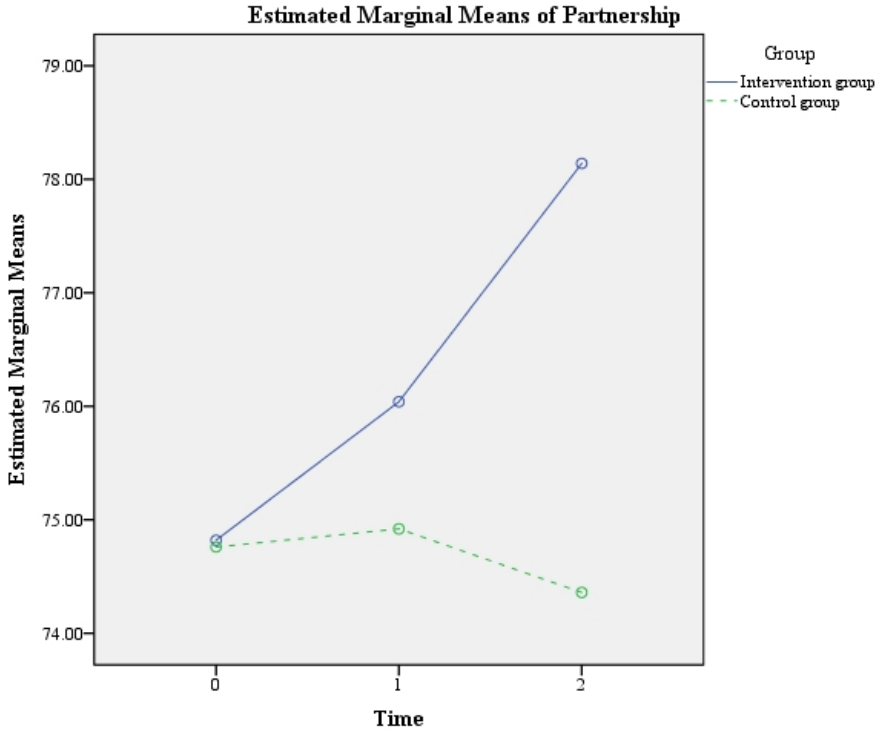

Figure 10-2 (No. 2). Means of Partnership for Females

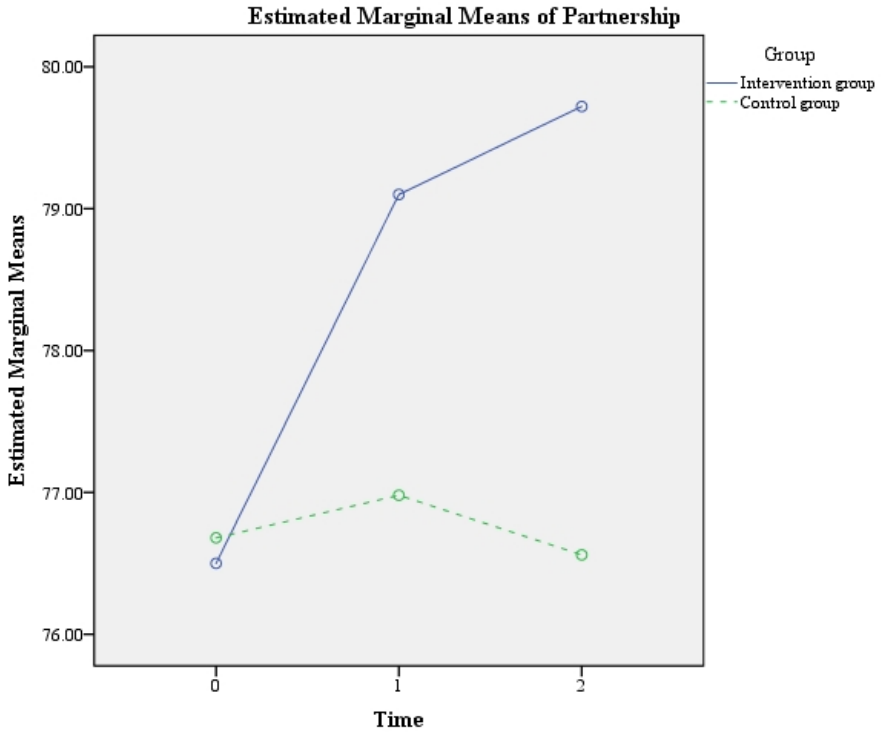

Figure 10-2 (No. 3). Means of Partnership for Males

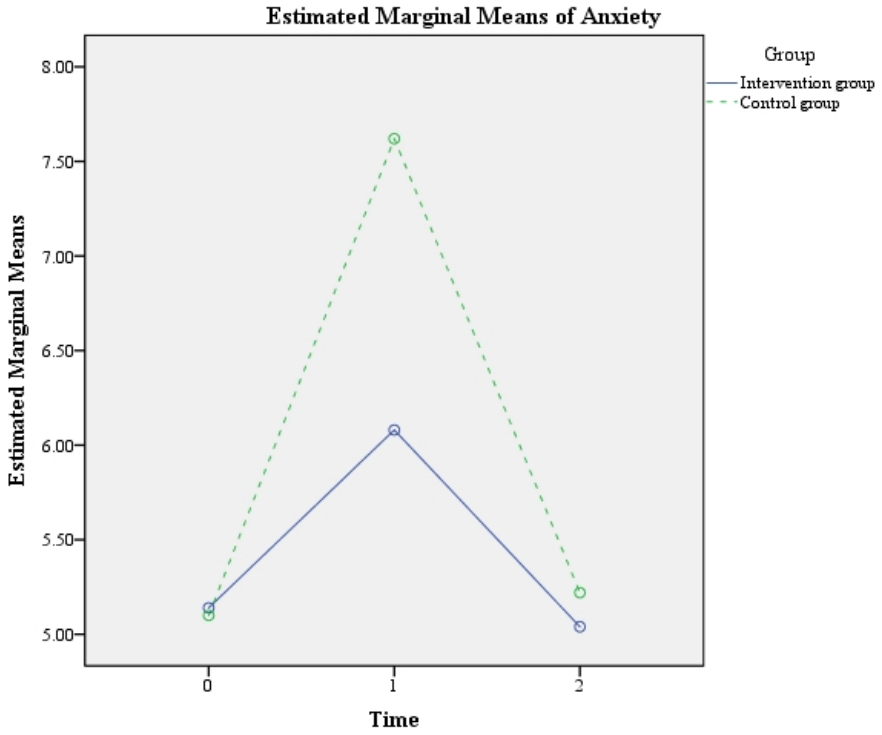

Figure 10-2 (No.4). Means of Anxiety for Females

Clinical pregnancy

As shown in Table 10-4, the clinical pregnancy rates for the intervention group and control group were 62% and 56%, respectively. There was no significant difference between the two groups regarding the clinical pregnancy outcome ($P > 0.05$).

Table 10-4 The clinical pregnancy of intervention and control group, n (%)

	Positive	Negative	x^2 value	*P* value
Intervention group	31 (62)	19 (38)	0.372	0.542
Control group	28 (56)	22 (44)		

10.4.4 Fidelity evaluation

The trained research assistant attended 10 of the 37 intervention sessions to conduct the evaluation of fidelity randomly according to her choice. A 43-item checklist (Appendices Table 10-1), including the key features of the intervention, was used to evaluate the researcher's 'compliance with the contents of the intervention'. The scores ranged from 5 to 1, referring respectively to 100% (43 items), 90% (38 items), 80% (34 items), 70% (30 items), and 60% (25 items) of these 43 items having been delivered. The mean score for 'compliance with the contents of the intervention' was five points.

The durations of the intervention were also calculated, and rated from 5 to 1, referring to differences of duration within 5 min, 10min, 15min, 20min, and 25min, respectively. The mean scores for 'compliance with time' were 4.8 points. The reasons for the prolonged duration of the intervention were 'longer experience with sharing on the part

of the couples' and 'responses to the couples' questions'. The delivery of the intervention was regarded as being of high fidelity in terms of adherence to the study protocol.

10.5 Discussion

The present study was conducted to investigate the acceptability and feasibility of a complex couple-based intervention for infertile couples undergoing IVF treatment. The findings of this quasi-experimental intervention study provided information on the acceptability, feasibility, and preliminary effects of this PCEP on the enhancement of partnership, couple coping, psychological well-being, marital functions, and pregnancy outcomes.

10.5.1 The acceptability and feasibility of the PCEP

The acceptability and feasibility of the PCEP was assessed using the participants' recruitment rate and retention rate as indicators. The recruitment rates of 87.7%-94.3% were higher than in other psychosocial interventions for women / couples seeking IVF treatment (69%-74%) (Chan et al., 2012; Ockhuijsen, Hoogen, Eijkemans, Macklon, & Boivin, 2014). The retention rates of 80%-92% were also higher than in other interventions (65%-90%) (Chan et al., 2012; Ockhuijsen et al., 2014). Therefore, in general, the PCEP is acceptable and feasible for couples undergoing IVF treatment.

The relatively high recruitment and retention rates of the couples in this intervention study can be attributed to the appropriate timing of the intervention, the kind assistance of the nurse manager, and the text reminders to the couples. Arrangements were made to

have the PCEP conducted in the morning of the embryo transfer procedure, when both the men and women of the infertile couples were to come to the reproductive centre. In addition, the nurse manager of the centre, whom the couples were familiar with and trusted, assisted in the recruitment of participants and collecting of data. It is worth noting that individual text reminders were sent to most of the female participants (as requested) at Time 1 and Time 2, which also increased the return rates of the questionnaires.

Apart from those non-responders, the most common reason given by couples for refusing to complete the questionnaires again at Time 1 and Time 2, was sadness about the negative treatment outcomes. However, those couples who failed the IVF cycle probably required support from their partner and from health professionals, and more attention should be paid to these couples.

10.5.2 The effects of the PCEP

In this study, some significant effects of the PCEP were found to enhance partnership and dyadic coping, and to reduce the levels of anxiety felt infertile couples undergoing IVF treatment.

Dyadic mediators: partnership and dyadic coping

The findings of this intervention study indicated that compared with the control group, the scores for partnership for both men and women, and for dyadic coping for the women of the infertile couples in the PCEP group were significantly higher one month

after the ET (T2). The PCEP had some effect on facilitating the partnership and dyadic coping of the infertile couples.

Partnership has been identified as an important buffer in a couple's adjustment to infertility and its related treatments (Kleanthi, 2012). Some unfavourable aspects of partnership among infertile couples have been observed in studies, such as the lack of involvement of male partners (Asazawa, 2012; Ying et al., 2015b), conflicts between partners (Schanz et al., 2011; Wischmann, Stammer, Scherg, Gerhard, & Verres, 2001), and a lack of support for male partners (Volgsten, Svanberg, & Olsson, 2010; Ying et al., 2015b). These aspects have been addressed in the development of the PCEP, which might have contributed to the improvements that were observed in both couples' perception of their partnership, especially for the men of the infertile couples. This is supported by the findings from other studies, indicating that for men, only perceived support from health care providers and partners would be helpful (Brucker & McKenry, 2004; Martins, Peterson, Almeida, Mesquita-Guimarães, & Costa, 2014).

Similar improvements were seen in the dyadic coping of the women of infertile couples. Although no significant effects were identified in the men, small effect sizes (d = 0.27) were also observed one month after the ET. The results of this study are in line with those of another couple-based skill-training intervention study, which found that couples who received skill-training and psycho-education reported a significantly higher level of dyadic coping in their efforts to cope with cancer (Li, Xu, Zhou, & Loke, 2015).

Psychological well-being

As expected, the levels of anxiety and depression of the couples at the waiting period (T1) were the highest among the three assessment time points. Similar results have been reported in other studies (Ismail, Menezes, Martin, & Thong, 2004; Ockhuijsen et al., 2014; Yong, Martin, & Thong, 2000). Compared with the control group, the women of infertile couples who received PCEP reported significantly lower levels of anxiety during the waiting period (T1), while no significant effects were observed on their levels of depression (Cohen's d=0.11). These findings were consistent with those of a nursing crisis intervention study, which found that women who received instructional information and materials, as well as relaxation training, reported improvements in their levels of state anxiety and depression during the waiting period, although the effects did not reach significance (Lee, 2003). The finding points to the need for a large sample to test the effects of PCEP in future studies.

For the men of infertile couples, no significant differences were found in psychological well-being in the three time points. The result, however, concurred with the report of a systematic review that in RCT studies (7/20) that included men, psychosocial interventions had no significant effects on men (Ying et al., 2016b).

The relatively unchanged psychological status of the men of infertile couples might be attributed to the nature of the IVF treatment and to gender roles. It was reported that compared with the women of infertile couples, the men had less negative emotions at all stages of the IVF treatment (Ying et al., 2016c). It is reasonable to expect that women would more actively adopt the knowledge and skills that they had been taught. In addition, in playing a supportive role to their female partners, the males of infertile

couples are usually expected to be strong and to pay less attention to their own psychological well-being. Therefore, strategies to facilitate the utilization by males of the knowledge and skills learned from the intervention programme should be adopted in a future study.

Marital functions

It was disappointing that the PCEP had no effect on the marital functions of the couples. In a qualitative study, infertile couples expressed the view that their marital relationship had improved during IVF treatment because of the mutual support and sharing that took place during the process (Ying et al., 2015b). In an RCT study of an Integrative Body-Mind-Spirit intervention, a significant increase in the marital satisfaction of women undergoing IVF treatment was observed (Chan et al., 2012).

The fact that couples who were undergoing their first IVF treatment had a relatively good marital relationship at the time that they participated in this study may have contributed to the results of the present study. In this study, the majority (79%) of the couples were receiving their first IVF treatment. It has also been reported in one study that couples who are undergoing their first IVF cycle have a better marital relationship than those who have been through repeated cycles (Gerrity, 2001). Those couples who were willing to take part in the study might also have had better marital function and greater satisfaction than those who had refused to participate to begin with. Therefore, recruiting infertile couples who have undergone repeated IVF treatments is an approach that should be considered in a future study.

Clinical pregnancy

The findings of this study showed that the PCEP had no significant effect on the treatment outcome (pregnancy). This result is consistent with the effect of various psychosocial interventions on the pregnancy rates of infertile couples; as reported in a review of the literature, the effects on pregnancy cannot be confirmed (Ying et al., 2016b).

Similarly, another review of 14 prospective studies also found no association between pre-treatment anxiety or depression and the pregnancy outcomes of IVF treatment (Boivin, Griffiths, & Venetis, 2011). However, studies have reported that emotional distress, especially anxiety, would likely have a negative effect on the chance of becoming pregnant by compromising implantation (Smeenk et al., 2001). This previous review only analysed the effects of pre-treatment psychological status (Boivin et al., 2011) when the levels of anxiety and depression were usually much lower than in the two-week waiting period for pregnancy testing (Boivin & Lancastle, 2010). Therefore, the relationships between the emotional distress of the couples across different periods of time in the IVF cycle and the outcome of treatment, and the mediating effects of psychosocial interventions deserve further exploration.

In summary, the findings of this feasibility study indicated that the PCEP has significant effects on the level of partnership and dyadic coping of women one month after embryo transfer (T2), and on the anxiety level of women during the period of waiting for the treatment outcomes (T1). The men of the infertile couples only reported a significant

effect on the level of partnership one month after the embryo transfer. The effect sizes for these variables ranged from 0.42 to 0.44 (Cohen's *d* value).

Limitations and implications for future research

There are limitations in the present study that require special attention in further research. First, there is a potential bias in the design of this study, with its non-randomization sampling. Also, all of the couples were recruited from one reproductive centre, which limits the generalizability of the results. Therefore, it is highly recommended that a larger, multicentre RCT study be conducted to test the effectiveness of this programme. Second, although all of the intervention sessions were conducted by the same researcher, after having been repeated for 37 times the interventions might still have varied. An attempt was made to remedy this limitation through an assessment of the fidelity shown by the researchers to the programme.

Another limitation of the study is that the inflexibility of the couples with regard to the issue of bearing children was not addressed in the intervention programme. One of the couples in this study ended up getting divorced soon after their first failed IVF cycle, although they had had a good marital relationship to begin with. As marriages are influenced by their socio-cultural context (Greil, Slauson‐Blevins, & McQuillan, 2010), in a society where the main purpose of marriage is to produce and raise children, infertility may lead to the dissolution of a marriage (Greil et al., 2010). In a future study, the focus should be on the inflexible attitude of couples towards childbearing, to determine whether the strain on a couple's relationship could be eased if they increase

their psychological flexibility on the issue of bearing children and/or accept their childless situation (Hayes, Strosahl, & Wilson, 2011).

10.6 Implications for practice

Despite the limitations of this study, the results of this study also have implications for health care providers who serve infertile couples. Since the levels of anxiety and depression of the couples were higher at the two-week waiting period for pregnancy testing, health care professionals should be aware of the distress of such couples during this period, and provide support to those at risk of developing psychological disorders.

The preliminary results of this intervention study indicate that the programme did not have many significant effects on the infertile couples. Thus, the researcher should identify possible areas for improvement in terms of the dosage, components, and approach of the intervention, and test the intervention again in another study, before nurses working in reproductive centres can consider integrating this support programme into the service offered to infertile couples undergoing IVF treatment.

10.7 Conclusion

The acceptability, feasibility, and preliminary effects of a Partnership and Coping Enhancement Programme (PCEP) adopting a quasi-experimental intervention study design were examined in this study. The findings of this feasibility study indicated that the PCEP is feasible and acceptable for couples undergoing IVF treatment. Preliminary positive outcomes on the partnership of the couples, and on the dyadic coping and anxiety levels of the women were obtained in this study. Improvements in the dosage

and in the various components of the intervention need to be considered, before a full-range and multi-centred randomized controlled trial is conducted to further confirm its effectiveness.

PART III CONCLUSIONS AND SUGGESTIONS

FOR FUTURE RESEARCH

Chapter 11

Summary of the thesis

11.1 Introduction

11.2 Main findings

11.3 Implication for practice

11.4 Limitations and future research recommendation

11.5 Reflection on the project

11.6 Summary

11.1 Introduction

According to Medical Research Council (MRC) framework, this project conducted the first two stages of the process of the development-evaluation-implementation of a complex intervention, namely, the development and pilot of the intervention. In following this guideline, a series of interrelated studies has been conducted to identify the evidence, identify / develop a framework, develop the intervention, and examine the feasibility and preliminary effects of the intervention, as outlined in Figure 11-1.

11.2 Main findings

STAGE I: DEVELOPMENT OF THE COMPLEX INTERVENTION

STEP 1: IDENTIFYING THE EVIDENCE BASE

Reviews of literature (Chapter 2-5), concept analysis (Study I-Chapter 6), and qualitative study (Study II-Chapter 7)

The findings of the reviews indicated that the females of infertile couples had more negative experiences than their male partners, while both females and males were subjected to a stressful married life. For both men and women of infertile couples, support from one's partner was inversely related to stress. It also indicated that the periods prior to the pregnancy test and after the IVF failure in the IVF cycle were the most stressful time points for both men and women. The systematic review, focusing on relevant psychosocial intervention studies, revealed that the effects of various interventions on levels of depression, anxiety, stress, pregnancy rates, and marital function of couples undergoing IVF treatment could not be confirmed. It is concluded that a complex intervention, based on sound evidence, is needed for couples seeking IVF treatment.

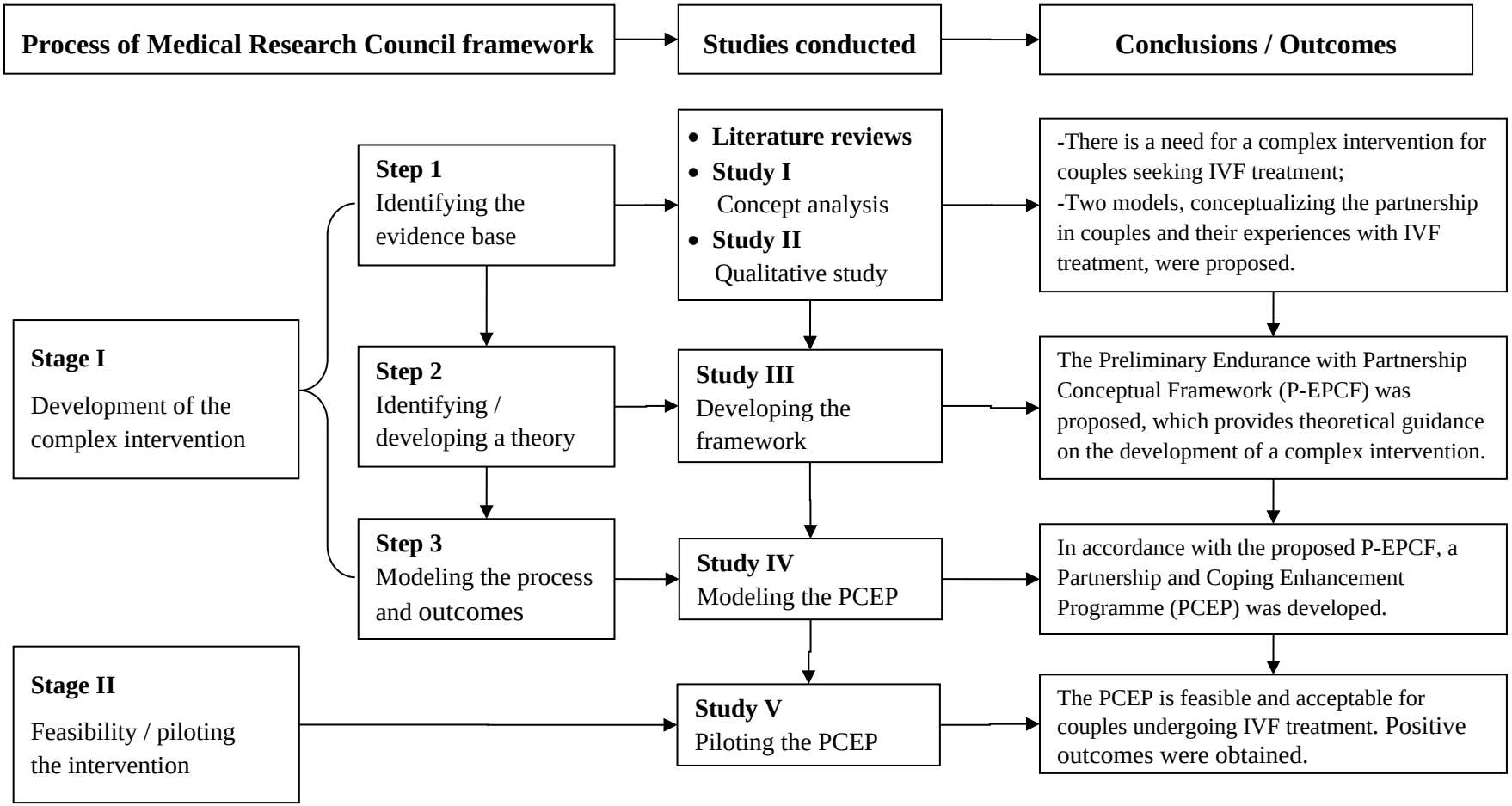

Figure 11-1. Process of MRC framework and corresponding studies conducted in developing and piloting the PCEP

Through the concept analysis, the attribute of ‘partnership’ in couples undergoing infertility treatment was identified as a process of joint hardship for infertile couples, which they endure through sharing, communication, and mutual support. The antecedents are love and attraction for each other, agreement on treatment goals, and interpersonal skills. The consequences of ‘partnership’ are marital benefit and improvements in psychological status and quality of life. According to the results of this concept analysis, a middle-range model for partnership was proposed. This model, which depicts a number of variables and their relationships, serves as a bridge between practice and theory in the related field.

A content analysis of the interviews of the qualitative study revealed four themes related to the experience of infertile couples: the process of hardship, enduring hardship with a loving relationship, the partnership in couples, and ambivalence towards social support. Based on the findings, a model on the experiences of couples undergoing IVF treatment was put forward. The participants in the interviews expressed a need to receive psychosocial interventions as part of the fertility treatment. This qualitative study provided insights for health professionals on the impacts of the IVF treatment on infertile couples, on the development of a framework, and on the development of a supportive programme for these couples.

STEP II: IDENTIFYING /DEVELOPING THEORY

Developing the framework (Study III-Chapter 8)

In Chapter 8, a preliminary endurance with partnership conceptual framework (P-EPCF) was proposed. It was developed on the basis of the biopsychosocial theory of infertility (BTI), and on the established theory of dyadic coping, which present a comprehensive picture of how individuals experience and adjust to infertility, and dyadic coping, respectively. The P-EPCF was then extended to include the middle-range model for partnership, and the model for the experience of IVF couples emerged from the qualitative study.

The proposed P-EPCF involves four domains. At the bottom of the diagram, the domain of the impacts of infertility and stressors represents the origin of the event or phenomenon, which refers to the experience of couples undergoing IVF treatment. The three dimensions of the dyadic outcomes domain are situated at the top of the diagram, and are comprised of psychological well-being, marital function, and biomedical outcome (pregnancy). In the middle of the diagram, the domains of the mediators of partnership and coping; and dyadic moderators, act as the pillars and buffers for the impacts of infertility and stressors. In particular, the partnership and coping mediators are the main focuses of the framework. This conceptual framework presents a comprehensive picture of the process by which couples cope with IVF treatment and its outcomes. It provides theoretical guidance on the development of a complex intervention, by including information on the components and dyadic outcome measures of the intervention, and the possible confounding factors.

STEP III: MODELLING THE PROCESS AND OUTCOMES

Modelling the PCEP (Study IV-Chapter 9)

In accordance with the proposed P-EPCF, a Partnership and Coping Enhancement Programme (PCEP) was developed for couples undergoing IVF treatment. The PCEP mainly targets the domain of the mediators of stress in the P-EPCF. It consists of two sections – partnership and coping – and was delivered to infertile couples on the day of embryo transfer. The essential components of this programme were developed based on a handbook for infertility counseling, the Bodenmann's dyadic coping theory, and meaningful findings from the reviews of the literature. The main focuses of the programme are to facilitate mutual sharing and support in infertile couples, and to improve their individual and dyadic coping strategies while undergoing IVF treatment, especially in the period when they are waiting for the results of a pregnancy test and after the disclosure of a negative treatment outcome. The programme is couple-based, consisting of experience sharing, psycho-education, meditation exercise, and skill practice. Written materials containing the essential elements of the intervention programme was distributed to supplement the session.

STAGE II: FEASIBILITY / PILOTING THE INTERVENTION

Piloting the PCEP (Study V-Chapter 10)

The acceptability and preliminary effects of the 'Partnership and Coping Enhancement Programme (PCEP)' were examined by a feasibility study with quasi-experimental controlled design. A total of 200 participants (100 couples) that recruited in sequence were distributed to a PCEP group or to a routine care control group. The couples in the intervention group receive a 90 min-session of PCEP in the morning of the day of ET, as well as the supplementary written materials.

Findings indicated that the recruitment rates were 94.3% and 87.7% for intervention group and control group respectively. In the intervention group, the retention rates for T1 and T2 assessment were 88% and 82%, while the corresponding retention rates in the control group were 92% and 80%.

Significant improvements were seen in partnership and dyadic coping in women at one month after embryo transfer (T2). The level of anxiety of the women was lower in the intervention than control group at waiting period (T1). The men of infertile couples only reported significantly improvement in the scores of partnership at T2. The effect sizes for these variables ranged from 0.42 to 0.46.

In summary, according to the MRC framework, five interrelated studies has been conducted to identify the evidence, identify / develop a framework, develop the intervention, and examine the feasibility and preliminary effects of the intervention. The findings of these studies can serve the next two stages of the process of the development-evaluation-implementation of a complex intervention, namely, the evaluation and implementation of the intervention.

11.3 Implication for practice

The results of this study also have implications for health care providers who serve infertile couples. Since the levels of anxiety and depression of the couples were higher at the two week waiting period for pregnancy testing, health care professionals should be aware of the distress of the couples during this period of time, and provide support to those at risk of psychological disorders.

This project provides a couple-based intervention, which targeted both on improving psychological well-being and marital benefit of couples undergoing IVF treatment. The results of the intervention study are promising though a full-range and multi-centered randomized controlled trial is needed to further confirm the effectiveness of the PCEP.

11.4 Limitations and future research recommendation

Although new contributions have been made to couples undergoing IVF treatment, this project has several limitations that need to be acknowledged.

Literature reviews

The articles included in the three reviews of literature were only those written in English or Chinese due to language barriers, which might result in biases in publications and sources. Another limitation is that the methodology of meta-analysis was not adopted because of the considerable heterogeneity among the studies that were included, which would inevitably affect the achievement of a reliable conclusion. Future research could adopt the approach of meta-analysis when the homogeneity of the included studies is desirable.

Concept analysis

In the process of identifying the components of partnership, it is possible that personal pre-conceptions might still have affected the process and outcomes of the analysis though the efforts of the researchers to maintain objectivity.

Qualitative study

The relatively small sample size of the interviews might be concerned though data saturation was reached. Another limitation is that the couple-based interviews were conducted with the presence of both partners, which might have hindered the free expression of deep feelings. Future research with larger sample size is needed so that other factors that might influence infertile couples' experience can be addressed, and stronger conclusion can be reached. In addition, future study should adopt a mixed interview format to explore each partner's feelings and experiences.

Developing the Preliminary Endurance with Partnership Conceptual Framework

In the development of the P-EPCP, the model for the experiences of IVF couples was conceptualized from a Chinese population. This might result in biases, because the socio-cultural context varies in different countries. However, the findings of this qualitative research are supported by studies conducted in other counties. Another limitation is that the relationships among the domains and variables have yet to be tested quantitatively, although the principles of building a conceptual framework were observed. Future study could test the framework quantitatively to reaffirm the relationships among the domains and variables.

Development of the Partnership and Coping Enhancement Programme (PCEP)

The PCEP has focus only on the two most difficult periods for couples undergoing IVF treatment, namely the two-week waiting period and the disclosure of the outcome of the treatment. Future study should also provide supportive interventions to infertile couple before treatment and during oocyte retrieval.

Another limitation is that the provision of treatment-related information has not been integrated into the complex intervention. This is because health information relating to the IVF treatment will be delivered by the staff from the study ART centre to all participants as part of their routine care. Only the psychosocial aspects of the infertile couples are considered in the intervention programme.

The feasibility study on the effects of PCEP for couples undergoing in vitro fertilization treatment

There are limitations in the present study that required special attention in further research. First, the design of this study has potential bias with non-randomization sampling. Also, all couples were recruited from one reproductive center, which limit the generalizability of the results. Therefore, it is highly recommended that a larger, multicenter randomized controlled trial study be conducted to test the effectiveness of this programme

Another limitation of the study is that the inflexibility of child bearing of the couples was not addressed in the intervention program. One of the couples in this study ended up in a divorce soon after their first failed IVF cycle although they had a good marital relationship to begin with. Further study should focus on the couples' inflexible attitude towards childbearing, to explore if by increasing the psychological flexibility of couples on bearing children could ease the couples' relationship strain and or acceptance of their childless situation (Hayes et al., 2011).

11.5 Reflection on the project

Identifying the research topic

When I started my PhD study, my supervisors and I shared our research experience, and tried to find a research topic for my study and lifelong research area as well. I recalled that I once participated in a research project that explored the experience of women seeking In Vitro Fertilization treatment. I was touched by the torturous process of treatment and the sufferings of the patients, and hoped that I could better serve this population. After considering the necessity and feasibility of this topic, my supervisors agreed with this research direction. In order to develop a potentially effective intervention, the Medical Research Council framework was adopted to guide the process of development of the programme.

Identifying the evidence base

In the first stage of identifying evidence base, a series of reviews of literature have been conducted, including the infertile couples' experience with and adjustment to infertility, couples' emotional reaction to IVF treatment, and the effects of existing psychosocial interventions on IVF patients. My supervisor suggested that I present the findings of each review as a manuscript ready for publication, which could also be a chapter of the final thesis. It was a great idea to identify and organize the evidence in a scientific and systematic way. However, it was a tough task for a beginner who has never published any academic paper in English. The process of manuscript writing was really painful and time-consuming, which seemed like a novice weaving a carpet. The first draft was so ineptness that I even did not have the courage to read it again. My supervisor, however, spent enormous time to review the manuscript, and offered critical, inspiring, and

detailed comments, encouraging and leading me to much deep and logical thinking. These efforts have eventually brought me a precious and breath-taking moment that our first paper was accepted for publication on the top journal in nursing science.

After conducting the literature reviews, we found that men of infertile couples were also affected psychologically. Both infertile women and men experience a stressful married life. However, the effects of relevant psychosocial interventions tested in RCT studies could not be confirmed due to methodological or practical issues, as identified by one of our systematic reviews. Thus, it was decided that my PhD project could focus on developing a supportive program that targeted infertile couples as a unit instead of the women only, and aimed at their psychological well-being and marital functions.

Also, the findings of literature reviews indicated that coping strategies and support were the two essential mediators for couples dealing with infertility-related stress. Specifically, for both men and women, partner support was found to be inversely associated with stress. Owing to the mutual support, some couples have even strengthened their marital relationship during the process of treatment. Therefore, it has been supposed that the partnership in couples plays an important role in couples coping with infertility.

Having a better understanding of the concept of partnership would be beneficial to the development of an intervention. My supervisor suggested that I should take a course named Concept Analysis, after which I conducted an analysis of the concept of ‘partnership’ in couples undergoing infertility treatment by using Rodger’s evolutionary method. This concept analysis has identified the antecedents, attributes, and

consequences of partnership, which would contribute to the future intervention in terms of the components, possible confounding factors, and outcome measures.

In addition to the findings identified from the literature, I was suggested to explore the experience of infertile couples in real clinical context. After content analysis of the interviews, couples' perception on the process of IVF treatment and the partner support was identified. Some unfavorable aspects on partnership in couples were also reported. A need for psychological counseling or a supportive program, as part of the infertility treatment, was expressed.

Developing the conceptual framework

According to the MRC framework, having a theory or conceptual framework is an important step in developing a complex intervention. However, after conducting a systematic search, no existing framework specifically for couples undergoing IVF treatment can be identified. Thus, we proposed the Preliminary Endurance with Partnership Conceptual Framework, which takes into the experiences of dyads (both men and women) with regard to IVF treatment, the dynamics of partnership support and coping of couples, dyadic moderators, and dyadic outcomes. It could provide researchers with a comprehensive picture of the experiences that couples have with and adjustments to IVF treatment. Also, the P-EPCF enables the development of a supportive intervention for couples enduring with the hardship.

A coincidence that I would like to mention here is about the diagram of the P-EPCF. It resembles the Chinese character [立], which is exactly one of my given names. I still

remember the day my supervisor and I discussed about the construction of the new conceptual framework. We put together all the models that identified from literature and our own studies, and tried to organize them in a logical way. It was so exciting when we figured out the preliminary diagram. The character [立] also has good meaning of "with-stand". We hoped that infertile couples will be inspired to stand strong and endure this difficult time.

Development of intervention programme

In accordance with the P-EPCF, the main focuses of the complex intervention were the two mediators: partnership in couples and dyadic coping. Four reliable sources were adopted when developing the Partnership and Coping Enhancement Programme (PCEP), namely, the handbook for infertility counseling, the Bodenmann's dyadic coping theory, the meaningful findings from reviews, and the results of interviews with Chinese IVF couples. The final components of the programme were decided in a discussion meeting held by the research team, which consists of medical and nursing specialists from the ART center, experts on women's health, and me. Besides, in order to be equipped with the skills needed, I attended a workshop titled 'Love & War in Couple Therapy: Effective Therapy with Difficult Couples'.

The piloting / feasibility study

After the development of the intervention, I conducted a feasibility study back in Hangzhou, Zhejiang Province, China. In the first stage, I worked on the study protocol, to depict each step in detail, and revising and combing the questionnaires. Besides, I made a lot of appointments with the administrative staff of this first-class hospital, and

the medical and nursing specialists from ART center, to negotiate the access of patients, the ethical approval, and to discuss the room, facilities, and the optimal procedure for the intervention.

The stage of delivery of intervention was pleasant, meaningful, and rewarding. I enjoyed listening to couples' experience with infertility, sharing knowledge and skills with them, and responding to their inquiries. The couples shared their happiness and sadness with me through the time spent together and the following contacts via We chat, and a good relationship among us was established. The PCEP program is regarded by the couples as necessary and helpful.

Looking back to the program, I wish I formally interviewed the couples after the completion of the study, especially those with failed cycles, the findings of which could be used to revise our programme. Also, it would be better to convert the PCEP into a DVD-based program, which could be delivered to the couples without the limitation of time and space.

The thesis presentation

When it comes to the final stage of thesis writing, I did not feel too anxious. I have conducted the inter-related studies step by step according to the MRC framework. Meanwhile, I was guided by my supervisor to write and publish the findings from each step of the project, including the reviews of literature, the concept analysis, the qualitative study, and the development of the intervention. In a sense, I have written the

thesis from the very beginning of my PhD study. The presentation of this thesis was also guided by MRC framework, which could make it more logical and understandable.

Looking back on my three-year study journey, I am so glad that my initial intention, serving for the couples undergoing IVF treatment, was realized. Owing to the intelligence and great responsibility of my supervisors, I could keep on the right track of the research project. Although the contributions to this area are not so significant, I have tried to do the best and will keep going throughout my academic career.

Summary of the reflection- surviving in PhD study

- Find a research topic that you are interested and have passion;
- Start writing the manuscript and get published at the beginning of the project;
- Enjoy responding to and appreciate the comments from supervisors and journal reviewers;
- Actively obtain knowledge and skills that needed from elective courses and workshops;
- Use win-win thinking in communicating with people involved in your project;
- Have faith in yourself and your project.

11.6 Summary

Guided by the Medical Research Council (MRC) framework, this project conducted the first two stages: the development and piloting of the Partnership and Coping Enhancement Programme (PCEP). The findings of this project provide a preliminary conceptual framework on the experiences and adjustments of IVF couples. The results of

the feasibility study indicated that the PCEP is feasible and acceptable for couples undergoing IVF treatment. This study has preliminary positive outcomes on partnership of couples, and on dyadic coping and anxiety levels of the women. Improvement in the dosage and the various components of the intervention are to be considered, before a full-range and multi-centered randomized controlled trial is needed to further confirm its effectiveness.

Appendices

Appendix VII Questionnaires for both female and male of infertile couples

Appendix VIII Questionnaires for females (Chinese version)

Appendix IX Questionnaires for males (Chinese version)

*English and Chinese versions included

Table 2-1 Summary of studies on the experiences of infertile couples

Quantitative studies

Authors (country of the study)	Aims	Samples/Age	Instrument Used/Study Design*	Significant Findings
Anderson et al., 2003 (UK)	To examine the emotional distress and infertility-related concerns of couples referred to a specialist infertility clinic and to determine changes in these over time.	- 113 couples. - no report.	- The Hospital Anxiety and Depression Scale (HADS). - Structured concerns questionnaire (self-developed). **Study design**: Cohort study.	- Women reported more symptoms of anxiety and depression than men at baseline assessment points (HADS Anxiety˃10: 25.7%vs. 8.9%, HADS Depression˃10: 2.7%vs. 1.8%, all $p<0.05$). - There was no significant change in HADS scores at the 6-month follow-up session. - Females reported greater infertility-related concerns regarding life satisfaction, sexuality, self-blame, self-esteem, and avoidance of friends compared with males.
Bayley et al., 2009 (UK)	To examine relationships among attachment, appraisal, coping. and adjustment in men and women experiencing	- females 98, males 64. - females: 32.64(5.22)y, males: 34.19(5.34).	- The experiences in close relationships-revised (ECR-R). - The appraisal of life events scale (ALES). - The ways of coping—revised (WOC-R). - The mental health inventory:	- In women, attachment anxiety was associated with well-being via appraisal of infertility as a loss (β =0.39, -0.28) and use of self-blame and avoidance (SBA) coping (β =0.37, -0.55), and also linked with infertility-related stress through SBA (β =0.37, 0.64). - In men, attachment anxiety was associated with well-being (β =0.37, -0.64) and infertility-related stress (β =0.37, 0.29)

	infertility concerns.		18-item version (MHI-18). - The fertility problem inventory (FPI). - Dyadic adjustment scale: modified Satisfaction Subscale (DAS).	again via SBA coping. - Attachment anxiety and avoidance were related to lower relationship satisfaction (β =-0.27, -0.28, respectively) in women, whereas only the former (β =-0.33) was important for men.
Bak et al., 2012 (Korea)	To evaluate the effect of a diagnosis of male infertility on anxiety and depression in the men themselves and in fertile female spouses.	- 72 infertile men and their fertile spouses, 60 fertile couples. - infertile men: 31.97(3.42)y, their fertile spouses: 30.81(3.60)y; fertile men: 33.87 (3.58)y, their fertile spouse: 30.20(4.26).	- The Beck Anxiety Inventory (BAI). - The Beck Depression Inventory (BDI).	- Fertile female partners of nonobstructive azoospermia (NOA) men reported higher BDI scores (m=26.81 vs. 22.61) after the initial diagnosis of azoospermia, whereas their partners recorded higher levels of depression (34.33 vs. 21.25) after the absence of testicular sperm was discovered (4 weeks later). - Insomnia was the most common complaint for both sexes after the diagnosis of azoospermia.
Bolsoy et al., 2010 (Turkey)	To examine potential differences in quality of life between infertile women and men.	- 141infertile women, 107 infertile men. - women: 30.48 y, men: 34.35y.	- World Health Organization Quality of Life-Brief (WHOQOL-Brief).	- No gender differences in the mean scores for the domains of physical health, psychological health, and social relations. - The mean score for the domain of environment was higher for infertile women than for infertile men (m=13.84 vs. 12.95). - Working infertile men had higher mean scores in the domains of physical health and social relations than women

				(physical health: m=15.66 vs. 15.21; social relations: m=14.89 vs. 14.52) and unemployed men (physical health: m=15.66 vs. 12.42; social relations: m=14.89 vs. 11.66).
Brucker et al., 2004 (USA)	To examine the relationship between support from health care providers and psychological adjustment for men and women experiencing infertility.	- females 73, males 47. - 35.14(4.29) y.	- Perceived support from health care providers (self-developed). - The Global Severity Index (GSI) Subscale of the Brief Symptom Inventory (BSI).	- For women, perceived support from health care providers did not predict levels of stress, depression, or anxiety. - For men, greater levels of perceived support from health care providers predicted lower levels of stress (FChange=4.90, $p<0.05$) and anxiety (FChange=4.81, $p<0.05$) but not depression.
Chachamovich et al., 2010 (Canada)	To examine the extent to which men and women seeking treatment for infertility were able to accurately perceive their partners' ratings of their quality of life.	- 162couples. - females: 32.11(5.8)y males: 36.15(7.69).	- World Health Organization Quality of Life-Brief (WHOQOL-Brief). - Beck Depression Inventory (BDI)	- Proxy assessments were consistently lower than self-reports on the domains of QOL (subject men: m=53.08 vs. 73.99, subject women: m=51.31 vs. 73.99, all $p<0.001$). - No gender difference was observed.
Cserepes et al., 2013	To investigate the infertility-related	- females 27, males 26 - females: 29.89	- Masculinity–femininity scale (MF).	- Infertility-related global stress, infertility-related social concerns, and general health problems have a greater effect

(Hungary)	stress in a Hungarian infertile population and examine the effects of gender roles, child wish motives, subjective well-being, and marital relationship on the experience of infertility.	(4.05)y males: 33.5(4.65)y.	- Marital roles subscale (MFRQ-MR). - The Leipzig Questionnaire on Motives to have a Child (LKM-20). - Dyadic Adjustment Scale (DAS). - The Fertility Problem Inventory (FPI). - Beck Depression Inventory (BDI). - Life meaning subscale from the Brief Stress and Coping Inventory (LM). - Short Form of the General Health Questionnaire (GHQ-12).	on women than on men (FBI, m=141.26 vs. 127.73; FBI, m=24.96 vs. 20.77; GHQ, m=23.48 vs. 25.54). - Infertile men more than women believe that life holds a deeper meaning (LM, m=12.62 vs. 11.11). - Women from the infertile group scored higher in femininity (MF, m=0.41, d=0.54, p<0.001) and lower in general health (GHQ, m=-0.70, d=0.54, p<0.05) than the reference population. - Femininity (β =0.460, p<0.05), traditional gender role concepts (β =-0.248, p<0.05), general health (β =-0.474, p<0.05), and marital relationship (β =-0.251, p<0.05) play the strongest roles in predicting stress caused by infertility.
Edelmann & Connolly, 2000 (UK)	To explore whether women experience greater distress than their partners with regard to infertility investigations and treatment.	- infertility clinic attenders: 130 couples, Referrals to an IVF clinic: 150couples. - infertility clinic attenders: females 28y, males 30y. Referrals to an IVF clinic: females	- Eysenck Personality Questionnaire (EPQ). - General Health Questionnaire (GHQ). - Beck Depression Inventory (BDI). - State–Trait Anxiety Inventory (STAI).	- Gender differences were found on all measures for both samples, but the scores showed few deviations from the normative data for both males and females. - Scores on the State-Trait Anxiety Inventory (STAI) and the General Health Questionnaire (GHQ) declined between assessments, with the scores for women showing a greater decline over time than the scores for men. - Females had a lower self-esteem score than males (SES:

		32y, males 34y.	- The Dyadic Adjustment Scale (DAS). - Self-esteem Scale (SES). - The Profile of Mood States (POMS). **Study design**: Longitudinal study	m=20.39 vs. 23.32) or normal people (m=28.6) on their first visit to the IVF clinic.
Fatoye et al., 2008 (Nigeria)	To determine gender differences in emotional status among infertile couples, and to identify factors associated with emotional burden in their families.	- 82 couples. - females: 34.1(6.4), males: 40.1(6.9).	- The Hospital Anxiety and Depression Scale (HADS).	- Women had a higher mean anxiety score (HADS: m=5.82 vs. 4.21) and a higher mean depression score (HADS: m=6.05 vs. 3.23) than their husbands. - The emotional burden on the family was associated with low religious inclinations on the part of husband and wife, a strained relationship between the couple, extended family pressure on the husband, the negative attitude of the husband towards the adoption of children, and the lower age group of the wife (all p<0.001).
Galhardo et al., 2011 (Portugal)	To have a better understanding of infertile couples in terms of psychological processes and their association with psychopathology, also with attention	- 100 couples. - 34.24(5.05) y.	- Beck Depression Inventory (BDI). - State Anxiety Inventory Form Y (STAI-Y). - Others as Shamer (OAS). - Experience of Shame Scale (ESS). - Self-Compassion Scale (SELFCS).	- In comparison with men, women showed more depressive symptoms (BDI: m=11.14 vs. 5.91), more internal shame (ESS: m= 54.86 vs. 44.95), and more self-judgment (SELFCS-Judg: m=38.44 vs. 31.55). - For infertile couples, self-judgment (β =0.29, p=0.000) , external shame (β =0.26, p=0.001) and internal shame (β =0.18, p=0.022) emerged as significant predictors of depressive symptoms.

	to gender differences.			
Galhardo et al., 2013 (Portugal)	To investigate gender differences regarding the mediating role of self-compassion and self-judgment on the effects of external shame, internal shame, dyadic adjustment, on infertility-related stress.	- females 162, males 147. -females: 33.79 (4.28)y males: 35.31(5.58)y.	- Fertility Problem Inventory (FPI). - Dyadic Adjustment Scale (DAS). - Others as Shamer (OAS). - Experience of Shame Scale (ESS). - Self-Compassion Scale (SCS).	- Women showed higher levels of infertility-related stress (FBI: m=143.09 vs. 128.19), external shame (OAS: m=19.92 vs. 17.14), and internal shame (ESS: m=52.59 vs. 43.35), and higher scores on self-judgment (SCS-judgment: m=37.87 vs. 31.21) than their male partners. - For women, self-compassion fully mediated the effect of internal shame on infertility-related stress and partially mediated the effect of dyadic adjustment on this variable, while external shame had a direct effect on infertility-related stress. - In men self-judgment fully mediated the effect of external and internal shame on infertility-related stress. Dyadic adjustment had only a direct effect on infertility-related stress.
Gulec et al., 2011 (Turkey)	To determine the effects of infertility on sexual functions and dyadic adjustment in infertile couples that seek infertility	- infertile group: 109 women, 111 men; Fertile group: 64 women, 46 men. - infertile group: women 30.7(5.6), men 34.8 (6.4).	- Beck Depression Inventory (BDI). - Golombok-Rust Inventory of Sexual Satisfaction (GRISS). - Dyadic Adjustment Scale (DAS).	- There were no gender differences in the BDI scores for infertile couples. - Men reported more problems according to the GRISS total scale (m=43 vs. 21) and subscale scores (with the exception of the avoidance subscale) than the women in the infertile group. -Women reported more problems according to the GRISS avoidance subscale score (m=1 vs. 2) than did the men in the

	treatment.			infertile group. - The men were more satisfied with the dyadic adjustment (34 vs. 32) than the women in the infertile group.
Karlidere et al., 2007 (Turkey)	To evaluate the levels of emotional distress, social support, and sexual function of infertile couples with no psychiatric Axis I disorder, according to gender differences.	- 103 primary infertile couples.	- Golombok Rust Inventory of Sexual Satisfaction (GRISS). - Procidano and Heller's Perceived Family Support (PFS). - Perceived Peer Support (PPS). - Beck Depression Inventory (BDI). - Spielberger State (STAI-S) and Trait (STAI-T) Anxiety Scale.	- Compared to men, women had more severe depressive symptoms when they were the cause of the couple's infertility, either alone (BDI, m=7.1 vs. 11.8) or when their husbands were also a cause of infertility (BDI, m=5.9 vs. 8.9), higher trait anxiety scores in all infertility groups, and perceived more social support from the family, whether they (PFS, m=22.3 vs. 26.5) or their husbands (PFS, m=23.1 vs. 26.4) were the cause of the infertility. - The most common sexual relationship problems in all infertility groups were non-communication and non-sensuality for men, and avoidance for women. - The emotional distress of women and men correlated negatively with their perceived social support and positively with their sexual functioning.
Kowalcek et al., 2001 (Germany)	To investigate the gender differences among infertile couples in coping strategies and in their relationship with the cause of	- 110 couples. - no report.	- The abbreviated form of the Freiburg Questionnaire on Coping with Illness (FKV-LIS).	- Among infertile couples, women reported a higher feature rating in the subscales "depressional coping" (m=2.09 vs. 1.61, p= 0.000) and "self-distraction and self-stabilization" (m= 2.91vs. 2.53, p=0.005) than their male partners. - Gender differences were observed in the coping strategies of infertile couples in relation to the cause of their infertility.

	infertility.			
Lau et al., 2008 (China)	To investigate the perceptions of and responses to infertility and their association with QOL among infertile couples living in rural China.	- 192 couples - females: <30y: 44.8%, ≥30y: 55.2%, males: <30y: 41.1%, ≥30y: 58.9%.	- The mental health and vitality subscale of the short-form-36 health survey (SF-36). - Quality of the spousal relationship (self-developed). - Perceived general physical health status (self-developed). - Perceptions and responses questionnaire (self-developed).	- Females were more likely than males to report lower mental health QOL (score<50: 12% vs. 4.7%) and poorer general physical health status (perceived as poor: 49.5% vs. 29.2%). - Over 30% of the respondents believed that childless couples could not live well, 80% desired to have a child very badly, over 60% pressured themselves or their spouse over the issue of infertility, and over 50% felt pressured when having sex. - 19.8% of men and 37.5% of women felt that infertility is humiliating for women. - Lower income, a worsening spousal relationship, infertility-related perceptions, pressuring oneself or one's spouse due to infertility, and a strong desire for children were associated with a lower quality of life.
Lee & Sun., 2000 (Taiwan, China)	To evaluate the differences in psychological distress, marital satisfaction, and sexual satisfaction between Chinese	- 59 infertile couples.	- The Infertility Questionnaire (IFQ). - Marital Satisfaction Questionnaire (MSQ). - Sexual Satisfaction Questionnaire (SSQ).	- Husbands expressed less distress than wives (IFQ, m=2.06 vs. 2.27). - The self-esteem of the husbands (Self-esteem subscale of IFQ, m=1.95 vs. 2.22) was higher than that of the wives. - The husbands' marital (MSQ, m=29.60 vs. 34.78) and sexual satisfaction (SSQ, m=13.24 vs. 15.07) was also higher than that of the wives.

	infertile husbands and wives.			
Lee et al., 2001 (Taiwan, China)	To compare the differences in distress, and marital and sexual satisfaction between husbands and wives due to a diagnosis of infertility.	- 138 couples. - females: 32.1y, males: 34.9y.	- The Chinese version of the Infertility Questionnaire (CIFQ). - Marital Satisfaction Questionnaire (MSQ). - Sexual Satisfaction Questionnaire (SSQ).	- Among couples in which both partners were infertile, females expressed less marital (MSQ: m=32.56 vs. 29.19) and sexual satisfaction (SSQ: m=16.22 vs. 14.63) than their male partners. - Wives who had been diagnosed with female infertility expressed higher distress over the issue of infertility than their husbands (CIFQ: m=2.52 vs. 2.20). - No differences in psychosocial responses were found among husbands, regardless of the diagnosis. - Wives who had been diagnosed with female infertility experienced greater distress over their self-esteem (subscale of CIFQ: m=2.49 vs. 2.12) and less satisfaction with their acceptance by their in-laws (subscale of MSQ: m=15.47 vs. 13.22) than those who whose husbands had been diagnosed with male infertility.
Liu et al., 2011 (China)	To explore the emotions and coping styles of infertile patients in terms of their gender and relationships.	- females 95, males 69. - females: <30y: 54.7%, 30-35y: 27.4%, ›35y: 17.9%. males: <30y: 46.4%, 30-35y: 34.8%,	- Self-Rating Depression Scale (SDS). - Self-Rating Anxiety Scale (SAS). - Coping Style Questionnaire (CSQ)	- The SDS and SAS total scores were higher for females than for males (SDS: m=43.2 vs. 40.4; SAS: m=39. 3 vs. 36.7). - The score on the CSQ "fantasy" factor was higher for females than for males (m=0.5 vs. 0.4, p<0.05). - The score on the CSQ "self-accusation" factor was positively correlated with the total scores on SDS and SAS

		›35y: 18.8%.		for females (β =0. 29, 0. 25, p<0.05), while for males the score on the CSQ "rationalization" factor was β =0. 49, 0.18, p<0.05.
Martins et al., 2014 (Portugal)	To investigate women's and men's perceived social support from family, friends, and their partner was associated with infertility-related stress.	- 213 couples. - females: 32.3(4.9)y, males: 34.3(6.2)y.	- Multidimensional Scale of Perceived Social Support (MSPSS). - The fertility problem inventory (FPI).	- Women's perceptions of spousal and familial support were inversely associated with their partner's infertility stress (β =-0.24, p=0.049; β =-0.23, p<0.001, respectively). - No significant partner effects were observed for women. - Infertility stress was found to be associated with a low level of family support for women (β =-0.27, p=0.003), and a low level of partner support for both men (β =-0.29, p=0.001) and women (β =-0.45, p=0.006).
Maximova et al., 2009 (Canada)	To examine whether unintended childlessness and unplanned births are associated with psychological distress, compared with intended childlessness and planned births.	- Early 30s: females 802, males 1081; Late 30s: females 274, males 367. - Early 30s: 32(2)y, Late 30s: 40 (0.5)y.	- Center for Epidemiologic Studies Depression scale (CES-D). - One self-developed question (to measure fertility intentions) **Study design**: Longitudinal study	- Unintended childlessness and unplanned births were not associated with psychological distress for women. - Among men, only unplanned births that occurred during their early 30s was associated with increases in psychological distress (β =2.51, p<0.05). - Unintended childlessness and unplanned births did not have a different association with psychological distress for men and women.
Musa et al.,	To evaluate	- 123 couples.	- Depression, Anxiety, and Stress	- Depression, anxiety, and stress-related difficulties were

2014 (Malaysia)	characteristics and gender differences in perceived psychological difficulties reported by infertile Malaysian couples.	- ≤34y: 172 (69.9%), >34y: 74 (31.1%).	Scale (DASS). - Coping Inventory for Stressful Situations (CISS).	reported at a higher frequency by wives than husbands (Depression, 31.7% vs. 15.4%; Anxiety, 56.1% vs. 30.1%; Stress, 25.2% vs. 18.7%, all $p<0.05$). - No gender differences were found in coping styles. - An emotion-oriented coping style was associated with higher levels of depression, anxiety, and stress in both genders (OR=2.5, 3.0, 1.5, respectively).
Onat & Beji, 2012 (Turkey)	To evaluate the effect of infertility on marital relations and quality of life in Turkey.	- 58 infertile couples, 51 fertile couples. - infertile women: ≤35y: 93.1%, ≥36y: 6.9%. Infertile men: ≤35y: 62.07%, ≥36y: 37.93%.	- World Health Organization Quality of Life-Brief (WHOQOL-Brief). - Dyadic Adjustment Scale (DAS). **Study design**: Case-control study	- No gender differences were found among infertile couples in QoL and DAS scores.
Pasch et al., 2002 (USA)	To test a theoretical model of the effect on marital communication and adjustment of men's and women's approaches to	- 48 couples. - females: 36.1(22-46)y, males: 38(26-52)y.	-Self-developed questions and questionnaire (to measure approach to infertility using a rating scale). - Couples Rating System (CRS). - Self-developed questionnaire (to measure the effect of infertility on marriage).	- Having children was more important to wives than to husbands (m=7.57 vs. 6.93, $p<0.05$); wives were more involved in trying to have a baby (m=8.50 vs. 6.70, $p<0.0001$), wanted to talk with their partner more about trying to have a baby (m=6.76 vs. 5.17, $p<0.0001$), and experienced a greater loss of self-esteem (m=4.15 vs. 2.74, $p<0.0001$) than did their husbands.

	infertility.			
Pinto-Gouveia et al., 2012 (Portugal)	To explore how emotion regulation processes are related to depression and to the sense of self-efficacy in dealing with infertility in infertile patients	- 100 fertile couples, 100 infertile couples. - infertile couples: 34.29(5.04) y, fertile couples: 35.16(4.37)y.	- Beck Depression Inventory (BDI). - Acceptance and Action Questionnaire II (AAQ II). - Coping Styles Questionnaire (CSQ). - Self-Compassion Scale (SELFCS).	- Infertile women showed more depressive symptoms (BDI: mean=11.14 vs. 5.90), less psychological flexibility/acceptance (AAQ II: mean=44.23 vs. 50.35), less self-compassion (SELFCS: mean=79.37 vs. 87.74), and more emotional and lessdetached coping style (CSQ: mean=33.68 vs. 37.74) than infertile men. - Psychological flexibility/acceptance was a significant predictor of depressive symptoms in men and women with infertility (β =.63; β =.45, respectively, all p=0.000).
Slade et al., 2007 (UK)	To test the model of proposed inter-relationships among stigma, disclosure, social support, partner relationship, and fertility-related and generic distress.	- females 87, males 64. - females: 31.8(5.7)y, males: 34.8 (6.3)y.	- The stigma consciousness questionnaire (SCQ). - The Disclosure Questionnaire (self-developed). - The Duke-UNC functional social support questionnaire (Broadhead et al., 1988). - Short form of the Dyadic Adjustment Scale (DAS-7). - The Fertility Problem Inventory (FPI). - The Hospital Anxiety and Depression Scale (HADS).	- Women reported greater stigma (SCQ: mean=22.30 vs. 16.81, p<0.001) and disclosure (DQ: mean=8.80 vs. 7.16, p<0.05) than men. - For men, stigma was linked to lower levels of disclosure (β =-0.263) and support (β =0.435) and higher levels of fertility-related distress (β =0.285) and generic distress (β =0.338). Disclosure itself was not linked to support. - For women, greater disclosure was linked only to higher generic distress (β =0.197). Stigma was directly linked to fertility-related distress (β =0.681) and to low perceived support, which mediated a relationship with generic distress (β =0.325, 0.304).

Sreshtha-putra et al., 2008 (Thailand)	To study infertility-related stress among infertile men and women and its relationship with the level of perceived social support.	- females 124, males 114. - females: 31.8(5.1)y, males: 34.1(5.8)y.	- The Fertility Problem Inventory (FPI). - The Personal Resource Questionnaire (PRQ).	- No gender differences were found in the global FPI scores and their perceived social support. - A negative correlation ($r=-0.1894$; $p<0.001$) existed between global stress and social support in women, but not in men.
Sultan & Tahir, 2011 (Pakistan)	To investigate the differences between infertile and fertile couples in levels of depression, anxiety, aggression, self-esteem, marital satisfaction, and sexual satisfaction.	- 200 infertile couples, 200 fertile couples. - females: 32.51(7.52) vs. 30.33(10.18), males: 37.55(7.95) vs. 35.3(11.26).	- Beck Depression Inventory (BDI). - Beck Anxiety Inventory (BAI). - Aggression Questionnaire (AQ). - Index of Self-Esteem (ISE). - Index of Marital Satisfaction (IMS). - Index of Sexual Satisfaction (ISS).	- Infertile couples tended to demonstrate higher levels of depression, anxiety, and aggression, and lower levels of self-esteem, marital satisfaction, and sexual satisfaction than fertile couples. - Infertile females tended to demonstrate higher levels of depression (BDI: mean=17.82 vs. 16.46) and anxiety (BAI: mean=20.10 vs. 17.24) and lower levels of self-esteem (ISE: mean=39.19 vs. 37.18) than their male partners. - No differences in the levels of aggression, marital satisfaction, and sexual satisfaction were found between the partners of infertile couples.
Wischmanne t al.,2009 (Germany)	To describe the psychosocial characteristics of infertile couples attending infertility	-females 633, males 535. -taking up counseling group: females: 33.45(3.98)y, males:	-Questionnaire on the case history of the desire for a child (KWA). -Questionnaire on motives for wanting a child (FKW). -Questionnaire on lay aetiologies	-No gender differences in the satisfaction with marriage, sexuality, and friends, acquaintances, and relatives were found both in the no counseling group and taking up counseling group. -Females tended to report higher level of depression than

	counseling	35.31(5.22)y; not counselled: females group: 32.43(4.26) y, males: 34.87(5.45)y.	(SUBURS). -Questionnaire on life satisfaction (FLZ). -Symptom checklist (SCL-90-R). -Glessen Test (GT). -Questionnaire on stress-inducing events in the couples' lives.	their male partners both in the no counseling group (Depression subscale of SCL-90: mean=53.02 vs. 48.93) and taking up counseling group (mean=56.58 vs.51.78). -Females had higher level of anxiety than males in taking up counseling group (Anxiety subscale of SCL-90: mean=54.57 vs.51.26), while no significant gender difference was found in the no counseling group (mean=53.44 vs. 51.90).
Wischmann et al., 2014 (Germany)	To investigate the sex lives and behavior of infertile women and men before and after the emergence of their mutual desire for a child.	-females 158, males 153. -females: 34y, males: 37.5y.	-Self-Esteem and Relationship Questionnaire (SEAR).	-Females of infertile couples reported lower level of sexual relationship satisfaction (Sexual Relationship Satisfaction subscale of SEAR: mean=73.80 vs. 77.53), and self-esteem (Self-Esteem subscale of SEAR: mean=75.61 vs. 84.27) than their male partners during the past 4 weeks.

*** Study Design: Unless specifically indicated, all studies were cross-sectional studies.**

Qualitative studies

Authors (country of the study)	Aims	SD	Informants	Significant Findings
Dimka et al., 2013 (Nigeria)	To examine how cultural beliefs influence perceptions of infertility, help seeking, and the consequences that ensue.	E	- infertile females 6, fertile females 2, infertile males 3, fertile males 3.	- Women were more likely to suffer verbal and physical abuse as a consequence of their infertility than men. - Infertile men found it easier to hide their shame, and most men would never acknowledge the possibility of their own sterility. - For some infertile women who found ways to overcome stigma by managing their relationships, the intense bonding to their husband militated against divorce.
Inhorn, 2003 (Egypt)	To explore the four major patriarchal paradoxes surrounding male infertility in the Middle Eastern Muslim country of Egypt.	F	- first period: 190 women; second period: 66 infertile couples.	- Infertility always mars a woman's femininity, no matter which partner is the cause of the problem; male infertility does not similarly redound on a man's masculinity. - Egyptian women married to infertile men experience diminished gender identity and threats of male-initiated divorce.
Mabasa, 2002 (South Africa)	To explore the community's perceptions of infertility and their influence on the interactions with	SC	- females 46, males 30.	- Women were pressured to reproduce by the community and held responsible for the couple's reproductive failure. - For men, infertility was considered so unacceptable that it is kept a secret. - The inability to interact with infertile people or to give them social support is modulated by the community's perceptions of the causes of infertility.

	and ability to act as a source of social support for infertile patients.			
Mumtaz et al., 2013 (Pakistan)	To explore and compare how gender ideologies, values, and expectations shape women's and men's experiences of infertility in Pakistan.	I	- females 12, males 8.	- For women, motherhood is not only a source of status and power, but also the only avenue to ensure their marital security. Weak marital ties did not affect the social identity, security, or power of men. - Women face harsher psychosocial, social, emotional, and physical consequences from childlessness than men. - Women unceasingly sought invasive infertility treatments, while most men assumed that there was nothing wrong with themselves.

Abbreviations: SD, Study design; E, Ethnographic; I, Interpretive descriptive approach; SC: social constructionist research orientation. F: field research

Table 3-1 Selected Searching Strategies

Ⅰ PubMed

Search	Query	Results
#1	"fertilization in vitro"[MeSH Terms] OR "sperm injections, intracytoplasmic"[MeSH Terms]	27728
#2	((((((((((((Fertilization* in Vitro[Title/Abstract]) OR In Vitro Fertilization*[Title/Abstract]) OR Test-Tube Fertilization*[Title/Abstract]) OR (Fertilizations [Title/Abstract] AND Test-Tube[Title/Abstract])) OR (Fertilization* [Title/Abstract] AND Test-Tube[Title/Abstract])) OR Test Tube Fertilization*[Title/Abstract]) OR Test-Tube Bab*[Title/Abstract]) OR (Bab* [Title/Abstract] AND Test-Tube[Title/Abstract])) OR Test Tube Babies[Title/Abstract]) OR (Sperm Injection* [Title/Abstract] AND Intracytoplasmic [Title/Abstract])) OR IVF[Title/Abstract]) OR (Injection* [Title/Abstract] AND Intracytoplasmic Sperm [Title/Abstract])) OR Intracytoplasmic Sperm Injection*[Title/Abstract]) OR (Injections [Title/Abstract] AND Sperm Intracytoplasmic [Title/Abstract])) OR ICSI[Title/Abstract]	20515
#3	#1 OR #2	33720
#4	((((Psychology[MeSH Terms]) OR Anxiety[MeSH Terms]) OR Depression[MeSH Terms]) OR Emotions[MeSH Terms]) OR Stress, Psychological[MeSH Terms]	406166
#5	((((((((((((((((Side Effect *[Title/Abstract] AND Psychological [Title/Abstract])) OR Psychological Side Effect*[Title/Abstract]) OR Anxiet*[Title/Abstract]) OR Depressi*[Title/Abstract]) OR Emotion*[Title/Abstract]) OR Distress*[Title/Abstract]) OR Psychological Stresses[Title/Abstract]) OR Stress*[Title/Abstract]) OR (Stress* [Title/Abstract] AND Psychologic*[Title/Abstract])) OR Psychologic* Stress*[Title/Abstract]) OR (Stress*[Title/Abstract] AND Life[Title/Abstract])) OR Mental Suffering[Title/Abstract]) OR (Suffering[Title/Abstract] AND Mental[Title/Abstract])) OR Suffering[Title/Abstract]) OR Emotional Stress[Title/Abstract]) OR (Stress [Title/Abstract] AND Emotional[Title/Abstract])) OR psychosocial[Title/Abstract]) OR psycholog*[Title/Abstract]	789389
#6	#4 OR #5	1075245
#7	Infertility[MeSH Terms]	52634
#8	((((((Sterility [Title/Abstract] AND Reproductive [Title/Abstract])) OR Sterility[Title/Abstract]) OR Reproductive Sterility[Title/Abstract]) OR Sub-Fertility[Title/Abstract]) OR Subfertility[Title/Abstract]) OR Infertil*[Title/Abstract]	56191
#9	#7 OR#8	79204
#10	#3AND #6	763
#11	((((((((("randomized controlled trial"[Publication Type]) OR "controlled clinical trial"[Publication Type]) OR "ramdomized"[Title/Abstract]) OR "ramdomised"[Title/Abstract]) OR "placebo"[Title/Abstract]) OR "sham"[Title/Abstract]) OR "randomly"[Title/Abstract]) OR "trial"[Title/Abstract])	878725
#12	#10 NOT #11	706
#13	(animals[MeSH Terms] NOT (humans[MeSH Terms] AND animals[MeSH Terms]))	3892914
#14	#12NOT #13	694
#15	("2000"[Date - Publication] : "3000"[Date - Publication])	10546676
#16	#14 AND #15	426
#17	English[Language]	19444833

#18	#16AND #17	383

Ⅱ EMBase

Search	Query	Results
#1	'infertility'/exp	93087
#2	'sterility reproductive':ab,ti OR sterility:ab,ti OR 'reproductive sterility':ab,ti OR 'sub-fertility':ab,ti OR subfertility:ab,ti OR infertil*:ab,ti	74740
#3	#1 OR #2	118368
#4	'fertilization in vitro'/exp	38297
#5	'intracytoplasmic sperm injection'/exp	12568
#6	'fertilization in vitro':ab,ti OR 'in vitro fertilization':ab,ti OR 'test-tube fertilization':ab,ti OR 'fertilizations test-tube':ab,ti OR (fertilization NEAR/3 'test tube'):ab,ti OR 'test tube fertilization':ab,ti OR 'test-tube baby':ab,ti OR (bab* NEAR/3 'test tube'):ab,ti OR 'test tube babies':ab,ti OR (sperm:ab,ti AND (injection NEAR/3 intracytoplasmic):ab,ti) OR ivf:ab,ti OR ((injection* NEAR/3 intracytoplasmic):ab,ti AND sperm:ab,ti) OR 'intracytoplasmic sperm injection':ab,ti OR ((injections NEAR/3 sperm):ab,ti AND intracytoplasmic:ab,ti) OR icsi:ab,ti	38754
#7	#4OR#5OR#6	53199
#8	'psychological aspect'/exp	464225
#9	'anxiety'/exp	126373
#10	'Depression'/exp	319422
#11	'Emotions'/exp	383734
#12	'stress'/exp	194839
#13	'Psychology'/exp	164071
#14	(‘Side Effect’NEAR/3 Psychological):ab,ti OR ‘Psychological Side Effect’:ab,ti OR Anxiet*:ab,ti OR Depressi*:ab,ti OR Emotion*:ab,ti OR Distress*:ab,ti OR ‘Psychological Stresses’:ab,ti OR Stress*:ab,ti OR (Stress* NEAR/3 Psychologic*):ab,ti OR ‘Psychological Stress’:ab,ti OR (Stress* NEAR/3 Life):ab,ti OR ‘Mental Suffering’ OR (Suffering NEAR/3 Mental):ab,ti OR Suffering:ab,ti OR ‘Emotional Stress’:ab,ti OR (Stress NEAR/3 Emotional):ab,ti OR psychosocial:ab,ti OR psycholog*:ab,ti	1559753
#15	#8OR#9OR#10OR#11OR#12OR#13OR#14	2199685
#16	#3 AND #7AND#15	1834
#17	‘controlled clinical trial’/exp OR ‘single blind procedure’/exp OR ‘double-blind procedure’/exp OR ‘crossover procedure’/exp	497137
#18	random*:ab,ti OR placebo:ab,ti OR trial:ab,ti	502009

#19	#17OR#18	822887
#20	#16NOT 19	1745
#21	‘animal’/exp OR ‘nonhuman’/exp OR ‘animal experiment’/exp	20545316
#22	'human'/exp	14796382
#23	#21 AND #22	14796382
#24	#21 NOT#23	5748934
#25	#20 NOT #24	1721
#26	[2000-2014]/py	12875524
#27	#25 AND #26	1300
#28	english:la	22425690
#29	#27 AND #28	1165
#30	'article':it OR 'Article in Press':it OR 'Review':it	22440006
#31	#29 AND #30	746

Ⅲ PsychInfo

Search	**Query**	**Results**
#1	MJSUB.EXACT.EXPLODE("Infertility")	1455
#2	ti(sterility NEAR/3 reproductive) OR ti(Sterility) OR ti("Reproductive Sterility") OR ti(Subfertility) OR ti(Sub-Fertility) OR ti(Infertil*)	1154
#3	ab(sterility NEAR/3 reproductive) OR ab(Sterility) OR ab("Reproductive Sterility") OR ab(Subfertility) OR ab(Sub-Fertility) OR ab(Infertil*)	2618
#4	#1 OR#2 OR #3	2859
#5	MJSUB.EXACT.EXPLODE("Reproductive Technology")	1135
#6	ti(Fertilization* in Vitro) OR ti((In Vitro Fertilization* OR IVF)) OR ti((Test-Tube Fertilization* OR Injection* NEAR/3 Intracytoplasmic Sperm)) OR ti((Intracytoplasmic Sperm Injection* OR Injections AND Sperm NEAR/3 Intracytoplasmic)) OR ti((Fertilization* NEAR/3 Test-Tube OR ICSI)) OR ti(Test Tube Fertilization*) OR ti(Test-Tube Bab*) OR ti(Bab* NEAR/3 Test-Tube) OR ti(Test Tube Babies) OR ti(Sperm Injection* NEAR/3 Intracytoplasmic)	215
#7	ab(Fertilization* in Vitro) OR ab((In Vitro Fertilization* OR IVF)) OR ab((Test-Tube Fertilization* OR Injection* NEAR/3 Intracytoplasmic Sperm)) OR ab((Intracytoplasmic Sperm Injection* OR Injections NEAR/3 Sperm NEAR/3 Intracytoplasmic)) OR ab((Fertilization* NEAR/3 Test-Tube OR ICSI)) OR ab(Test Tube Fertilization*) OR ab(Test-Tube Bab*) OR ab(Bab* NEAR/3 Test-Tube) OR ab(Test Tube Babies) OR ab(Sperm Injection*	599

	NEAR/3 Intracytoplasmic)	
# 8	#5 OR #6 OR #7	1375
#9	MJSUB.EXACT.EXPLODE("Clinical Psychology")	6090
#10	MJSUB.EXACT.EXPLODE("Anxiety")	39121
#11	MJSUB.EXACT.EXPLODE("Depression (Emotion)")	17254
#12	MJSUB.EXACT.EXPLODE("Emotions")	182440
#13	MJSUB.EXACT.EXPLODE("Psychological Stress")	5997
#14	ti(Anxiet*) OR ti(Depressi*) OR ti(Emotion*) OR ti(Distress*) OR ti(Stress*) OR ti(Suffering) OR ti(psychosocial) OR ti(psycholog*)	358442
#15	ab(Anxiet*) OR ab(Depressi*) OR ab(Emotion*) OR ab(Distress*) OR ab(Stress*) OR ab(Suffering) OR ab(psychosocial) OR ab(psycholog*)	930699
#16	#9 OR #10 OR #11 OR #12 OR #13 OR #14 OR #15	1039166
#17	#4 AND #8 AND #16	284
#18	MJSUB.EXACT("Random Sampling")	177
#19	MJSUB.EXACT("Clinical Trials")	652
#20	ti(placebo) OR ti(trial) OR ti(random*)	32224
#21	ab(placebo) OR ab(trial) OR ab(random*)	222050
#22	#18 OR #19 OR #20 OR #21	226292
#23	#17 NOT #22	273
#24	PY=2000-2014	160

Ⅳ CAJ

Search	**Query**	**Results**
#1	题名=不孕 OR 不育，或者 关键词=不孕 OR 不育	27149
#2	题名=IVF OR ICSI OR 试管婴儿 OR 体外受精 OR 胚胎移植 OR 体外授精 或者 关键词=IVF OR ICSI OR 试管婴儿 OR 体外受精 OR 胚胎移植 OR 体外授精	643
#3	题名=心理 OR 压力 OR 焦虑 OR 抑郁 OR 情* OR 心*或者 关键词=心理 OR 压力 OR 焦虑 OR 抑郁 OR 情* OR 心*	29
#4	#1AND #2AND #3	29

Table 3-2. Pretreatment emotional reactions to IVF treatment

Authors (country of study)	Sample size	Measure-ment point	Reference group	Significant findings			
				Depression		Anxiety	
				Women	Men	Women	Men
Dong et al., 2013 (China)	502 men of infertile couples, inductees	At the beginning of treatment	Normative data	—	IVF > norm (SDS, m = 44.00 vs. 41.88)	—	IVF > norm (SAS, m = 39.75vs. 37.23)
Holter et al., 2006 (Sweden)	117 couples, inductees	2-4 weeks before the first treatment	Norm values from a Swedish population of matched age and gender	IVF = norm (PGWB*****, m = 15.4 vs. 15.3) ***** The higher value indicates less depression/anxiety.	IVF < norm (PGWB*****, m = 16.3 vs. 15.8)	IVF < norm (PGWB, m = 21.6 vs. 23.1)	IVF > norm (PGWB*****, m = 23.1 vs. 24.5)
Kee et al., 2000 (Korea)	138 IVF women	At the time of entering the IVF program	77 fertile women	IVF > norm (BDI, m = 27.24 vs. 26.32)	—	Trait anxiety: IVF > norm (STAI, m = 46.23 vs. 43.56); State anxiety: IVF = norm (the exact value was not provided)	—
Lewis et al., 2013 (USA)	321 IVF women	Prior to undergoing IVF treatment	7860 postpartum patients, 3000 published primary care patients, and 4836 patients from the general population	-IVF < primary care group (PHQ-9, Incidences of MDD: 1% vs. 10%; ODD: 2% vs. 6%), -No depressive symptoms: IVF > postpartum and general population group (PHQ-9, 45.2% vs. 19.9% vs. 34%)	—	—	—
Merari et al., 2002 (Israel)	113 couples, inductees and veterans	10-15 days prior to the initiation of the treatment	Population norm	Group C (succeeded in conceiving) = Group NC (failed to conceive) > Norm (DACL, m = 11.35 vs. 9.87 vs. 8.59)	Group C = Norm > Group NC (DACL, m = 10.0 vs. 8.5 vs. 7.3)	Trait: Group C = Group NC > Norm (STAI, m = 41.04 vs. 41.44 vs. 38.3); State: Group C = Group NC > Norm (STAI, m = 43.04 vs. 39.18 vs. 33.8)	Trait: Group C = Norm > Group NC (STAI: m = 38.26 vs. 37.4 vs. 34.99); State: Group C = Group NC = Norm (STAI: m = 35.6 vs. 31.8 vs. 32.5)

Salvatore et al., 2001 (Italy)	101women, inductees and veterans	At the first visit of index treatment cycle	75 fertile women	IVF > fertile women (MMPI, m = 59.61 vs. 49.56)		IVF > fertile women (SCL-90, m = 0.55 vs. 0.40); Inductee > veterans (P = 0.04)	
Wang et al., 2007 (China)	100 IVF women, 100 ICSI women	During their first visits to the IVF clinic	100 fertile women	IVF > ICSI > control (SCL-90, m = 0.70 vs. 0.58 vs. 0.47)		IVF group = ICSI group > control group (SCL-90, m = 0.73 vs. 0.67 vs. 0.43)	
Yassini et al., 2005 (Iran)	25 IVF couples, 25 ICSI couples	Waiting for their first treatment cycle of IVF or ICSI	25 couples with a history of fertility	Moderate and severe: IVF < ICSI > control (BDI ≥ 10, IVF vs. ICSI vs. control = 48% vs. 52% vs. 12%)	Moderate and severe: IVF > ICSI > control (BDI ≥ 10, IVF vs. ICSI vs. control = 44% vs. 26.7% vs. 24%)	Moderate and severe: IVF > ICSI > control (STAI ≥ 40, IVF vs. ICSI vs. control = 88% vs. 76% vs. 44%)	Moderate and severe: IVF = ICSI = control (P > 0.05)
Wichman et al., 2011 (USA)	160 couples	Before proceeding with IVF	No	**Women** > **Men** (BDI, m = 4.0 vs. 2.7)		**Women** > **Men**: state anxiety (STAI-S, m = 32.8 vs. 30.4)	

Abbreviations: BDI: the Beck Depression Inventory; **DACL**: the Lubin's Depression Adjective Checklist Scale; **MDD:** major depressive disorder; **MMPI**: the Welsh anxiety and depression sub-scale of the Minnesota multiphasic personality inventory; **ODD:** other depressive disorders; **PGWB**: the Psychological General Well-Being Index; **PHQ-9**: the Patient Health Questionnaire-9; **PSS**: Perceived Stress Scale; **SAS**: the Self-Rating Anxiety Scale; **SCL-90**: the Symptom Check List; **SDS**: the Self-Rating Depression Scale; **STAI**: the State Trait Anxiety Inventory.

Table 3-3 Emotional reactions of infertile couples during a treatment cycle

Authors (country of the study)	Sample size	Measure-ment point	Significant findings			
			Depression		Anxiety	
			Women	Men	Women	Men
Chiaffarino et al., 2011 (Italy)	872 women and 859 men, inductees and veterans	**T1:** at first visit; **T2:** at the time of the β-HCG dosage (or at the moment of the suspension of the cycle)	T2 › T1 (ZDS, m = 34.62 vs. 33.40)	T2 ＝ T1 (ZDS, m = 29.51 vs. 29.78)	T2 › T1 (ZAS, m = 32.64 vs. 31.95)	T2 = T1 (ZAS, m = 27.55 vs. 27.84)
Ismail et al., 2004 (UK)	30 couples, veterans	**T1:** pretreatment; **T2:** before the embryo transfer; **T3:** before the pregnancy test	T2 < T1 < T3 (MAACL, m = 50.6 vs. 51.7 vs. 61.9)	T2 < T1 > T3 (MAACL, m = 50.3 vs. 54.6 vs. 61.8)	Similar for all visits	Similar for all visits.
Jin et al., 2013 (China)	460 women, inductees	On the day their oocytes were retrieved	Prevalence: (ZDS ≥ 40, 14.8%)	—	Prevalence: (ZAS ≥ 40: 33.3%)	—
Li et al., 2012 (China)	538 women, inductees and veterans	Within 2 hours after the embryo transfer	Prevalence: (SDS, 12.3%)	—	Prevalence: (SAS, 38.5%)	—
Mahajan et al., 2010 (Australia)	74 women, inductees	**T1:** before the start of the study, **T2:** before the ovum pick-up (OPU), **T3:** before the embryo transfer	—	—	State anxiety: T1 < T2 = T3 (STAI, m = 44.00 vs. 46.41 vs. 46.72)	—
Romano et al., 2012 (Israel)	63 women with explained infertility (EIF), 42 women with unexplained infertility (UIF); inductees and veterans	**T1:** before entering treatment; **T2:** 2-4 weeks after baseline, at the end of the 2-week gonadotropin administration period; **T3:** 12 days after the embryo transfer but before the pregnancy test	EIF, T1 = T2 = T3 (CES-D, 31.36 vs. 34.43 vs. 35.7, *P* >0.05); UIF, T1=T2=T3 (CES-D, 31.73 vs. 34.81 vs. 34.41, *P* >0.05)	—	EIF, T1 = T2 = T3 (STAI, m = 39.53 vs. 43.16 vs. 45.35, *P* > 0.05); UIF, T1 = T2 = T3 (STAI, m = 38.95 vs. 43.52 vs. 43.92, *P* > 0.05)	—

Turner et al., 2013 (USA)	44 women, inductees and veterans	**T1:** prior to ovarian stimulation; **T2:** one day prior to the oocyte retrieval; **T3:** 5-7 days after the embryo transfer	—	—	State anxiety: T1 = T2 = T3 > norm (STAI, m = 41.45 vs. 41.63 vs. 42.06 vs. 35.20) Trait anxiety: T1 = T2 = T3 (STAI, m = 38.68 vs. 38.87 vs. 37.81), T1 = T2 > norm (STAI, m = 38.68 vs. 38.87 vs. 34.79)	—
Volgsten et al., 2008 (Sweden)	439 women, 423 men, inductees and veterans	On the day of the oocyte retrieval	Prevalence of major depression (PRIME-MD, 10.9%)	Prevalence of major depression (PRIME-MD, 5.1%)	Prevalence of anxiety disorder (PRIME-MD, 14.8%)	Prevalence of anxiety disorder (PRIME-MD, 4.9%)
Yong et al., 2000 (UK)	37 women, Inductees	**T1:** before treatment; **T2:** before the embryo transfer; **T3:** before the pregnancy test	T1 = T2 < T3 (MAACL, m = 45.21 vs. 45.21 vs. 57.12)	—	T1 < T2 = T3 (MAACL, m = 60 vs. 77.26 vs.71.51)	—
Wu et al., 2008 (China)	212 women	**T1:** pretreatment; **T2:** 1h before the embryo transfer; **T3:** 9-10 days after ET; **T4:** 20 days after the embryo transfer	The prevalence of depression: T1 = T2 = T3 < T4 (CES-D, 32.1% vs. 27.4% vs. 30.2% vs. 47.2%)	—	The prevalence of anxiety: T1 = T2 = T3 < T4 (SAS, 15.1% vs. 17.5% vs. 18.4 vs. 25.9%)	—

Table 3-4 Psychological distress of infertile couples during a treatment cycle

Authors (country of the study)	Sample size	Measurement point	Significant Findings	
			Psychological Distress	
			Women	Men
Holter et al., 2006 (Sweden)	117 couples, inductees	**T1:** 2-4 weeks before the first treatment, **T2:** 1h before the oocyte retrieval	Psychological impacts: T2 ˃ T1 (EIQ, m = 34.2 vs. 33.5)	Psychological impacts: T2 ˃ T1 (EIQ, m = 32.0 vs. 30.8)
Ismail et al., 2004 (UK)	30 couples, veterans	**T1:** pretreatment; **T2:** before the embryo transfer; **T3:** before the pregnancy test	Positive affect: T2 > T1 > T3 (MAACL, m = 43.4 vs. 40.8 vs. 37.2)	Positive affect: T2 > T1 > T3 (MAACL, m = 44.1 vs. 42.8 vs. 39.8)
Mahajan et al., 2010 (Australia)	74 women, inductees	**T1:** before the start of the study, **T2:** before ovum pick-up (OPU), **T3:** before the embryo transfer	-Positive affect: T2 = T3 < T1 (PANAS, m = 30.10 vs. 29.90 vs. 32.00) -Negative affect: T1 < T2 < T3 (PANAS, m = 26.44 vs. 29.75 vs. 31.89)	—
Yong et al., 2000 (UK)	37 women, inductees	**T1:** before treatment; **T2:** before the embryo transfer; **T3:** before the pregnancy test	-Positive affect: T1 = T2 > T3 (MAACL, m = 39.45 vs. 41.92 vs. 35.34)	—
Boivin & Lancastle, 2010 (UK)	61women, inductees and veterans	Active stage, waiting stage, outcome stage	-Active stage: positive affect with a lesser degree of anxiety; -Waiting stage: a combination of positive affect and anxiety symptoms versus depression; -Outcome stage: depression	—

Abbreviations: BDI: the Beck Depression Inventory; **CES-D:** the Center for Epidemiologic Studies Depression Scale; **EIQ**: the Effects of Infertility Questionnaire; **ICQ**: the Illness Cognition Questionnaire; **MAACL**: the Mean Affect Adjective Check-List; **PANAS**: The Positive and Negative Affect Schedule; **PRIME-MD**: the Primary Care Evaluation of Mental Disorders; **SAS**: the Self-Rating Anxiety Scale; **SDS**: the Self-Rating Depression Scale; **STAI**: the State Trait Anxiety Inventory; **ZAS**: Zung Anxiety Scale; **ZDS**: the Zung Self-Rating Depression Scale.

Table 3-5 Long-term emotional reactions after IVF failure

Authors (country of the study)	Sample size	Measure-ment point	Significant findings			
			Depression		Anxiety/*other emotional reactions	
			Women	Men	Women	Men
Verhaak et al., 2005 (The Netherlands)	148 women, 71men, inductees	**T1:** Pre-treatment; **T2:** 4-6 weeks after the pregnancy test; **T3:** 6 months after the treatment cycle	Pregnant women: T1 > T2 = T3 (BDI, m = 1.5 vs. 0.8 vs. 0.5); non-pregnant women: T1 < T2 = T3 (BDI, m = 1.5 vs. 2.3 vs. 2.3)	In couples with pregnant women: T1 = T2 < T3 (BDI, m = 0.7 vs. 0.6 vs. 0.4) In couples with non-pregnant women: T1 = T2 = T3 (BDI, m = 1.0 vs. 1.5 vs. 0.8)	State anxiety: pregnant women: T1 > T2 = T3 (STAI, m = 36.7 vs. 33.5 vs. 34.2); non-pregnant women: T1 < T2 = T3 (STAI, m = 37.3 vs. 40.2 vs. 39.0)	state anxiety: in couples with pregnant women: T1 = T2 = T3 (STAI, m = 32.8 vs. 32.3 vs. 32.3); in couples with non-pregnant women: T1 = T2 = T3 (STAI, m = 33.5 vs. 34.9 vs. 32.4)
Bryson et al., 2000 (UK)	76 women whose treatment had failed 4-9 years ago	4-9 years after the failure of the IVF treatment	Those who became parents < those who remained childless (MMPI, m = 1.71 vs. 4.56)	—	***other emotional reactions** -Stress: those who became parents < those who remained childless (PSS, m = 14.88 vs. 18.44) -Satisfaction with life: those who became parents > those who remained childless (SWLS, m = 26.29 vs. 21.58)	—

Abbreviations: BDI: Beck Depression Index; **MMPI**: the Welsh anxiety and depression sub-scale of the Minnesota multiphasic personality inventory; **PSS**: the perceived stress scale; **STAI**: State and Trait Anxiety Inventory; **SWLS**: the satisfaction with life scale.

Table 4-1 Searching Strategies

PubMed

Search	Query	Items found
#1	("Infertility"[MeSH Terms]) OR infertile[Title/Abstract]	59693
#2	((((((("fertilization in vitro"[MeSH Terms]) OR "sperm injections, intracytoplasmic"[MeSH Terms]) OR "Reproductive Techniques, Assisted"[Mesh]) OR IVF[Title/Abstract]) OR ICSI[Title/Abstract]) OR in vitro fertilization[Title/Abstract]) OR assisted reproductive technology[Title/Abstract]) OR assisted reproductive technologies[Title/Abstract]) OR Intracytoplasmic Sperm Injection[Title/Abstract]	63660
#3	((((((((((((((("Psychotherapy"[Mesh]) OR Psychotherapy [Title/Abstract]) OR therapy[Title/Abstract]) OR Intervention [Title/Abstract]) OR programme [Title/Abstract]) OR program [Title/Abstract]) OR Mind body [Title/Abstract]) OR Cognitive behavioral[Title/Abstract]) OR counseling [Title/Abstract]) OR (acceptance and commitment therapy [Title/Abstract])) OR progressive muscle relaxation[Title/Abstract]) OR relaxation therapy [Title/Abstract]) OR hypnosis[Title/Abstract]) OR medical clowning[Title/Abstract]) OR stress management [Title/Abstract]) OR emotional disclosure[Title/Abstract]) OR emotional support[Title/Abstract]) OR group support[Title/Abstract]	2121432
#4	((((((((((((((((Psychology[MeSH Terms]) OR Anxiety[MeSH Terms]) OR Depression[MeSH Terms]) OR Emotions[MeSH Terms]) OR Stress, Psychological[MeSH Terms]) OR Psychology[Title/Abstract]) OR anxiety[Title/Abstract]) OR depression[Title/Abstract]) OR emotion [Title/Abstract]) OR Stress[Title/Abstract]) OR distress [Title/Abstract]) OR mental health[Title/Abstract]) OR quality of life[Title/Abstract]) OR psychological well-being [Title/Abstract]) OR marital relationship [Title/Abstract]) OR marital satisfaction [Title/Abstract]) OR pregnancy rate[Title/Abstract]	1277633
#5	(((((("randomized controlled trial"[Publication Type])OR "controlled clinical trial"[Publication Type]) OR randomized[Title/Abstract]) OR randomly[Title/Abstract]) OR trial [Title/Abstract]) OR groups [Title/Abstract])))	2172997
#6	(("Animals"[Mesh]) NOT (("Animals"[Mesh]) AND "Humans"[Mesh]))	4020213
#7	#1 AND #2 AND #3 AND #4 AND #5 NOT #6	446

#7	((((((((((("Infertility"[MeSH Terms]) OR infertile[Title/Abstract])) AND (((((((("fertilization in vitro"[MeSH Terms]) OR "sperm injections, intracytoplasmic"[MeSH Terms]) OR "Reproductive Techniques, Assisted"[Mesh]) OR IVF[Title/Abstract]) OR ICSI[Title/Abstract]) OR in vitro fertilization[Title/Abstract]) OR assisted reproductive technology[Title/Abstract]) OR assisted reproductive technologies[Title/Abstract]) OR Intracytoplasmic Sperm Injection[Title/Abstract]))) AND ((((((((((((((((("Psychotherapy"[Mesh]) OR Psychotherapy [Title/Abstract]) OR therapy[Title/Abstract]) OR Intervention [Title/Abstract]) OR programme [Title/Abstract]) OR program [Title/Abstract]) OR Mind body [Title/Abstract]) OR Cognitive behavioral[Title/Abstract]) OR counseling [Title/Abstract]) OR (acceptance and commitment therapy [Title/Abstract])) OR progressive muscle relaxation[Title/Abstract]) OR relaxation therapy [Title/Abstract]) OR hypnosis[Title/Abstract]) OR medical clowning[Title/Abstract]) OR stress management [Title/Abstract]) OR emotional disclosure[Title/Abstract]) OR emotional support[Title/Abstract]) OR group support[Title/Abstract]))) AND ((((((((((((((((Psychology[MeSH Terms]) OR Anxiety[MeSH Terms]) OR Depression[MeSH Terms]) OR Emotions[MeSH Terms]) OR Stress, Psychological[MeSH Terms]) OR Psychology[Title/Abstract]) OR anxiety[Title/Abstract]) OR depression[Title/Abstract]) OR emotion [Title/Abstract]) OR Stress[Title/Abstract]) OR distress [Title/Abstract]) OR mental health[Title/Abstract]) OR quality of life[Title/Abstract]) OR psychological well-being [Title/Abstract]) OR marital relationship [Title/Abstract]) OR marital satisfaction [Title/Abstract]) OR pregnancy rate[Title/Abstract]))) AND (((((((("randomized controlled trial"[Publication Type])OR "controlled clinical trial"[Publication Type]) OR randomized[Title/Abstract]) OR randomly[Title/Abstract]) OR trial [Title/Abstract]) OR groups [Title/Abstract])))))) NOT (("Animals"[Mesh]) NOT (("Animals"[Mesh]) AND "Humans"[Mesh]))	446

EMBase

Search	Query	Items found
#1	'infertility'/exp OR 'infertile':ab,ti	102018
#2	'fertilization in vitro'/exp OR 'intracytoplasmic sperm injection'/exp OR 'fertilization in vitro':ab,ti OR 'in vitro fertilization':ab,ti OR'intracytoplasmic sperm injection':ab,ti OR 'ivf':ab,ti OR 'icsi':ab,ti OR 'assisted reproductive technology':ab,ti OR 'assisted reproductive technologies':ab,ti	59937
#3	'psychotherapy'/exp OR 'psychotherapy':ab,ti OR 'therapy':ab,ti OR 'intervention':ab,ti OR 'programme':ab,ti OR 'program':ab,ti OR 'mind body':ab,ti OR 'cognitive behavioral':ab,ti OR 'counseling':ab,ti OR 'acceptance and commitment therapy':ab,ti OR 'progressive muscle relaxation':ab,ti OR 'relaxation therapy':ab,ti OR 'hypnosis':ab,ti OR 'medical clowning':ab,ti OR 'stress management':ab,ti OR 'emotional disclosure':ab,ti OR 'emotional support':ab,ti OR 'group support':ab,ti	2832374

#4	'psychology'/exp OR 'anxiety'/exp OR 'depression'/exp OR 'emotion'/exp OR 'mental stress'/exp OR 'psychology':ab,ti OR 'anxiety':ab,ti OR 'depression':ab,ti OR 'emotion':ab,ti OR 'stress':ab,ti OR 'distress':ab,ti OR 'mental health':ab,ti OR 'quality of life':ab,ti OR 'psychological well-being':ab,ti OR 'marital relationship':ab,ti OR 'marital satisfaction':ab,ti OR 'pregnancy rate':ab,ti	1857255
#5	'randomized controlled trial'/exp OR random*:ab,ti OR 'controlled clinical trial'/exp OR 'trial':ab,ti OR 'groups':ab,ti	2970862
#6	'animal'/exp OR 'nonhuman'/exp OR 'animal experiment'/exp NOT ('animal'/exp OR 'nonhuman'/exp OR 'animal experiment'/exp AND 'human'/exp)	5747255
#7	#1 AND #2 AND #3 AND #4 AND #5 NOT #6	589
#7	'infertility'/exp OR 'infertile':ab,ti AND ('fertilization in vitro'/exp OR 'intracytoplasmic sperm injection'/exp OR 'fertilization in vitro':ab,ti OR 'in vitro fertilization':ab,ti OR 'intracytoplasmic sperm injection':ab,ti OR 'ivf':ab,ti OR 'icsi':ab,ti OR 'assisted reproductive technology':ab,ti OR 'assisted reproductive technologies':ab,ti) AND ('psychotherapy'/exp OR 'psychotherapy':ab,ti OR 'therapy':ab,ti OR 'intervention':ab,ti OR 'programme':ab,ti OR 'program':ab,ti OR 'mind body':ab,ti OR 'cognitive behavioral':ab,ti OR 'counseling':ab,ti OR 'acceptance and commitment therapy':ab,ti OR 'progressive muscle relaxation':ab,ti OR 'relaxation therapy':ab,ti OR 'hypnosis':ab,ti OR 'medical clowning':ab,ti OR 'stress management':ab,ti OR 'emotional disclosure':ab,ti OR 'emotional support':ab,ti OR 'group support':ab,ti) AND ('psychology'/exp OR 'anxiety'/exp OR 'depression'/exp OR 'emotion'/exp OR 'mental stress'/exp OR 'psychology':ab,ti OR 'anxiety':ab,ti OR 'depression':ab,ti OR 'emotion':ab,ti OR 'stress':ab,ti OR 'distress':ab,ti OR 'mental health':ab,ti OR 'quality of life':ab,ti OR 'psychological well-being':ab,ti OR 'marital relationship':ab,ti OR 'marital satisfaction':ab,ti OR 'pregnancy rate':ab,ti) AND ('randomized controlled trial'/exp OR random*:ab,ti OR 'controlled clinical trial'/exp OR 'trial':ab,ti OR 'groups':ab,ti) NOT ('animal'/exp OR 'nonhuman'/exp OR 'animal experiment'/exp NOT ('animal'/exp OR 'nonhuman'/exp OR 'animal experiment'/exp AND 'human'/exp))	589

Cochrane

Search	Query	Items found
#1	MeSH descriptor: [infertility] explode all trees OR infertile:ti,ab,kw	2570
#2	MeSH descriptor: [Fertilization in Vitro] explode all trees OR MeSH descriptor: [Sperm Injections, Intracytoplasmic] explode all trees OR MeSH descriptor: [Reproductive Techniques, Assisted] explode all trees OR IVF:ti,ab,kw or ICSI:ti,ab,kw or in vitro fertilization:ti,ab,kw or assisted reproductive technology:ti,ab,kw or assisted reproductive technologies:ti,ab,kw (Word variations have been searched) OR Intracytoplasmic Sperm Injection:ti,ab,kw (Word variations have been searched)	5113

#3	MeSH descriptor: [Psychotherapy] explode all trees OR Psychotherapy:ti,ab,kw or therapy:ti,ab,kw or Intervention:ti,ab,kw or programme:ti,ab,kw or program:ti,ab,kw (Word variations have been searched) OR Mind body:ti,ab,kw or Cognitive behavioral:ti,ab,kw or counseling:ti,ab,kw or acceptance and commitment therapy:ti,ab,kw or progressive muscle relaxation:ti,ab,kw (Word variations have been searched) OR relaxation therapy:ti,ab,kw or hypnosis:ti,ab,kw or medical clowning:ti,ab,kw or stress management:ti,ab,kw or emotional disclosure:ti,ab,kw (Word variations have been searched) OR emotional support:ti,ab,kw or group support:ti,ab,kw (Word variations have been searched)	364184
#4	MeSH descriptor: [Psychology] explode all trees OR MeSH descriptor: [Anxiety] explode all trees OR MeSH descriptor: [Depression] explode all trees OR MeSH descriptor: [Emotions] explode all trees OR MeSH descriptor: [Stress, Psychological] explode all trees OR Psychology:ti,ab,kw or "anxiety":ti,ab,kw or "depression":ti,ab,kw or "emotion":ti,ab,kw or "stress":ti,ab,kw (Word variations have been searched) OR "distress":ti,ab,kw or "mental health":ti,ab,kw or "quality of life":ti,ab,kw or "psychological well-being":ti,ab,kw or "marital relationship":ti,ab,kw (Word variations have been searched) OR "marital satisfaction":ti,ab,kw or "pregnancy rate":ti,ab,kw (Word variations have been searched)	124067
#5	#1 AND #2 AND #3 AND #4	540
#6	Trials	511

CINAHL

Search	Query	Items found
#1	(MM "Infertility") OR TI infertile OR AB infertile	2774
#2	(MM "Fertilization in Vitro") OR (MM "Reproductive Techniques, Assisted") OR TI ivf OR TI ICSI OR TI “in vitro fertilization” OR TI “assisted reproductive technology” OR TI “assisted reproductive technologies” OR TI “Intracytoplasmic Sperm Injection” OR AB ivf OR AB ICSI OR AB “in vitro fertilization” OR AB “assisted reproductive technology” OR AB “assisted reproductive technologies” OR AB “Intracytoplasmic Sperm Injection”	622

#3	(MM "Psychotherapy+") OR TI Psychotherapy OR TI therapy OR TI Intervention OR TI programme OR TI program OR TI “Mind body” OR TI “cognitive behavioral” OR TI counseling OR TI “acceptance and commitment therapy” OR TI “progressive muscle relaxation” OR TI “relaxation therapy” OR TI hypnosis OR AB Psychotherapy OR AB therapy OR AB Intervention OR AB programme OR AB program OR AB “Mind body” OR AB “cognitive behavioral” OR AB counseling OR AB “acceptance and commitment therapy” OR AB “progressive muscle relaxation” OR AB “relaxation therapy” OR AB hypnosis OR TI “medical clowning” OR TI “stress management” OR TI “emotional disclosure” OR TI “emotional support” OR TI “group support” OR AB “medical clowning” OR AB “stress management” OR AB “emotional disclosure” OR AB “emotional support” OR AB “group support”	95786
#4	(MM "Depression+") OR (MM "Anxiety+") OR (MM "Emotions+") OR (MM "Stress, Psychological+") OR TI psychology OR TI anxiety OR TI depression OR TI emotion OR TI Stress OR TI distress OR TI "mental health" OR TI "quality of life" OR TI "psychological well-being" OR TI "marital relationship" OR TI "marital satisfaction" OR TI "pregnancy rate" OR AB psychology OR AB anxiety OR AB depression OR AB emotion OR AB Stress OR AB distress OR AB "mental health" OR AB "quality of life" OR AB "psychological well-being" OR AB "marital relationship" OR AB "marital satisfaction" OR AB "pregnancy rate"	73982
#5	#1 AND #2 AND #3 AND #4	7

PsycINFO

Search	Query	Items found
#1	MJSUB.EXACT.EXPLODE("Infertility") OR ab(infertile) OR ti(infertile)	1776
#2	MJSUB.EXACT.EXPLODE("Reproductive Technology") OR (ti(IVF) OR ti(ICSI) OR ti(in vitro fertilization) OR ti(assisted reproductive technology) OR ti(assisted reproductive technologies) OR ti(Intracytoplasmic Sperm Injection) OR ab(IVF) OR ab(ICSI) OR ab(in vitro fertilization) OR ab(assisted reproductive technology) OR ab(assisted reproductive technologies) OR ab(Intracytoplasmic Sperm Injection))	1643
#3	(MJSUB.EXACT.EXPLODE("Psychotherapeutic Techniques") OR MJSUB.EXACT.EXPLODE("Psychotherapy") OR MJSUB.EXACT.EXPLODE("Group Psychotherapy") OR MJSUB.EXACT.EXPLODE("Supportive Psychotherapy")) OR (ti(Psychotherapy) OR ti(therapy) OR ti(Intervention) OR ti(programme) OR ti(program) OR ti(Mind body) OR ti(Cognitive behavioral) OR ti(counseling) OR ti(acceptance and commitment therapy) OR ti(progressive muscle relaxation) OR ti(relaxation therapy) OR ti(hypnosis) OR ti(medical clowning) OR ti(stress management) OR ti (emotional disclosure) OR ti (emotional support) OR ti (group support) OR ab(Psychotherapy) OR ab(therapy) OR ab(Intervention) OR ab(programme) OR ab(program) OR ab(Mind body) OR ab(Cognitive behavioral) OR ab(counseling) OR ab(acceptance and commitment therapy) OR ab(progressive muscle relaxation) OR ab(relaxation therapy) OR ab(hypnosis) OR ab(medical clowning) OR ab(stress management) OR ab (emotional disclosure) OR ab (emotional support) OR ab (group support))	821656
#4	MJSUB.EXACT.EXPLODE("Clinical Psychology") OR MJSUB.EXACT.EXPLODE("Anxiety") OR MJSUB.EXACT.EXPLODE("Depression (Emotion)") OR MJSUB.EXACT.EXPLODE("Emotions") OR MJSUB.EXACT.EXPLODE("Psychological Stress") OR (ti (Psychology) OR ti (anxiety) OR ti (depression) OR ti (emotion) OR ti (Stress) OR ti (distress) OR ti (mental health) OR ti (quality of life) OR ti (psychological well-being) OR ti (marital relationship) OR ti (marital satisfaction) OR ti (pregnancy rate) OR ab (Psychology) OR ab (anxiety) OR ab (depression) OR ab (emotion) OR ab (Stress) OR ab (distress) OR ab (mental health) OR ab (quality of life) OR ab (psychological well-being) OR ab (marital relationship) OR ab (marital satisfaction) OR ab (pregnancy rate))	219400
#5	#1 AND #2 AND #3 AND #4	18
#5	(MJSUB.EXACT.EXPLODE("Infertility") OR ab(infertile) OR ti(infertile)) AND (MJSUB.EXACT.EXPLODE("Reproductive Technology") OR (ti(IVF) OR ti(ICSI) OR ti(in vitro fertilization) OR ti(assisted reproductive technology) OR ti(assisted reproductive technologies) OR ti(Intracytoplasmic Sperm Injection) OR ab(IVF) OR ab(ICSI) OR ab(in vitro fertilization) OR ab(assisted reproductive technology) OR ab(assisted reproductive technologies) OR ab(Intracytoplasmic Sperm Injection))) AND ((MJSUB.EXACT.EXPLODE("Psychotherapeutic Techniques") OR MJSUB.EXACT.EXPLODE("Psychotherapy") OR MJSUB.EXACT.EXPLODE("Group Psychotherapy") OR MJSUB.EXACT.EXPLODE("Supportive Psychotherapy")) OR (ti(Psychotherapy) OR ti(therapy) OR ti(Intervention) OR ti(programme) OR ti(program) OR ti(Mind body) OR ti(Cognitive behavioral) OR ti(counseling) OR ti(acceptance and commitment therapy) OR ti(progressive muscle relaxation) OR ti(relaxation	18

	therapy) OR ti(hypnosis) OR ti(medical clowning) OR ti(stress management) OR ti (emotional disclosure) OR ti (emotional support) OR ti (group support) OR ab(Psychotherapy) OR ab(therapy) OR ab(Intervention) OR ab(programme) OR ab(program) OR ab(Mind body) OR ab(Cognitive behavioral) OR ab(counseling) OR ab(acceptance and commitment therapy) OR ab(progressive muscle relaxation) OR ab(relaxation therapy) OR ab(hypnosis) OR ab(medical clowning) OR ab(stress management) OR ab (emotional disclosure) OR ab (emotional support) OR ab (group support))) AND (MJSUB.EXACT.EXPLODE("Clinical Psychology") OR MJSUB.EXACT.EXPLODE("Anxiety") OR MJSUB.EXACT.EXPLODE("Depression (Emotion)") OR MJSUB.EXACT.EXPLODE("Emotions") OR MJSUB.EXACT.EXPLODE("Psychological Stress") OR (ti (Psychology) OR ti (anxiety) OR ti (depression) OR ti (emotion) OR ti (Stress) OR ti (distress) OR ti (mental health) OR ti (quality of life) OR ti (psychological well-being) OR ti (marital relationship) OR ti (marital satisfaction) OR ti (pregnancy rate) OR ab (Psychology) OR ab (anxiety) OR ab (depression) OR ab (emotion) OR ab (Stress) OR ab (distress) OR ab (mental health) OR ab (quality of life) OR ab (psychological well-being) OR ab (marital relationship) OR ab (marital satisfaction) OR ab (pregnancy rate)))	

CAJ

Search	Query	Items found
#1	((TI='IVF' OR TI='ICSI' OR TI='试管婴儿' OR TI='体外受精' OR TI='胚胎移植' OR TI='体外授精') OR (KY='IVF' OR KY='ICSI' OR KY='试管婴儿' OR KY='体外受精' OR KY='胚胎移植' OR KY='体外授精')) AND ((TI='心理' OR TI='压力' OR TI='焦虑' OR TI='抑郁' OR TI='情*' OR TI='心*') OR (KY='心理' OR KY='压力' OR KY='焦虑' OR KY='抑郁' OR KY='情*' OR KY='心*')) AND ((TI='干预' OR TI= '疗法') OR (KY='干预' OR KY= '疗法'))	42

Table 4-2 Methodological Quality Assessment of the Included Studies

Study (Sorted by Intervention Category)	1. Was the method of randomization adequate?	2.Was the treatment allocation concealed	3. Was the patient blinded to the intervention ?	4. Was the care provider blinded to the intervention ?	5. Was the outcome assessor blinded to the intervention ?	6. Was the drop-out rate described and acceptable?	7. Were all randomized participants analyzed in the group to which they were allocated?	8. Are reports of the study free of suggestion of selective outcome reporting?	9. Were the groups similar at baseline regarding the most important prognostic indicators?	10. Were co-interventions avoided or similar?	11. Was the compliance acceptable in all groups?	12. Was the timing of the outcome assessment similar in all groups?
1 Gorayeb et al. 2012	Yes	Unsure	No	No	Yes	No	No	Yes	Yes	Yes	No	Yes
2 Mosalanejad et al. 2012a,b	Unsure	Unsure	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3 Tarabusi et al. 2004	Unsure	Unsure	No	No	No	Yes	No	Yes	Yes	Yes	Yes	Yes
4 Chan et al. 2006	Yes	Unsure	No	No	No	Yes	No	Yes	Yes	Yes	Yes	Yes
5 Chan et al.2012	Yes	No	No	No	No	Yes	No	Yes	Yes	Yes	Yes	Yes
6 Domar et al.2011	Yes	Yes	No	No	Yes	No	No	Yes	Yes	Yes	No	Yes
7 Connolly et al.1993	Unsure	Unsure	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes
8 de Klerk et al.2005	Yes	Yes	No	No	No	No	No	Yes	Yes	Yes	No	Yes
9 Emery et al.2003	Yes	Yes	No	No	No	Yes	No	Yes	Yes	Yes	Yes	Yes
10 Zyl et al.2005	Unsure	Yes	No	No	No	Yes	No	Yes	Yes	Yes	Yes	Yes
11Catoire et al.2013	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
12 Lancastle et al. 2008	Unsure	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	No	Yes
13 Ockhuijsen et al.2014	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
14 Tuil et al. 2007	No	Yes	No	Yes	No	No	No	Yes	Yes	Unsure	Yes	Yes
15 Lee et al. 2003	Unsure	Unsure	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
16 Matthiesen et al. 2012	Yes	No	Yes	No	Yes	Yes	No	Yes	Yes	Yes	No	Yes
17 Murphy et al. 2014	Yes	Unsure	No	No	No	Yes	No	Yes	Yes	Yes	Yes	Yes
18 Panagopoulou et al.2009	Unsure	Unsure	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
19 Skiadas et al.2011	Yes	Yes	No	No	No	No	Yes	Yes	Yes	Yes	No	Yes
20 Zhu et al.2010	Yes	Unsure	No	No	No	Yes	No	Yes	Yes	Yes	Yes	Yes

Table 4-3 Characteristics and outcomes of psychosocial interventions for patients undergoing IVF treatment

Reference, country	Participants (N)		Intervention name (category)	Timing	-Number of sessions -Duration of each session -Duration of intervention	Format	Delivery person	Measurement points	Anxiety	Depression	Stress	Pregnancy rate	Other psychological outcomes
	Intervention	Control											
Gorayeb et al., 2012 Brazil	93C	95C	Brief cognitive behavior intervention (CBT)	Before cycle	-5 -2 hours -5 weeks	Group/ couple Face to face	Psychologist	**Post-test** (the end of the cycle)	—	—	—	(↑): *d*=0.43	—
Mosalanejad et al., 2012a,b Iran	15F	16F	Cognitive behavioral therapy (CBT)	Before cycle	-15 -1.5 hours -4 months	Group/ female Face to face	Psychologist	**Pre-test** (referring to the ART clinic), **post-test** (4 months later)	(↓): *d*=0.95, **within group**	(↓): *d*=1.64, **within group**	(↓): *d*=1.92, **within group**	—	-Hardiness (↑): *d*=4.99
Tarabusi et al., 2004 Italy	28C	28C	Cognitive behavioral treatment (CBT)	Before cycle	-12 -1 hour -4 months	Group/ couple Face to face	Psychologist	**Pre-test** (being scheduled for IVF/ICSI), **post-test** (4 months later)	(–)	(–)	—	—	-Psychological uneasiness of female (↓): *d*=0.260, **within group**
Chan et al., 2006 Hong Kong	69F	115F	Eastern body-mind-spirit (MBI)	Before cycle	-4 -3 hours -4 weeks	Group/ female Face to face	Practitioner	**Pre-test** (referring to the ART center), **post-test** (the day of the start of ovarian stimulations), **follow-up** (the day of	(↓): state anxiety ¶ (–): trait anxiety	—	—	(–)	-Importance of childbearing (self) (↓) ¶ -Importance of childbearing (marriage) (–)

								ET, 1 month later)					
Chan et al., 2012 Hong Kong	172F	167F	Integrative body-mind-spirit (MBI)	Before cycle	-4 -3 hours -4 weeks	Group/ female Face to face	Practitioner	**Pre-test** (referring to the ART center), **post-test** (the day of the start of ovarian stimulations), **follow-up** (the day of ET, 1 month after the post-test)	(↓): state anxiety, post-test: *d*=0.59; follow-up: *d*=0.46; (↓):trait anxiety, post-test: *d*=0.29; follow-up: *d*=0.29	—	—	(–)	-Marital satisfaction: post-test (–); follow-up (↑): *d*=0.29 -Importance of childbearing (↓): post-test: *d*=0.41; follow-up: *d*=0.59 -Negative affect: post-test (–); follow-up (↓): *d*=0.35 -Positive affect: post-test (–); follow-up(↑): *d*=0.20
Domar et al., 2011 USA	46F	51F	Mind/body intervention (MBI)	During cycle	-10 -2 hours -10 weeks	Group/ female Face to face	Practitioner	**Post-test** (the end of each cycle)	—	—	—	(↑): *d*=0.82,	—
Connolly et al., 1993 UK	37C	45C	Counseling	During cycle	-3 -1 hour -3 weeks	Dyadic couple Face to face	Counselor	**Pre-test** (First visit to the clinic), beginning of the treatment cycle, **post-test** (at the end of the treatment cycle)	(–)	(–)	(–)		-General psychological state (–) -Self-esteem (–) -Mood state (–)
de Klerk et	21C	19C	Counseling	During	-3	Dyadic	Social worker	**Pre-test** (1	(–)	(–)	—	—	-Distress (–)

al., 2005 The Netherlands				cycle	-1 hour -4 weeks	couple Face to face		week before the down-regulation or the first day of the pituitary down-regulation), **post-test** (2 weeks after the pregnancy test), distress was measured daily during treatment					
Emery et al., 2003 Switzerland	100C	100C	Counseling	Before cycle	-1 -1-1.5 hours -1 day	Dyadic couple Face to face	Counselor	**Pre-test** (before the start of IVF), **post-test** (6 weeks after ET)	(–)	(–)	—	—	—
Zyl et al., 2005 South Africa	25F	27F	Counseling	During cycle	-2 -Unclear -5-10 days	Individual/ female Face to face	Embryologist	**Pre-test** (days 4-9 of the menstrual cycle), **post-test (**after oocyte aspiration)	(↓): *d*=0.34, **within group**	(–)	—	—	-Use of problem-focused coping strategies (↑): *d*=0.35, **within group**
Lancastle et al., 2008 UK	28F	27F	Positive reappraisal coping interven-tion (Coping therapy)	During 2-week waiting period	-28 -1 min -14 days	Individual/ female; self-adminis-tered	Patient herself	**Pre-test** (the day of embryo transfer), **post-test** (the day of the pregnancy	—	—	—	—	-Dispositional optimism (↑): helpfulness: *d*=0.69 suitability: *d*=0.71 confidence: *d*=0.66 enduring effects: *d*=0.71

								test)					feeling positive: *d*=0.83 future plans: *d*= 0.73 sustained coping: *d*=0.70
Ockhuijsen et al., 2014 The Netherlands	127 F	126 F 124 F	Positive reappraisal coping interven-tion (Coping therapy)	During 2-week waiting period	-28 -1 min -14 days	Individual/ female; self-adminis-tered	Patient herself	**Pre-test** (before the waiting period), **post-test (**on day 10 of the 14-day waiting period), **follow-up** (6 weeks after the start of the waiting period)	(–)	(–)	—	(–)	-Daily negative emotions (–) -Positive emotions (↑)*: *(*group by time interaction: *F*(1, 2652)=16.15)
Catoire et al., 2013 France	50F	43F	Hypnosis (Others)	During embryo transfer	-1 -20-30 min -20-30 min	Individual/ female; Face to face	Hypnotist	**Pre-test** (before the embryo transfer), **post-test** (after ET)	(–)	—	—	(–)	—
Tuil et al., 2007 The Netherlands	51F	40F	Internet-based record (Others)	During cycle	-Infinite -Infinite -The period of a cycle	Dyadic couple; via Internet	Couple themselves	**Pre-test (**before cycle), **post-test** (the end of the cycle)	—	—	—	(–)	-Patient empowerment (–)
Lee et al., 2003 Taiwan	64F	68F	Nursing Crisis Interven-tion Program (Others)	During cycle	-2 videos & 3-6 phone counseling -Video: 30-40 min; counseling: unclear -The period	Individual/ female; via video and phone	Counselor	**Pre-test** (the initial stage of treatment-day 3), **middle** (at the stage of the embryo transfer),	(–)	(–)	—	—	-Psychological responses (–) -Coping strategies (–)

					of a cycle			**post-test (**before the pregnancy test)					
Matthiesen et al., 2012 Denmark	42 (F+M)	40 (F+ M)	Expressive writing interven-tion (Others)	2 weeks after the start of the cycle	-3 -20 min -3 days	Individual/ Female or male; self-adminis-tered	Patient themselves	**Pre-test** (at treatment enrollment), **post-test** (3 weeks later), **follow-up** (6 weeks after the intervention)	—	—	(↓): *d*=0.46, **within group**	—	—
Murphy et al., 2014 USA	90F	91F	Harp Therapy (Others)	During embryo transfer	-1 -20 min -20 min	Individual/ female; face to face	Music practitioner	**Pre-test** (before the embryo transfer), **post-test** (after ET)	(↓): state anxiety, *d*=0.457 (–): trait anxiety	—	—	(–)	—
Panagopou-lou et al., 2009 Greece	50F	50F 48F	Written Emotional Disclosure (Others)	During 2-week waiting period	-7 -20 min -1 week	Individual/ female; self-adminis-tered	Patient herself	**Pre-test** (2 h after ET), **post-test** (2 days prior to the pregnancy test)	(–)	—	(–)	(–) Non-participants group (+)	-Positive and negative affect (–) -Infertility-related concerns (–)
Skiadas et al., 2011 USA	66F	65F	Emotional Support - phone call (Others)	During 2-week waiting period	-2 -5-15 min -2 weeks	Individual/ female; via phone	Social workers	**Pre-test** (the day of ET), **post-test** (10 days after ET)	—	—	(–)	—	—
Zhu et al., 2010 China	50F	50F	Group psycho-therapy (Others)	During cycle	-6 -1.5-2 hours -3 weeks	Group/ female; face to face	Psycho-therapist	**Pre-test** (the initial stage of treatment days 3-4), **post-test** (the end of the intervention)	(↓): *d*=0.46	(–)	—	(–)	—

-Participants: **C**: Couple; **F**: Female; **M**: Male

-Intervention category: **CBT**: Cognitive Behavioral Therapy; **MBI**: Mind Body Intervention

¶ No standard deviation provided

*: No mean and standard deviation provided.

Table 4-4 Components of psychosocial interventions for patients undergoing IVF treatment

Reference, country	Participants (N)		Intervention name	Components
	Intervention	Control		
Gorayeb et al., 2012 Brazil	93C	95C	Brief cognitive behavior intervention	-Dealt with topics such as social and personal requirements to have children, marital relationship (affective and sexual), fears regarding AR techniques, and the presence of social support, with an attempt made to find ways of coping in a functional manner in each of these areas. -Progressive muscle relaxation technique of Jacobson. -Provide information: on the AR techniques and to resolve remaining doubts.
Mosalanejad et al., 2012a,b Iran	15F	16F	Cognitive behavioral therapy	-Stress management, negative thought blocking techniques, relaxation therapy and biofeedback; -Cognitive restructuring, positive thoughts or beliefs, imagination exercises, expressing feelings, communication and problem-solving techniques.
Tarabusi et al., 2004 Italy	28C	28C	Cognitive behavioral treatment	-Provides both an emotive and cognitive approach; -Discusses the beliefs and the expectations linked to medical staff; -Provides proper information on medical–surgical procedures, stimulating a verbal expression of feelings linked to the different phases of the therapeutic program; -Encourages the acknowledgment and discrimination of emotions and stimulates the redefinition of individual modalities of coping, through exchanges and comparisons with others.
Chan et al., 2006 Hong Kong	69F	115F	Eastern body-mind-spirit	-Mini-lectures on Traditional Chinese Medicine; -Stress-reduction training coupled with tai-chi exercises, meditation, and breathing techniques; -Activities: such as singing, journal writing, and drawing. -Reading materials excerpted from ancient Chinese philosophical writings on suffering and the meaning of life.
Chan et al., 2012 Hong Kong	172F	167F	Integrative body-mind-spirit	-Mini-lectures on holistic well-being; -Stress-reduction training coupled with stretching exercises, acupressure, massage, meditation, and breathing

				techniques; -Activities: such as singing, journal writing, and drawing. -Reading materials excerpted from ancient Chinese philosophical writings on suffering and the meaning of life.
Domar et al., 2011 USA	46F	51F	Mind/body intervention	-Cognitive behavior therapy, relaxation training, negative health behavior modification, and social support components.
Connolly et al., 1993 UK	37C	45C	Counseling	-Non-directive counseling sessions. -Discuss their reproductive difficulties, treatment history, or the forthcoming IVF programme. -A number of dimensions of difficulty should be considered, including interpersonal and psychosexual considerations, support networks, coping with treatment, the fertility problem and its relation to other aspects of life, financial considerations, and feelings about self and coping strategies.
de Klerk et al., 2005 The Netherlands	21C	19C	Counseling	-Non-directive counseling sessions. -Discuss their feelings and thoughts on topics related to infertility and IVF treatment. -Depending on the needs of the clients, the counselor alternately used the four basic aspects of infertility counseling: information gathering and analysis, implications and decision-making counseling, support counseling and therapeutic counseling.
Emery et al., 2003 Switzerland	100C	100C	Counseling	-A preventive counseling concept focusing on the narrative capacities of couples; -Require couples to share the history of their infertility; -The personal and family histories of both partners are also narrated and summarized on a genogram.
Zyl et al., 2005 South Africa	25F	27F	Counseling	-Non-directive counseling skills allowed patients to tell “their stories”. Patients’ concerns about the treatment programme were addressed by directive counseling.
Lancastle et al., 2008 UK	28F	27F	Positive reappraisal coping intervention	-Reading the PRCI card at least twice a day. The 10 statements in the card were positively toned to prompt women to think about positive aspects of their situation, thereby promoting positive reappraisal coping efforts. The items were generated from sources that examined ways of coping with stressful experiences.
Ockhuijsen et al., 2014 The Netherlands	127F	126F 124F	Positive reappraisal coping intervention	-Reading the PRCI card at least twice a day and monitoring their reactions daily.
Catoire et al., 2013 France	50F	43F	Hypnosis	-Using the metaphor of a stairway, the metaphor of a long-awaited visit from a friend, and a visit to a previously chosen place, and describing the place using all of the senses; a muscle relaxation technique; giving suggestions of relaxation and calm.
Tuil et al., 2007 The Netherlands	51F	40F	Internet-based record	-An Internet-based personal health record that provides patients with general and personal information concerning the treatment that they have been given and that also provides facilities for communicating with fellow patients and physicians.
Lee et al., 2003 Taiwan	64F	68F	Nursing Crisis Intervention Program	-30-minute videotape on therapeutic processes; self-instructional materials and 40-minute videotape on self-hypnosis and muscle relaxation training; individual cognitive-behavioral counseling via telephone with a frequency of one to two times per week.

Matthiesen et al., 2012 Denmark	42 (F+M)	40 (F+M)	Expressive writing intervention	-Writing about deepest feelings and thoughts in relation to (1) involuntary childlessness (first day of writing), and (2) IVF/ ICSI-treatment for infertility (second day of writing), and (3) positive thoughts and feelings that they may have experienced in relation to their involuntary childlessness (third day of writing). -Participants in the control group were instructed to write in an emotionally neutral manner about their daily activities.
Murphy et al., 2014 USA	90F	91F	Harp Therapy	-During embryo transfer, women received harp therapy for 20 minutes, which was performed by a certified music practitioner.
Panagopoulou et al., 2009 Greece	50F	50F 48F	Written Emotional Disclosure	-Women in the EC were asked to write about their deepest thoughts and feelings regarding the infertility and its treatment at night-time before they went to bed.
Skiadas et al., 2011 USA	66F	65F	Emotional Support - phone call	-2 phone calls from an IVF social worker (first phone call: days 2-4, second: days 5-9) to check in and see how the patient has been doing since ET.
Zhu et al., 2010 China	50F	50F	Group psychotherapy	-Relaxation techniques; description of IVF-ET related stressors; identifying the irrational cognition; discussing the impact of infertility on the couple's relationship; finding the meaning and value of life; demonstrating and practicing assertive communication skills.

-Participants: **C**: Couple; **F**: Female; **M**: Male

Table 6-1 Attributes of partnership in the couples undergoing treatment for infertility

Attributes	**Themes**	**References**
A process of joint hardship	A long journey of treatment	Gerrity 2001, Alesi 2005, Daniluk 2001
	Couples together suffered physically, mentally, socially, and financially	Chachamovich et al. 2010, Daniluk 2001, Güleç et al. 2011, Reporaki et al. 2007, Peterson et al. 2003, Peterson & Eifert 2011, Pasch et al. 2002, Tao et al. 2012, Wu et al. 2013, Pasch & Christensen 2000, Alesi 2005

Sharing	Sharing of feeling and stress	Cousineau et al. 2004, Daniluk 2001, Drosdzol & Skrzypulec 2009, Glover et al. 2009, Holter et al. 2006, Onat & Beji 2012b, Pash & Christensen 2000, Peterson et al. 2003, Peterson & Eifert 2011, Reporaki et al. 2007, Salvatore et al. 2001, Newton 2006
	Sharing of decision-making	Güleç et al. 2011, Newton 2006, Pasch et al. 2002
	Sharing of responsibility	Pasch et al. 2002
Intra-couple communication	The importance of communication	Daniluk 2001, Glover et al. 2009, Onat & Beji 2012b, Schmidt et al. 2005, Schanz et al. 2011, Wischmann et al. 2001
	The contents of communication	Cousineau et al. 2004, Drosdzol & Skrzypulec 2009, Holter et al. 2006, Pasch & Christensen 2000, Reporaki et al. 2007, Robaina et al. 2008
	The forms of communication	Drosdzol & Skrzypulec 2009, Newton 2006
Mutual support	Emotional support	Chang & Mu 2008, Drosdzol & Skrzypulec 2009, Gourounti et al. 2012, Holter et al. 2006, Onat & Beji 2012b, Peters et al. 2011, Peterson et al. 2003, Tao et al. 2012, Matsubayashi et al. 2004, Newton 2006
	Supportive behaviors	de Faria et al. 2012, Drosdzol & Skrzypulec 2009, Matsubayashi et al. 2004, Newton 2006, Onat & Beji 2012b, Pasch et al. 2002, Pash & Christensen 2000, Reporaki et al. 2007, Schmidt et al. 2005, Schanz et al. 2011, Wischmann et al. 2001

Table 8-1 Searching Strategies

PubMed

Search	Query	Items found
#1	("Infertility"[MeSH Terms]) OR infertile[Title/Abstract]	61832
#2	(((((((("fertilization in vitro"[MeSH Terms]) OR "sperm injections, intracytoplasmic"[MeSH Terms]) OR "Reproductive Techniques, Assisted"[Mesh]) OR IVF[Title/Abstract]) OR ICSI[Title/Abstract]) OR in vitro fertilization[Title/Abstract]) OR assisted reproductive technology[Title/Abstract]) OR assisted reproductive technologies[Title/Abstract]) OR Intracytoplasmic Sperm Injection[Title/Abstract]	65627
#3	((((((((((((((("Psychotherapy"[Mesh]) OR Psychotherapy [Title/Abstract]) OR therapy[Title/Abstract]) OR Intervention [Title/Abstract]) OR programme [Title/Abstract]) OR program [Title/Abstract]) OR Mind body [Title/Abstract]) OR Cognitive behavioral[Title/Abstract]) OR counseling [Title/Abstract]) OR (acceptance and commitment therapy [Title/Abstract])) OR progressive muscle relaxation[Title/Abstract]) OR relaxation therapy [Title/Abstract]) OR hypnosis[Title/Abstract]) OR medical clowning[Title/Abstract]) OR stress management [Title/Abstract]) OR emotional disclosure[Title/Abstract]) OR emotional support[Title/Abstract]) OR group support[Title/Abstract]	2319262
#4	((((((((((((((((Psychology[MeSH Terms]) OR Anxiety[MeSH Terms]) OR Depression[MeSH Terms]) OR Emotions[MeSH Terms]) OR Stress, Psychological[MeSH Terms]) OR Psychology[Title/Abstract]) OR anxiety[Title/Abstract]) OR depression[Title/Abstract]) OR emotion [Title/Abstract]) OR Stress[Title/Abstract]) OR distress [Title/Abstract]) OR mental health[Title/Abstract]) OR quality of life[Title/Abstract]) OR psychological well-being [Title/Abstract]) OR marital relationship [Title/Abstract]) OR marital satisfaction [Title/Abstract]) OR pregnancy rate[Title/Abstract]	1351327
#5	(("Animals"[Mesh]) NOT (("Animals"[Mesh]) AND "Humans"[Mesh]))	4167397
#6	#1 AND #2 AND #3 AND #4 NOT #5	1081

EMBase

Search	Query	Items found
#1	'infertility'/exp OR 'infertile':ab,ti	135201
#2	'fertilization in vitro'/exp OR 'intracytoplasmic sperm injection'/exp OR 'fertilization in vitro':ab,ti OR 'in vitro fertilization':ab,ti	63438

	OR 'intracytoplasmic sperm injection':ab,ti OR 'ivf':ab,ti OR 'icsi':ab,ti OR 'assisted reproductive technology':ab,ti OR 'assisted reproductive technologies':ab,ti	
#3	'psychotherapy'/exp OR 'psychotherapy':ab,ti OR 'therapy':ab,ti OR 'intervention':ab,ti OR 'programme':ab,ti OR 'program':ab,ti OR'mind body':ab,ti OR 'cognitive behavioral':ab,ti OR 'counseling':ab,ti OR 'acceptance and commitment therapy':ab,ti OR 'progressive muscle relaxation':ab,ti OR 'relaxation therapy':ab,ti OR 'hypnosis':ab,ti OR 'medical clowning':ab,ti OR 'stress management':ab,ti OR'emotional disclosure':ab,ti OR 'emotional support':ab,ti OR 'group support':ab,ti	3056749
#4	'psychology'/exp OR 'anxiety'/exp OR 'depression'/exp OR 'emotion'/exp OR 'mental stress'/exp OR 'psychology':ab,ti OR 'anxiety':ab,ti OR 'depression':ab,ti OR 'emotion':ab,ti OR 'stress':ab,ti OR 'distress':ab,ti OR 'mental health':ab,ti OR 'quality of life':ab,ti OR 'psychological well-being':ab,ti OR 'marital relationship':ab,ti OR 'marital satisfaction':ab,ti OR 'pregnancy rate':ab,ti	1990407
#5	'animal'/exp OR 'nonhuman'/exp OR 'animal experiment'/exp NOT ('animal'/exp OR 'nonhuman'/exp OR 'animal experiment'/exp AND 'human'/exp)	6097374
#6	#1 AND #2 AND #3 AND #4 NOT #5	1791

Cochrane

Search	Query	Items found
#1	MeSH descriptor: [Infertility] explode all trees	2007
#2	"infertile":ti,ab,kw or "infertility":ti,ab,kw (Word variations have been searched)	3830
#3	#1 or #2	3925
#4	MeSH descriptor: [Fertilization in Vitro] explode all trees	1931
#5	MeSH descriptor: [Sperm Injections, Intracytoplasmic] explode all trees	493
#6	MeSH descriptor: [Reproductive Techniques, Assisted] explode all trees	2983
#7	"IVF":ti,ab,kw or "ICSI":ti,ab,kw or "in vitro fertilization":ti,ab,kw or "assisted reproductive technology" or "assisted reproductive technologies" (Word variations have been searched)	4178
#8	"intracytoplasmic sperm injection":ti,ab,kw (Word variations have been searched)	959
#9	#4 or #5 or #6 or #7 or #8	5326

#10	MeSH descriptor: [Psychotherapy] explode all trees	16473
#11	"psychotherapy":ti,ab,kw or "therapy":ti,ab,kw or "intervention":ti,ab,kw or "programme":ti,ab,kw or "program":ti,ab,kw (Word variations have been searched)	367784
#12	"mind body":ti,ab,kw or "Cognitive behavioral":ti,ab,kw or "counseling":ti,ab,kw or "acceptance and commitment therapy":ti,ab,kw or "progressive muscle relaxation":ti,ab,kw (Word variations have been searched)	16145
#13	"relaxation therapy":ti,ab,kw or "hypnosis":ti,ab,kw or "medical clowning":ti,ab,kw or "stress management":ti,ab,kw or "emotional disclosure":ti,ab,kw (Word variations have been searched)	3295
#14	"emotional support":ti,ab,kw or "group support":ti,ab,kw (Word variations have been searched)	434
#15	#10 or #11 or #12 or #13 or #14	371921
#16	MeSH descriptor: [Psychology] explode all trees	895
#17	MeSH descriptor: [Anxiety] explode all trees	5304
#18	MeSH descriptor: [Depression] explode all trees	5680
#19	MeSH descriptor: [Emotions] explode all trees	11915
#20	MeSH descriptor: [Stress, Psychological] explode all trees	3821
#21	"psychology":ti,ab,kw or "anxiety":ti,ab,kw or "depression":ti,ab,kw or "emotion":ti,ab,kw or "stress":ti,ab,kw (Word variations have been searched)	84223
#22	"distress":ti,ab,kw or "mental health":ti,ab,kw or "quality of life":ti,ab,kw or "psychological well-being":ti,ab,kw or "marital relationship":ti,ab,kw (Word variations have been searched)	52203
#23	"marital satisfaction":ti,ab,kw or "pregnancy rate":ti,ab,kw (Word variations have been searched)	3656
#24	#16 or #17 or #18 or #19 or #20 or #21 or #22 or #23	130052
#25	#3 AND #9 AND #15 AND #24	799
#236	Trials	765

CINAHL

Search	Query	Items found
#1	MM Infertility OR TI infertile OR TI infertility OR AB infertile OR AB infertility	1061

#2	MM Fertilization in Vitro OR MM Reproductive Techniques, Assisted OR TI ivf OR TI ICSI OR TI "in vitro fertilization" OR TI "assisted reproductive technology" OR TI "assisted reproductive technologies" OR TI "Intracytoplasmic Sperm Injection" OR AB ivf OR AB ICSI OR AB "in vitro fertilization" OR AB "assisted reproductive technology" OR AB "assisted reproductive technologies" OR AB "Intracytoplasmic Sperm Injection"	701
#3	MM Psychotherapy OR TI Psychotherapy OR TI therapy OR TI Intervention OR TI programme OR TI program OR TI “Mind body” OR TI “cognitive behavioral” OR TI counseling OR TI “acceptance and commitment therapy” OR TI “progressive muscle relaxation” OR TI “relaxation therapy” OR TI hypnosis OR TI “medical clowning” OR TI “stress management” OR TI “emotional disclosure” OR TI “emotional support” OR TI “group support” OR AB Psychotherapy OR AB therapy OR AB Intervention OR AB programme OR AB program OR AB “Mind body” OR AB “cognitive behavioral” OR AB counseling OR AB “acceptance and commitment therapy” OR AB “progressive muscle relaxation” OR AB “relaxation therapy” OR AB hypnosis OR AB “medical clowning” OR AB “stress management” OR AB “emotional disclosure” OR AB “emotional support” OR AB “group support”	115801
#4	MM Depression OR MM Anxiety OR MM Emotions OR MM Depression OR MM "Stress, Psychological" OR TI psychology OR TI anxiety OR TI depression OR TI emotion OR TI Stress OR TI distress OR TI "mental health" OR TI "quality of life" OR TI "psychological well-being" OR TI "marital relationship" OR TI "marital satisfaction" OR TI "pregnancy rate" OR AB psychology OR AB anxiety OR AB depression OR AB emotion OR AB Stress OR AB distress OR AB "mental health" OR AB "quality of life" OR AB "psychological well-being" OR AB "marital relationship" OR AB "marital satisfaction" OR AB "pregnancy rate"	72094
#5	#1 AND #2 AND #3 AND #4	9

CAJ

Search	Query	Items found
#1	((TI='IVF' OR TI='ICSI' OR TI='试管婴儿' OR TI='体外受精' OR TI='胚胎移植' OR TI='体外授精') OR (KY='IVF' OR KY='ICSI' OR KY='试管婴儿' OR KY='体外受精' OR KY='胚胎移植' OR KY='体外授精')) AND ((TI='心理' OR TI='压力' OR TI='焦虑' OR TI='抑郁' OR TI='情*' OR TI='心*') OR (KY='心理' OR KY='压力' OR KY='焦虑' OR KY='抑郁' OR KY='情*' OR KY='心*')) AND ((TI='干预' OR TI= '疗法') OR (KY='干预' OR KY= '疗法'))	45

PsycINFO

Search	Query	Items found
#1	MJSUB.EXACT.EXPLODE("Infertility") OR ab(infertile) OR ab(infertility) OR ti(infertile) OR ti(infertility)	2818
#2	MJSUB.EXACT.EXPLODE("Reproductive Technology") OR (ti(IVF) OR ti(ICSI) OR ti(in vitro fertilization) OR ti(assisted reproductive technology) OR ti(assisted reproductive technologies) OR ti(Intracytoplasmic Sperm Injection) OR ab(IVF) OR ab(ICSI) OR ab(in vitro fertilization) OR ab(assisted reproductive technology) OR ab(assisted reproductive technologies) OR ab(Intracytoplasmic Sperm Injection))	1727
#3	(MJSUB.EXACT.EXPLODE("Psychotherapeutic Techniques") OR MJSUB.EXACT.EXPLODE("Psychotherapy") OR MJSUB.EXACT.EXPLODE("Group Psychotherapy") OR MJSUB.EXACT.EXPLODE("Supportive Psychotherapy")) OR (ti(Psychotherapy) OR ti(therapy) OR ti(Intervention) OR ti(programme) OR ti(program) OR ti(Mind body) OR ti(Cognitive behavioral) OR ti(counseling) OR ti(acceptance and commitment therapy) OR ti(progressive muscle relaxation) OR ti(relaxation therapy) OR ti(hypnosis) OR ti(medical clowning) OR ti(stress management) OR ti (emotional disclosure) OR ti (emotional support) OR ti (group support) OR ab(Psychotherapy) OR ab(therapy) OR ab(Intervention) OR ab(programme) OR ab(program) OR ab(Mind body) OR ab(Cognitive behavioral) OR ab(counseling) OR ab(acceptance and commitment therapy) OR ab(progressive muscle relaxation) OR ab(relaxation therapy) OR ab(hypnosis) OR ab(medical clowning) OR ab(stress management) OR ab (emotional disclosure) OR ab (emotional support) OR ab (group support))	850777
#4	MJSUB.EXACT.EXPLODE("Clinical Psychology") OR MJSUB.EXACT.EXPLODE("Anxiety") OR MJSUB.EXACT.EXPLODE("Depression (Emotion)") OR MJSUB.EXACT.EXPLODE("Emotions") OR MJSUB.EXACT.EXPLODE("Psychological Stress") OR (ti (Psychology) OR ti (anxiety) OR ti (depression) OR ti (emotion) OR ti (Stress) OR ti (distress) OR ti (mental health) OR ti (quality of life) OR ti (psychological well-being) OR ti (marital relationship) OR ti (marital satisfaction) OR ti (pregnancy rate) OR ab (Psychology) OR ab (anxiety) OR ab (depression) OR ab (emotion) OR ab (Stress) OR ab (distress) OR ab (mental health) OR ab (quality of life) OR ab (psychological well-being) OR ab (marital relationship) OR ab (marital satisfaction) OR ab (pregnancy rate))	225401
#5	#1 AND #2 AND #3 AND #4	23

Table 10-1 Quality Checklist

The followings are the key components of the intervention. Please indicate whether each of the contents has been delivered.

Title / main focus	Number	Contents	It has been delivered	It has been not delivered
Dyadic partnership: Facilitating infertile couples' sharing and mutual support	1	**Sharing experiences:** couples' experience with sharing and support during the treatment		
		-Awareness of gender differences in psychological status		
	2	Gender differences in experiences with and adjustments to infertility		
	3	Gender differences in the emotional reaction to IVF treatment.		
		-Awareness of the essential elements in infertile couples' sharing		
	4	Recognition of gender differences		
	5	Soft self-disclosure		
	6	Active listening		
	7	Emotional validation		
	8	Keeping a balance between the partners' need to share		
		-Modification of undesirable sharing behaviours		
	9	Incongruence between the 'pursuer' and the 'distancer'		
	10	Inadequate discussion		
	11	Vague complaints		
	12	Derogatory labels for the partner		
		-Facilitation of tangible support between partners		
	13	Understanding different forms of support		
	14	Being aware of the approaches and effects of tangible support		
		-Development of skills for enhancing mutual support		
	15	Recognition of the stress of oneself and one's partner		
	16	Assertive skills		
	17	Empathic joining skills		
	18	Emotional support for the male partner		
	19	**Skills in sharing and practice:** practise soft self-disclosure, active listening, emotional validation, empathic joining, and assertive skills		

	20	**-Homework assignment:** practise and implement the effective skills of sharing and support		
Dyadic coping: Improving the individual and dyadic coping skills of infertile couples.	21	**-Recalling experiences:** couples' individual and dyadic coping strategies		
		-Understanding different coping strategies		
	22	Emotion-focused coping		
	23	Problem-focused coping		
	24	Appraisal-focused coping		
		-Promoting stress-antagonistic activities		
	25	Building up a personal repertoire of pleasant events		
	26	Relaxation technique: meditation		
		-Promoting infertility-specific coping strategies		
	27	During the embryo transfer: relaxation music, guided imagery		
	28	During the two-week waiting period and after the disclosure of a negative outcome		
	29	Stopping thoughts because of irrational fears		
	30	Laughing more and looking for humour		
	31	Positively appraising the experience of infertility and its treatment		
	32	Having realistic expectations of the treatment outcome		
	33	Sharing experiences in social media-based support groups		
	34	Turning to nature for comfort		
		-Enhancing positive dyadic coping		
	35	Supportive dyadic coping strategies		
	36	Common dyadic coping strategies		
	37	Delegated dyadic coping strategies		
		-Shying away from negative dyadic coping		
	38	Hostile dyadic coping behaviours		
	39	Ambivalent dyadic coping behaviours		
	40	Superficial dyadic coping behaviours		
	41	**-Exercises:** Practise meditation, self-guided imagery		
	42	**-Distribution of written supplemental materials**		
	43	**-Homework assignment:** Practise positive dyadic coping skills with your partner		

Appendix I Ethics Approval Letter for Qualitative Study

THE HONG KONG POLYTECHNIC UNIVERSITY 香港理工大學

To	Loke Yuen Jean Tak Alice (School of Nursing)		
From	CHIEN Wai Tong, Chair, Departmental Research Committee		
Email	hschien@	Date	04-Dec-2014

Application for Ethical Review for Teaching/Research Involving Human Subjects

I write to inform you that approval has been given to your application for human subjects ethics review of the following project for a period from 01-Dec-2014 to 01-Dec-2015:

Project Title:	Infertile couples' perceptions of their 'partnership' when undergoing In Vitro Fertilization treatment: A qualitative descriptive study
Department:	School of Nursing
Principal Investigator:	Loke Yuen Jean Tak Alice
Reference Number:	HSEARS20141117003

Please note that you will be held responsible for the ethical approval granted for the project and the ethical conduct of the personnel involved in the project. In the case of the Co-PI, if any, has also obtained ethical approval for the project, the Co-PI will also assume the responsibility in respect of the ethical approval (in relation to the areas of expertise of respective Co-PI in accordance with the stipulations given by the approving authority).

You are responsible for informing the Departmental Research Committee in advance of any changes in the proposal or procedures which may affect the validity of this ethical approval.

You will receive separate email notification should you be required to obtain fresh approval.

CHIEN Wai Tong

Chair

Departmental Research Committee

Appendix II Information Sheet for Qualitative Study

INFORMATION SHEET

Infertile Couples' Perceptions of their 'Partnership' When Undergoing In Vitro Fertilization Treatment: A Qualitative Descriptive Study

You are invited to participate in a study supervised by Prof. Alice Yuen Loke and Dr. Lai-har Wu, and conducted by Liying Ying, who is a student of the School of Nursing in The Hong Kong Polytechnic University.

The aim of this study is to explore infertile couples' feelings and perceptions of their 'partnership' when undergoing IVF treatment; and to identify the needs for professional support. You will be interviewed together with your husband/wife. The study will involve an in-depth and tape-recorded interview, which will take you 60 to 90 minutes. It is hoped that this information will help to understand the partnership among couples with IVF treatment in order to develop better interventions. The interview should not result in any undue discomfort, but you will need to recall the partnership with your spouse before, during, and after IVF treatment.

You have every right to withdraw from the study before or during the measurement without penalty of any kind. All information related to you will remain confidential, and will be identifiable by codes known only to the researcher.

If you have any complaints about the conduct of this research study, please do not hesitate to contact Miss Cherrie Mok, Secretary of the Human Subjects Ethics Sub-Committee of The Hong Kong Polytechnic University in person or in writing (c/o Research Office of the University).

If you would like more information about this study, please contact Liying Ying at telephone number 137******** or her supervisor Prof. Loke at telephone number +852-2*******.

Thank you for your interest in participating in this study.

Principal Investigator

Prof. Alice Loke Yuen

有关资料

体外受精-胚胎移植患者夫妻伙伴关系的质性研究

诚邀参加袁桢德博士和胡丽霞博士负责监督，应立英同志负责执行的研究计 划。应立英同志是香港理工大学护理学院博士学生。

这项研究的目的是了解“体外受精-胚胎移植”夫妇对治疗前、中、后夫妻伙伴关系的看法、体会及需求，以期为制定相应的干预措施提供依据，用以帮助这类夫妻。研究方法是对夫妻双方一起进行面对面访谈，在访谈过程中将会进行录音，以便为后期的资料分析提供依据。整个访谈过程需要花费的时间大约 1-1.5 小时。访谈过程不会引起明显不适，但需要你回忆体外受精-胚胎移植治疗期间的夫妻伙伴关系。

您享有充分的权利在研究开始之前或之后决定退出这项研究，而不会受到任何对您不正常的待遇或被追究责任。凡有关您的资料将会保密，一切资料的编码只有研究人员得悉。

如果您对这项研究有任何的不满，可随时与香港理工大学人类实验对象操守小组委员会秘书莫小姐联络(地 址：香港理工大学研究事务处转交)。

如果您想获得更多有关这项研究的资料，请与应立英联络,电话 137********或联络她的导师袁桢德博士，电话+852-2*******。

谢谢您有兴趣参与这项研究。

主要研究员(PI)
袁桢德博士

Appendix III Consent Form for Qualitative Study

CONSENT TO PARTICIPATE IN RESEARCH

Infertile Couples' Perceptions of Their 'Partnership' When Undergoing In Vitro Fertilization Treatment: A Qualitative Descriptive Study

I _____hereby consent to participate in the captioned research supervised by Prof. Alice Yuen Loke, and Dr. Lai-Har Wu, and conducted by Liying Ying, the doctoral student from School of Nursing in The Hong Kong Polytechnic University.

I understand that information obtained from this research may be used in future research and published. However, my right to privacy will be retained, i.e. my personal details will not be revealed.

The procedure as set out in the attached information sheet has been fully explained. I understand the benefit and risks involved. My participation in the project is voluntary.

I acknowledge that I have the right to question any part of the procedure and can withdraw at any time without penalty of any kind.

Name of participants：_____

Signature of participants：_____

Name of researcher：_____

Signature of researcher：_____

Date ：_____

参与研究同意书

体外受精-胚胎移植患者夫妻伙伴关系的质性研究

本人_____同意参加由袁桢德博士和胡丽霞博士负责监督，应立英同志执行的研究项目。

我理解此研究所获得的资料可用于未来的研究和学术交流。然而我有权保护 自己的隐私，我的个人资料将不能泄漏。

我对所附资料的有关步骤已经得到充分的解释。我理解可能会出现的风险。我是自愿参与这项研究。

我理解我有权在研究过程中提出问题，并在任何时候决定退出研究而不会受到任何不正常的待遇或被追究责任。

参加者（双方）姓名：_____

参加者（双方）签名：_____

研究人员姓名：_____

研究人员签名：_____

日期：_____

Appendix IV Ethics Approval Letter for Feasibility Study - From University

THE HONG KONG POLYTECHNIC UNIVERSITY
香港理工大學

To	Loke Yuen Jean Tak Alice (School of Nursing)		
From	CHIEN Wai Tong, Chair, Departmental Research Committee		
Email	hschien@	Date	10-Jul-2015

Application for Ethical Review for Teaching/Research Involving Human Subjects

I write to inform you that approval has been given to your application for human subjects ethics review of the following project for a period from 01-Jul-2015 to 30-Nov-2016:

Project Title:	The Effectiveness of a 'Partnership and Coping Enhancement Programme (PCEP)' on Psychological Well-being and Marital Benefit of Couples Undergoing In Vitro Fertilization Treatment
Department:	School of Nursing
Principal Investigator:	Loke Yuen Jean Tak Alice
Reference Number:	HSEARS20150616001

Please note that you will be held responsible for the ethical approval granted for the project and the ethical conduct of the personnel involved in the project. In the case of the Co-PI, if any, has also obtained ethical approval for the project, the Co-PI will also assume the responsibility in respect of the ethical approval (in relation to the areas of expertise of respective Co-PI in accordance with the stipulations given by the approving authority).

You are responsible for informing the Departmental Research Committee in advance of any changes in the proposal or procedures which may affect the validity of this ethical approval.

You will receive separate email notification should you be required to obtain fresh approval.

CHIEN Wai Tong

Chair

Departmental Research Committee

Appendix IV Ethics Approval Letter for Feasibility Study - From Hospital

AF16 浙江省人民医院医学伦理委员会

伦理审查批件

批件编号	2016KY001	项目受理号	KY2016001
项目名称/版本号	双向应对和支持能力的综合干预对 IVF 夫妇的效果研究		
研究类型	□药物临床试验 □医疗器械临床试验 □体外诊断试剂临床试验 ■科研项目 □其他_____		
申办单位	浙江中医药大学		
组长单位	无		
主要研究者	舒静	申请专业	生殖内分泌科
审查类别	■新方案 □作必要修改后的复审案 □修正案		
审查方式	□会议审查 ■快速审查		
审查日期	2016/2/4	审查会议地点	无
审查文件	研究方案；知情同意书		

投票结果：

同意	作修改后同意	作修改后重审	不同意	终止或暂停
2票	0票	0票	0票	0票

审查意见	1、基本符合 GCP 原则，同意进行临床试验。 2、医学伦理委员会对该研究实施过程的持续审查：■是 □否 审查频度为研究批准之日起：□3个月 □6个月 ■1年 3、医学伦理委员会有权根据实际进展情况改变持续审查频度。

主任委员签名：_____ 日期：

医学伦理委员会（盖章）

注：

1、研究者应遵循伦理委员会批准的方案执行，本伦理委员会组成运行符合 SFDA/GCP 和赫尔辛基宣言的原则。

2、在试验实施过程中，对研究方案和知情同意等相关文件所做的任何修改，均需得到伦理委员会审查同意后方可实施。

3、发生严重不良事件及可能影响风险受益比的任何事件和新信息需及时报告伦理委员会。

4、接受伦理委员会持续审查的项目，请在到期前1个月（无论试验开始与否）提出持续审查的申请。

5、如有违背/偏离方案或暂停/提前终止的试验项目，应及时以书面文件报告伦理委员会；临床试验结束后，须及时向伦理委员会提交结题报告。

6、本批件有效期1年（自批准之日起），如试验逾期未实施即自行废止。

7、本批件一式四份，分别由申办方、主要研究者、药物临床试验机构和本伦理委员会保存。

Appendix V Ethics Information Sheet for Feasibility Study

INFORMATION SHEET

The Effectiveness of a 'Partnership and Coping Enhancement Programme (PCEP)' on Psychological Well-being and Marital Benefit of Couples Undergoing In Vitro Fertilization Treatment

You are cordially invited to participate in a study supervised by Prof. Alice Yuen Loke and Dr. Lai Har Wu, and conducted by Liying Ying, who is a PhD student of the School of Nursing in The Hong Kong Polytechnic University.

The aim of this study is to develop, deliver, and evaluate a 'Partnership and Coping Enhancement Programme (PCEP)'aiming at improving psychological well-being and marital relationship of couples undergoing In Vitro Fertilization treatment in China. The study would involve completing a questionnaire for about half an hour at three different time points: on the day of embryo transfer, 10 days after embryo transfer, and 30 days after embryo transfer. It is a feasibility study.

If you are allocated to the intervention group, you will be asked to take part in one face-to-face and couple-based group sessions of PCEP. This session is about 1.5 hours in duration, on the day of embryo transfer. The sessions will be semi-structured, consisting of psychoeducation, group sharing, and exercise.The programme should not result in any undue discomfort, but you will need to share the coping strategies and partners' dynamics during the group discussion. If you are allocated to the control group, you will not attend the session. After you complete the questionnaires at the third time point, we would like to send you the

related written material on the strategies of dyadic coping and mutual support if it is required.

All information related to you or your partner will remain confidential, and will be identifiable by codes only known to the researcher. If you feel uncomfortable during the study, you can contact the researcher at any time for help. You have every right to withdraw from the study before or during the measurement without penalty of any kind. The whole project, including the session and questionnaire completion, will take about 3 hours.

If you would like to get more information about this study, please contact Liying Ying on tel. no. 137******** or her supervisor Prof. Loke on tel. no. +852-2*******; mailing address **********@connect.polyu.hk and email address: **********@polyu.edu.hk.

If you have any complaints about the conduct of this research study, please do not hesitate to contact Miss Cherrie Mok, Secretary of the Human Subjects Ethics Sub-Committee of The Hong Kong Polytechnic University in writing (c/o Research Office of the University) stating clearly the responsible person and department of this study.

Thank you for your interest in participating in this study.

Prof. Alice Yuen Loke

Principal Investigator

有关资料

双向应对和支持能力的综合干预对体外受精-胚胎移植夫妇的效果研究

诚邀您参加由袁桢德教授和胡丽霞博士负责监督,应立英同志负责执行的研究项目。应立英同志是香港理工大学护理学院博士学生。

这项研究的目的是评估双向应对和支持能力的综合干预对体外受精-胚胎移植夫妇的心理及夫妇关系的效果。您将被邀请在干预开始之前、胚胎移植后 10 天、和胚胎移植后 30 天各填写一份问卷，每次约需 0.5 小时。该项目是一个面对面、夫妻共同参与的干预活动，是属于对照研究。

如果您被分配在干预组，您将于胚胎移植当日早上受邀参加 1 次活动，持续 1.5 小时。干预活动包括心理教育、经验分享、以及应对、交流和放松等技巧的练习。该干预措施不会引起明显的不适。在小组活动时，可能需要您分享治疗过程中的相互支持和应对的体验。我们会制定措施保护您的隐私。

如果您被分配在对照组，将不会参加上述干预活动。如果你需要，我们会在您填写完 3 次问卷后，将干预活动的资料寄给您，期望对提高夫妇之间交流及应对困难的能力有所帮助。无论您是否参与干预活动，在研究过程中如出现任何不适，可以随时与应立英同志联系，以寻求帮助。

您享有充分的权利在研究开始之前或之后决定退出这项研究，而不会受到任何对您不正常的待遇或被追究责任。所有与您相关的信息都会保密及加上编码，一切资料的编码只有研究人员得悉。在研究结束后会对所有资料进行销毁处理。

如果您对这些研究有任何的不满，可随时与香港理工大学人类实验对象操守小组委员会秘书莫小姐联络（地址：香港理工大学研究事务处转交）。

如果您想获得更多有关这项研究的资料，请与应立英联络，电话 137******** 或联络她的导师袁桢德教授，电话+852-2*******。

谢谢您有兴趣参与这项研究。

主要研究员（PI）
袁桢德教授

Appendix VI Consent Form for Feasibility Study

CONSENT TO PARTICIPATE IN RESEARCH

The Effectiveness of a 'Partnership and Coping Enhancement Programme (PCEP)' on Psychological Well-being and Marital Benefit of Couples Undergoing In Vitro Fertilization Treatment

I _____hereby consent to participate in the captioned research supervised by Prof. Alice Yuen Loke and Dr. Lai Har Wu, and conducted by Liying Ying, who is a PhD student of the School of Nursing in The Hong Kong Polytechnic University.

I understand that information obtained from this project may be used in future research and published. However, my right to privacy will be retained, i.e. my personal details will not be revealed.

The procedure as set out in the attached information sheet has been fully explained. I understand the benefit and risks involved. My participation in the project is entirely voluntary.

I acknowledge that I have the right to question any part of the procedure and can withdraw at any time without penalty of any kind.

Name of participants：_____

Signature of participants：_____

Name of researcher：_____

Signature of researcher：_____

Date ：_____

参与研究同意书

双向应对和支持能力的综合干预对“体外受精-胚胎移植”夫妇的效果研究

本人_____同意参与由袁桢德教授和胡丽霞博士负责监督，应立英同志开展的上述研究。

本人理解此研究所得的资料可能被用作未来的研究及学术交流，但本人的隐私权利将得以保留，即本人的个人资料不会被公开。

研究人员已向本人清楚解释列在所附资料卡上的研究程序，本人理解当中涉及的利益及风险；本人自愿参与研究项目。

本人理解本人有权就程序的任何部分提出疑问，并有权随时退出而不受任何不正常的待遇或被追究责任。

参加者（双方）姓名：_____

参加者（双方）签名：_____

研究人员姓名：_____

研究人员签名：_____

日期：_____

Appendix VII Questionnaires for both female and male of infertile couples

Section 1: The Background Information Form (BIF)

- Demographic characteristics: age, level of education, duration of marriage, religion, employment status, personal income of both partners, economic burden of the treatment, interpersonal skills, loving relationships.
- Treatment factors: duration of infertility treatment, cause of infertility, previous IVF treatment, current treatment type, number of fertilized embryos.

Section 2: Psychological wellbeing

The Hospital Anxiety and Depression Scale (HADS)

This questionnaire is designed to help your doctor to know how you feel. Read each item and tick the reply which closest to how you have been feeling in the past week.

Items	3	2	1	0
1. I feel tense or 'wound up'	□Most of the time	□ A lot of the time	□ From time to time, occasionally	□ Not at all
2. I still enjoy the things I used to enjoy	□ Hardly at all	□ Only a little	□ Not quite so much	□ Definitely as much
3. I get a sort of frightened feeling as if something awful is about to happen	□ Very definitely and quite badly	□ Yes, but not too badly	□ A little, but it doesn't worry me	□ Not at all
4. I can laugh and see the funny side of things	□ Not at all	□ Definitely not so much now	□ Not quite so much now	□ As much as I always could
5. Worrying thoughts go through my mind	□A great deal of the time	□ A lot of time	□ From time to time but not too often	□Only occasionally
6. I feel cheerful	□ Not at all	□ Not often	□ Sometimes	□ Most of the time
7. I can sit at ease and feel relaxed	□ Not at all	□ Not often	□ Usually	□ Definitely
8. I feel as if I am slowed down	□Nearly all the time	□ Very often	□ Sometimes	□ Not at all
9. I get a sort of frightened feeling like 'butterflies' in the stomach	□ Very often	□ Quite often	□ Occasionally	□ Not at all
10. I have lost my interest in my appearance	□ Definitely	□ I don't take so much care as I should	□ I may not take quite as much care	□ I take just as much care as ever
11. I feel restless as if I have to be on the move	□Very much indeed	□ Quite a lot	□ Not very much	□ Not at all
12. I look forward with enjoyment to things	□ Hardly at all	□ Definitely less than I used to	□ Rather less than I used to	□ As much as I ever did
13. I get sudden feelings of panic	□ Very often indeed	□ Quite often	□ Not very often	□ Not at all
14. I can enjoy a good book or radio or TV programme	□ Very seldom	□ Not often	□ Sometimes	□ Often

Section 3: Marital benefits

(I)The Revised Dyadic Adjustment Scale (RDAS)

Most persons have disagreements in their relationships. Please indicate below the approximate extent of agreement or disagreement between you and your partner for each item on the following list.

	Always agree	**Almost always agree**	**Occasionally agree**	**Frequently disagree**	**Almost always disagree**	**Always disagree**
1.Religious matters	5	4	3	2	1	0
2.Demonstrations of affection	5	4	3	2	1	0
3.Making major decisions	5	4	3	2	1	0
4.Sex relations	5	4	3	2	1	0
5.Conventionality (correct or proper behavior)	5	4	3	2	1	0
6.Career decisions	5	4	3	2	1	0

	All the time	**Most of the time**	**More often than not**	**Occasionally**	**Rarely**	**Never**
7.How often do you discuss or have you considered divorce, separation, or terminating your relationship?	0	1	2	3	4	5
8.How often do you and your partner quarrel?	0	1	2	3	4	5
9.Do you ever regret that you married (or lived together)?	0	1	2	3	4	5
10.How often do you and your mate “get on each other’s nerves”?	0	1	2	3	4	5

	Every day	**Almost every day**	**Occasionally**	**Rarely**	**Never**
11.Do you and your mate engage in outside interests together?	4	3	2	1	0

	Never	**Less than once a month**	**Once or twice a month**	**Once or twice a week**	**Once a day**	**More often**
12.Have a stimulating exchange of ideas	0	1	2	3	4	5
13.Work together on a project	0	1	2	3	4	5
14.Calmly discuss some thing	0	1	2	3	4	5

(II) The Kansas Marital Satisfaction Scale (KMS)

Please read each statement and select the response that best indicates how much you agree with each statement. There is no right or wrong answers. The best answer is the one that describes your personal view.

Items	Extremely dissatisfied	Very dissatisfied	Some-what dissatisfied	Mixed	Some-what satisfied	Very satisfied	Extremely satisfied
1.How satisfied are you with your marriage?	□	□	□	□	□	□	□
2.How satisfied are you with your husband as a spouse?	□	□	□	□	□	□	□
3.How satisfied are you with your relationship with your husband?	□	□	□	□	□	□	□

Section 4: Dyadic coping

The Dyadic Coping Inventory (DCI)

This scale is designed to measure how you and your partner cope with stress. Please indicate the first response that you feel is appropriate. Please be as honest as possible. Please response to any item by marking the appropriate case, which is fitting to your personal situation. There are no false answers.

How do you evaluate your coping as a couple?	Never/Very rarely	Rarely	Some-times	Often	Very often
1.I am satisfied with the support I receive from my partner and the way we deal with stress together.	□	□	□	□	□
2.I am satisfied with the support I receive from my partner and I find as a couple, the way we deal with stress together is effective.	□	□	□	□	□

Section 5: Partnership

The Infertility Partnership Scale (IPS)

Please read each statement on partnership between your partner and you. Select the response that best indicates how much you agree with each statement.

Items	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1.We provide advice concerning concerns of the treatment and relief with one another.	□	□	□	□	□
2.We provide consultation concerning suffering during the treatment with one another.	□	□	□	□	□
3.We support each other emotionally during the treatment.	□	□	□	□	□
4.I talk my feeling from the treatment with my partner.	□	□	□	□	□
5.I share burden of the treatment with my partner.	□	□	□	□	□
6.I share information of the treatment with my partner.	□	□	□	□	□
7.I feel relieved when I talk with my partner about the treatment.	□	□	□	□	□
8.We give care to each other to get refreshed except the treatment.	□	□	□	□	□
9.After starting treatment, I have a hunger to cherish my partner.	□	□	□	□	□
10.I understand my partner's psychological burden by treatment.	□	□	□	□	□
11.I understand my partner's physical burden by treatment.	□	□	□	□	□
12.I understand that my partner has challenges have been trying to balance work (household chores) and treatment.	□	□	□	□	□
13.I understand my partner has worries about treatment.	□	□	□	□	□
14.I try to maintain good health for the treatment.	□	□	□	□	□
15.I adjust the time of work and house chores for the treatment.	□	□	□	□	□
16.I am enrolling in treatment positively.	□	□	□	□	□
17.I come up with the money for the treatment.	□	□	□	□	□
18.I refrain from drinking alcohol and smoking.	□	□	□	□	□

Appendix VIII Questionnaires for females (Chinese version)

尊敬的女士：

您好！本问卷旨在了解生育问题对您的身体及心理状况的影响，以便我们更好地为您提供服务。本调查所有的问题都不涉及能辨认您身份的信息，答案无对错之分，请您根据自己的实际情况在您认为最合适的答案的代码上打勾（√）。我们会完全对您所填内容保密。您的参与不仅有利于您的疾病的治疗和心理调适，而且将会对其他病人的治疗产生积极的影响和巨大的贡献。衷心感谢您的合作！

祝您心想事成，平安幸福！

第一部分：一般情况调查

出生年月		同居年限		不孕治疗年限	
曾做过___次试管婴儿	目前胚胎数量___个	移植类型：□ 冻胚移植 □ 鲜胚移植			
1. 您的受教育程度：					
□ 没有受过教育	□ 小学	□ 中学	□ 大学	□ 硕士	□ 博士
2. 您的宗教信仰：					
□ 无宗教信仰	□ 佛教	□ 基督教	□ 道教	□ 其他 _____	
3. 您本次治疗前的工作状态：					
□ 在职	□ 在家做兼职	□ 辞职	□ 病休	□ 全职太太	□ 务农 □ 其他 _____
4. 您不孕的原因：					
□ 男方原因	□ 女方原因	□ 双方原因	□ 不明原因	□ 其他 _____	
5. 您本次计划做的试管婴儿类型：					
□ 第一代（IVF）	□ 第二代（ICSI）	□ 第三代（PGD）			
6. 总体来说，你觉得自己的人际沟通能力：					
□ 非常好	□ 好	□ 较好	□ 一般	□ 差	□ 非常差
7. 在不孕治疗前，您对两人之间的关系评价是：					
□ 非常好	□ 好	□ 较好	□ 一般	□ 差	□ 非常差

第二部分：心理状况评估

HAD 情绪评估量表(HADS)

请您阅读以下各个项目，在其中最符合您<u>过去一周以来</u>的情绪评分上打“√”。对这些问题的回答不要做过多的考虑，立即做出的回答更切合实际。

条　目	3	2	1	0
1. 我感到紧张 （或痛苦）	□ 几乎所有时候	□ 大多数时候	□ 有时	□ 根本没有
2. 我对以往感兴趣的事情还是有兴趣	□ 基本上没有了	□ 只有一点儿	□ 不像以前那样多	□ 肯定一样
3. 我感到有点害怕，好像预感到有什么可怕事情要发生	□ 非常肯定和十分严重	□ 是有，但并不太严重	□ 有一点，但并不使我苦恼	□ 根本没有
4. 我能够哈哈大笑，并看到事物好的一面	□ 根本没有	□ 现在肯定是不太多了	□ 现在已经不大这样了	□ 我经常这样
5. 我的心中充满烦恼	□ 大多数时间	□ 常常如此	□ 时时，但并不经常	□ 偶然如此
6. 我感到愉快	□ 根本没有	□ 并不经常	□ 有时	□ 大多数
7. 我能够安闲而轻松地坐着	□ 根本没有	□ 并不经常	□ 经常	□ 肯定
8. 我对自己的仪容（打扮自己）失去兴趣	□ 肯定	□ 并不像我应该做到的那样关心	□ 我可能不是非常关心	□ 我仍像以往一样关心
9. 我有点坐立不安，好像感到非要活动不可	□ 确实非常多	□ 是不少	□ 并不很多	□ 根本没有
10. 我对一切都是乐观地向前看	□ 几乎从来不这样做	□ 很少这样做	□ 并不完全是这样做的	□ 差不多是这样做的
11. 我突然发现恐慌感	□ 确实很经常	□ 时常	□ 并非经常	□ 根本没有
12. 我好像感到情绪在渐渐低落	□ 几乎所有的时间	□ 很经常	□ 有时	□ 根本没有
13. 我感到有点害怕，好像身体某个部位出问题了	□ 非常经常	□ 很经常	□ 有时	□ 根本没有
14. 我能欣赏一本好书或一项好的广播或电视节目	□ 很少	□ 并非经常	□ 有时	□ 常常

第三部分：婚姻状况评估

（I）修订版婚姻适应量表(RDAS)

许多人在婚姻中会有意见不一致。针对以下条目，请选出您与您伴侣意见一致的程度。

条　目	总是一致	几乎完全一致	偶尔一致	有时一致	几乎完全不一致	总是不一致
1. 宗教信仰	□	□	□	□	□	□
2. 性爱表示	□	□	□	□	□	□
3. 做出重要的决定	□	□	□	□	□	□
4. 性关系	□	□	□	□	□	□
5. 传统观念和习俗	□	□	□	□	□	□
6. 有关职业的决定	□	□	□	□	□	□

	总是如此	大部分时间	比较多时间	偶尔	极少	从来没有
7. 与配偶讨论离婚、分居等	□	□	□	□	□	□
8. 与配偶吵架时间	□	□	□	□	□	□
9. 后悔结婚	□	□	□	□	□	□
10. 令配偶心烦时间	□	□	□	□	□	□

	每天	几乎每天	偶尔	极少	从来没有
11. 与配偶一同外出进行社交活动	□	□	□	□	□

	从不	少于每月一次	每月一次或两次	每周一次或两次	每天一次	经常
12. 有启发性或激发性的意见交流	□	□	□	□	□	□
13. 一起进行一件事或计划	□	□	□	□	□	□
14. 冷静地讨论事情	□	□	□	□	□	□

（II）Kansas 婚姻满意感量表(KMS)

请你按照你对理想婚姻关系的感觉在以下每一问题后面‘√’出你认为最能代表你的感受的答案。

条　　目	极度不满意	很不满意	有点不满意	界乎满意与不满意之间	有点满意	很满意	极度满意
1. 您对您的婚姻满意程度有多少?	□	□	□	□	□	□	□
2. 您的丈夫作为一个配偶，您对他的满意程度有多少？	□	□	□	□	□	□	□
3. 您对你们夫妻之间关系的满意程度有多少？	□	□	□	□	□	□	□

第四部分：双向应对量表(DCI)

本量表用来测评您和您的伴侣是如何应对压力。请在答题时根据您个人的情况做出最佳选择。

条　目	极少	很少	有时	经常	非常频繁
1. 我对我的伴侣提供的支持感到**满意**。	□	□	□	□	□
2. 我觉得我们一起应对压力的方式是**有效**的。	□	□	□	□	□

第五部分：夫妇伙伴关系评估

不孕夫妇伙伴关系量表(IPS)

本量表是用来评价您和您的伴侣在前段时间治疗过程中的相互配合。请根据您的实际情况做出选择，答案无对错之分。

条　　目	非常不同意	不同意	无意见	同意	非常同意
1. 我们相互提供建议，以减轻或消除治疗带来的不安和焦虑。	□	□	□	□	□
2. 我们相互商讨在治疗过程中所遭受的痛苦。	□	□	□	□	□
3. 在治疗过程中，我们在情感上相互支持。	□	□	□	□	□
4. 我会告诉我的伴侣治疗相关的感受。	□	□	□	□	□
5. 我与我的伴侣共同承担治疗带来的负担。	□	□	□	□	□
6. 我会告诉我的伴侣治疗相关的信息。	□	□	□	□	□
7. 我与伴侣交流治疗情况后，会感觉心情轻松。	□	□	□	□	□
8. 在治疗以外，我们互相关心，以便重新振作。	□	□	□	□	□
9. 在治疗开始后，我更愿意疼惜我的伴侣。	□	□	□	□	□
10. 我能理解治疗对我的伴侣造成的心理负担。	□	□	□	□	□
11. 我能理解治疗对我的伴侣造成的身体负担。	□	□	□	□	□
12. 我能理解我伴侣的难处，她/他在努力平衡工作（家务事）和治疗。	□	□	□	□	□
13. 我能理解我的伴侣在为治疗而担忧。	□	□	□	□	□
14. 我努力保持身体健康来配合治疗。	□	□	□	□	□
15. 我调整工作和家务事的时间来配合治疗。	□	□	□	□	□
16. 我积极参与治疗。	□	□	□	□	□
17. 我们一起支付治疗费用。	□	□	□	□	□
18. 我戒了烟和酒。（如原本就不吸烟喝酒，请选“无意见”）	□	□	□	□	□

Appendix IX Questionnaires for males (Chinese version)

尊敬的先生：

您好！本问卷旨在了解生育问题对您的身体及心理状况的影响，以便我们更好地为您提供服务。本调查所有的问题都不涉及能辨认您身份的信息，答案无对错之分，请您根据自己的实际情况在您认为最合适的答案的代码上打勾（√）。我们会完全对您所填内容保密。您的参与不仅有利于您的疾病的治疗和心理调适，而且将会对其他病人的治疗产生积极的影响和巨大的贡献。衷心感谢您的合作！

祝您心想事成，平安幸福！

第一部分：一般情况调查

1. 您的出生年月：_____

2. 您的受教育程度：

□ 没有受过教育 □ 小学 □ 中学 □ 大学 □ 硕士 □ 博士

3. 您的宗教信仰：

□ 无宗教信仰 □ 佛教 □ 基督教 □ 道教 □ 其他 _____

4. 您本次治疗前的工作状态：

□ 在职 □ 在家做兼职 □ 无业 □ 经商 □ 务农 □ 其他 _____

5. 您的家庭月收入为：

□ 小于 1000 元 □小于 3000 元 □小于 5000 元 □小于 10000 元 □10000 元以上

6. 不孕治疗给您家庭带来的经济压力：

□ 较重 □ 一般 □ 较轻

7. 总体来说，你觉得自己的人际沟通能力：

□ 非常好 □ 好 □ 较好 □ 一般 □ 差 □ 非常差

8. 在不孕治疗前，您对两人之间的关系评价是：

□ 非常好 □ 好 □ 较好 □ 一般 □ 差 □ 非常差

第二部分：心理状况评估

HAD 情绪评估量表(HADS)

请您阅读以下各个项目，在其中最符合您<u>过去一周以来</u>的情绪评分上打“√”。对这些问题的回答不要做过多的考虑，立即做出的回答更切合实际。

条　目	3	2	1	0
1. 我感到紧张 （或痛苦）	□ 几乎所有时候	□ 大多数时候	□ 有时	□ 根本没有
2. 我对以往感兴趣的事情还是有兴趣	□ 基本上没有了	□ 只有一点儿	□ 不像以前那样多	□ 肯定一样
3. 我感到有点害怕，好像预感到有什么可怕事情要发生	□ 非常肯定和十分严重	□ 是有，但并不太严重	□ 有一点，但并不使我苦恼	□ 根本没有
4. 我能够哈哈大笑，并看到事物好的一面	□ 根本没有	□ 现在肯定是不太多了	□ 现在已经不大这样了	□ 我经常这样
5. 我的心中充满烦恼	□ 大多数时间	□ 常常如此	□ 时时，但并不经常	□ 偶然如此
6. 我感到愉快	□ 根本没有	□ 并不经常	□ 有时	□ 大多数
7. 我能够安闲而轻松地坐着	□ 根本没有	□ 并不经常	□ 经常	□ 肯定
8. 我对自己的仪容（打扮自己）失去兴趣	□ 肯定	□ 并不像我应该做到的那样关心	□ 我可能不是非常关心	□ 我仍像以往一样关心
9. 我有点坐立不安，好像感到非要活动不可	□ 确实非常多	□ 是不少	□ 并不很多	□ 根本没有
10. 我对一切都是乐观地向前看	□ 几乎从来不这样做	□ 很少这样做	□ 并不完全是这样做的	□ 差不多是这样做的
11. 我突然发现恐慌感	□ 确实很经常	□ 时常	□ 并非经常	□ 根本没有
12. 我好像感到情绪在渐渐低落	□ 几乎所有的时间	□ 很经常	□ 有时	□ 根本没有
13. 我感到有点害怕，好像身体某个部位出问题了	□ 非常经常	□ 很经常	□ 有时	□ 根本没有
14. 我能欣赏一本好书或一项好的广播或电视节目	□ 很少	□ 并非经常	□ 有时	□ 常常

第三部分：婚姻状况评估

（I）修订版婚姻适应量表(RDAS)

许多人在婚姻中会有意见不一致。针对以下条目，请选出您与您伴侣意见一致的程度。

条　目	总是一致	几乎完全一致	偶尔一致	有时一致	几乎完全不一致	总是不一致
1. 宗教信仰	□	□	□	□	□	□
2. 性爱表示	□	□	□	□	□	□
3. 做出重要的决定	□	□	□	□	□	□
4. 性关系	□	□	□	□	□	□
5. 传统观念和习俗	□	□	□	□	□	□
6. 有关职业的决定	□	□	□	□	□	□

	总是如此	大部分时间	比较多时间	偶尔	极少	从来没有
7. 与配偶讨论离婚、分居等	□	□	□	□	□	□
8. 与配偶吵架时间	□	□	□	□	□	□
9. 后悔结婚	□	□	□	□	□	□
10. 令配偶心烦时间	□	□	□	□	□	□

	每天	几乎每天	偶尔	极少	从来没有
11. 与配偶一同外出进行社交活动	□	□	□	□	□

	从不	少于每月一次	每月一次或两次	每周一次或两次	每天一次	经常
12. 有启发性或激发性的意见交流	□	□	□	□	□	□
13. 一起进行一件事或计划	□	□	□	□	□	□
14. 冷静地讨论事情	□	□	□	□	□	□

（II）Kansas 婚姻满意感量表(KMS)

请你按照你对理想婚姻关系的感觉在以下每一问题后面‘√’出你认为最能代表你的感受的答案。

条　目	极度不满意	很不满意	有点不满意	界乎满意与不满意之间	有点满意	很满意	极度满意
1. 您对您的婚姻满意程度有多少?	□	□	□	□	□	□	□
2. 您的丈夫作为一个配偶，您对他的满意程度有多少？	□	□	□	□	□	□	□
3. 您对你们夫妻之间关系的满意程度有多少？	□	□	□	□	□	□	□

第四部分：双向应对量表(DCI)

本量表用来测评您和您的伴侣是如何应对压力。请在答题时根据您个人的情况做出最佳选择。

条　目	极少	很少	有时	经常	非常频繁
1. 我对我的伴侣提供的支持感到**满意**。	□	□	□	□	□
2. 我觉得我们一起应对压力的方式是**有效**的。	□	□	□	□	□

第五部分：夫妇伙伴关系评估

不孕夫妇伙伴关系量表(IPS)

本量表是用来评价您和您的伴侣在前段时间治疗过程中的相互配合。请根据您的实际情况做出选择，答案无对错之分。

条　　目	非常不同意	不同意	无意见	同意	非常同意
1. 我们相互提供建议，以减轻或消除治疗带来的不安和焦虑。	□	□	□	□	□
2. 我们相互商讨在治疗过程中所遭受的痛苦。	□	□	□	□	□
3. 在治疗过程中，我们在情感上相互支持。	□	□	□	□	□
4. 我会告诉我的伴侣治疗相关的感受。	□	□	□	□	□
5. 我与我的伴侣共同承担治疗带来的负担。	□	□	□	□	□
6. 我会告诉我的伴侣治疗相关的信息。	□	□	□	□	□
7. 我与伴侣交流治疗情况后，会感觉心情轻松。	□	□	□	□	□
8. 在治疗以外，我们互相关心，以便重新振作。	□	□	□	□	□
9. 在治疗开始后，我更愿意疼惜我的伴侣。	□	□	□	□	□
10. 我能理解治疗对我的伴侣造成的心理负担。	□	□	□	□	□
11. 我能理解治疗对我的伴侣造成的身体负担。	□	□	□	□	□
12. 我能理解我伴侣的难处，她/他在努力平衡工作（家务事）和治疗。	□	□	□	□	□
13. 我能理解我的伴侣在为治疗而担忧。	□	□	□	□	□
14. 我努力保持身体健康来配合治疗。	□	□	□	□	□
15. 我调整工作和家务事的时间来配合治疗。	□	□	□	□	□
16. 我积极参与治疗。	□	□	□	□	□
17. 我们一起支付治疗费用。	□	□	□	□	□
18. 我戒了烟和酒。（如原本就不吸烟喝酒，请选“无意见”）	□	□	□	□	□

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