

School of Public Health

**Infertility and Marital Well-being among Infertile, Chinese Couples
from Hei Longjiang Province in China**

Peng Tao

This thesis is presented for the degree of

**Doctor of Philosophy
Curtin University**

December 2012

DECLARATION

To the best of my knowledge and belief this thesis contains no material previously published by any other person except where due acknowledgment has been made.

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university.

Signature: *Peng Tao*

Date: December 8, 2012

ACKNOWLEDGE

It is a substantial truth that I have been given more support from many people in my research. Indeed, it is not possible to finish this research without their assistance and help.

First and foremost, I would like to express my sincerest and deepest gratitude to my major supervisor, Prof Rosemary Coates, for constantly encouragement, meticulous consideration and research guidance in my research from the beginning to the concluding, have been motivating me greatly, specifically during the period of my experiencing dramatic stress and changes in my life. My sincerely appreciation also to other members from the committee. I am very grateful to Prof Bruce Maycock for sharing with his wisdom and broad vision in academic study; to Dr Yun Zhao for her expertise in statistics to enhance the quality of the research; to Dr Maryanne Doherty for being willing to be my co-supervisor to guide my study, specifically in conducting more negotiation with managing departments for ensuring my student life in a normal status. Owing to their valuable comments, in the proceeding of my study, the fruitful publications with 4 papers related to the study were published by different peer-reviewed journals; to Dr Matt Tilley for his excellent discourse on sexology which made me have a seminal moment in my doctoral program.

I would also like to express my sincere gratitude to Associate Professor WANG Zhuoran and Associate Professor Liu Wanpeng from the Reproductive Medicine Center of the First Hospital Affiliated to Harbin Medical University provided great support for the data collection in this study. I am also thankful to the all study participants willing to involve in the survey and interview for the study. In addition, I would like to express my appreciation to Dr BK and her husband Mr. James for their sincerely care and support in my living in Perth, Australia. I also hope to take this opportunity to show my sincere appreciation to all of PhD students from health science, I cherish our academic communication and relax talking in study harbor.

Finally yet importantly, I would like to acknowledge my wife Judy (Jiang Hong), my parents, and my parents in law, for their love and support. Without their support I may not finish this study. During my thesis writing, my daughter came to this world,

who can sit up on the bed now. I am so sorry that I did not give her more care, and my wife undertook all of responsibility of bring up. Without the love and support of my family, I could never have accomplished this endeavor.

ABSTRACT

The purpose of this cross-sectional and mixed methods study was to examine the relationships among biosocial demographics, infertility stress, sexuality and marital well-being, further, to identify predicting factors influencing infertile Chinese couples' marital well-being.

In this study, quantitative and qualitative methods were employed. A convenient sample of 254 infertile Chinese couples participated in cross sectional survey, among them, 28 infertile couples were interviewed in-depth.

The findings of the quantitative survey indicated that both men and women had high level of infertility stress, low-moderate level of sexuality and low level of marital well-being. By univariate analysis on biosocial demographics' association with infertility stress, sexuality and marital well-being in husbands and wives respectively, a relatively comprehensive results indicated biosocial demographics had effects on infertility stress, sexuality and marital well-being. Furthermore, the results of multiple regression demonstrated that female factor infertility, wives' perceived rejection of childfree life style, husbands' perceived social concern and sexual concern were negative predictors for husbands' marital adjustment. Additionally, husbands' perceived social concern was a negative predictor for their marital satisfaction. However, husbands' sexual esteem and sexual satisfaction were predictors of their positive marital adjustment and marital satisfaction. Also, compared with the grand mean of all groups, male factor infertility and unexplained factors infertility were predictors for positive marital adjustment. For wives' marital adjustment, the results indicated wives' perceived sexual concern and relationship concern, and husbands' perceived sexual concern were negative contributors. In contrast, the shortest length of marriage and wives' sexual motivation were positive predictors for wives' marital adjustment. Low economic level and female factor for infertility were negative predictors for wives' marital satisfaction as well as wife's perceived the need for parenthood. However, compared with the grand mean of all groups, male factor infertility and unexplained factor infertility were predictors for positive marital satisfaction, as well as wives' sexual consciousness and sexual satisfaction with positive contribution.

In qualitative interview, three themes related to the experience on infertility were discovered: (1) frustration in carrying on the family lineage; (2) Emotion stress; (3) decreasing social connection. Additionally, three themes related to infertile couples' understanding on sexuality were discovered: (1) self identity; (2) communication on sex; (3) sexual life. Furthermore, three themes on the effect of infertility stress and sexuality on marital well-being were discovered: (1) adjustment to infertility; (2) sexual satisfaction; (3) commitment to marriage.

In Hei Longing Province even in China, no other empirical studies on infertility and infertile well-being. These results provide a useful beginning for future studies, specifically providing the effective intervention in management of infertility.

Keywords: Biosocial demographics, Infertility, Sexuality, Marital Well-being

LIST FIGURES

Figure 1 Model of concurrent transformative strategy in study	62
Figure 2 Normality, Linearity and Homoscedasticity (Residual Plots) for Husbands' Marital Adjustment (Dependent Variable)	159
Figure 3 Normality, Linearity and Homoscedasticity (Residual Plots) for Husbands' Marital Satisfaction (Dependent Variable)	159
Figure 4 Normality, Linearity and Homoscedasticity (Residual Plots) for Wives' Marital Adjustment (Dependent Variable)	167
Figure 5 Normality, Linearity and Homoscedasticity (Residual Plots) for Wives' Marital Satisfaction (Dependent Variable)	167

LIST OF TABLES

Table 1. Biosocial Demographics Data of Individuals in Quantitative Survey	119
Table 2. Biosocial Demographics Data of Couples in Quantitative Survey	119
Table 3. Test on Husbands' Infertility Stress in Relation to Biosocial Demographics	123
Table 4. Difference of Sexual Concern, Relationship Concern, Rejection of Childless Lifestyle and Global Stress between Different Education Level	124
Table 5. Difference of Relationship Concern, Rejection of Childless Lifestyle and the Need for Parenthood between Different Economic Level.....	125
Table 6. Difference of Global Stress in Husbands from Couples with Different Infertility Diagnosis	126
Table 7. Difference of Global Stress between Different Infertility Duration	126
Table 8. Test on Wives' Infertility Stress in Relation to Biosocial Demographics.....	127
Table 9. Difference of Need for Parenthood among Different Age Group in Wives.....	127
Table 10. Difference of Global Stress among Different Education Level in Wives.....	128
Table 11. Difference of Rejection of Childless Lifestyle between Different Economic Level ...	128
Table 12. Difference of Relation Concern in Wives from Couples with Different Infertility Diagnosis.....	129
Table 13. Test on Normal Distribution for the Differences in Infertility Stress between Husbands and Wives.....	130
Table 14. Difference between Husbands and Wives in Global Stress of Infertility	130
Table 15. Difference between Husbands and Wives in Specific Infertility Stress	131
Table 16. Test on Husbands' Sexuality in Relation to Biosocial Demographics.....	132
Table 17. Difference of Sexual Esteem, Sexual Consciousness and Sexual Motivation in Husbands with Different Education Levels.....	133
Table 18. Difference of Sexual Esteem, Sexual Motivation and Sexual Satisfaction in Husbands from Couples with Different Infertility Diagnosis	134
Table 19. Difference of Sexual Consciousness and Sexual Satisfaction in Husbands with Different Infertility Duration	134
Table 20. Test on Wives' Sexuality in Relation to Biosocial Demographics.....	135
Table 21. Difference of Sexual Esteem and Sexual Satisfaction in Wives from Couples with Different Infertility Diagnosis	136
Table 22. Difference of Sexual Esteem and Sexual Motivation in Wives Different Infertility Duration	137
Table 23. Test on Normal Distribution for the Differences between Husbands and Wives in	

Sexuality.....	137
Table 24. Difference between Husbands and Wives in Sexuality	138
Table 25. Test on Husbands' Marital Well-being in Relation to Biosocial Demographics.....	139
Table 26. Difference of DAS Total in Husbands with Different Age Group.....	140
Table 27. Difference of Dyadic Consensus in Husbands with Different Length of marriage	141
Table 28. Difference of Dyadic Satisfaction and DAS Total in Husbands with Different Length of Marriage	141
Table 29. Difference of Dyadic Consensus, Dyadic Cohesion, Dyadic Satisfaction, DAS Total and Marital Satisfaction in Husbands from Couples with Different Infertility Diagnosis.....	142
Table 30. Test on Wives' Marital Well-being in Relation to Biosocial Demographics	143
Table 31. Difference of Dyadic Cohesion, Affectional Expression, DAS Total and Marital Satisfaction between Different Education Level.....	144
Table 32. Difference of Dyadic Satisfaction in Wives with Different Length of Marriage.....	145
Table 33. Difference of Dyadic Consensus and Marital Satisfaction in Wives from Couples with Different Infertility Diagnosis	145
Table 34. Difference of Dyadic Satisfaction, DAS Total and Marital Satisfaction in Wives with Different Infertility Duration.....	146
Table 35. Test on Normal Distribution for the Differences between Husbands and Wives in Marital Well-being	147
Table 36. Difference between Husbands and Wives in Dyadic Consensus.....	147
Table 37. Difference between Husbands and Wives in Dyadic Cohesion, Dyadic Satisfaction, Affectional Expression, DAS Total and Marital Satisfaction.....	147
Table 38. Correlation between Husbands' Infertility Stress, Wives' Infertility Stress, Dissimilarity in Infertility Stress and Husbands' Sexuality	149
Table 39. Correlation between Husbands' Infertility Stress and Wives' Infertility Stress, Dissimilarity in Infertility Stress, Husbands' Sexuality and Husbands' Marital Well-being.....	150
Table 40. Correlation between Husbands' Infertility Stress, Wives' Infertility Stress, Dissimilarity in Infertility Stress and Wives' Sexuality	152
Table 41. Correlation between Husbands' Infertility Stress, Wives' Infertility Stress, Dissimilarity in Infertility Stress, Wives' Sexuality and Wives' Marital Well-being	153
Table 42. Intercorrelations of Variables Related to Husbands' Marital Adjustment.....	156
Table 43. Intercorrelations of Variables Related to Husbands' Marital Satisfaction	157
Table 44. Marital Adjustment's Multiple Regression Model with Tolerance Measures.....	158
Table 45. Marital Satisfaction's Multiple Regression Model with Tolerance Measures	158
Table 46. Multiple Regression Prediction of Marital Well-Being in Husbands	161
Table 47. Intercorrelations of Continuous Variables Related to Wives' Marital Adjustment	164

Table 48. Intercorrelations of Continuous Variables Related to Wives' Marital Satisfaction.....	164
Table 49. Wives' Marital adjustment: Multiple Regression Model with Tolerance Measures	165
Table 50. Wives' Marital Satisfaction: Multiple Regression Model with Tolerance Measures...	166
Table 51. Multiple Regression Prediction of Marital Well-Being in Wives	168
Table 52. Biosocial Demographics of the Sample in Qualitative Interview.....	172

LIST OF ABBREVIATIONS

WHO	World Health Organization
WAS	World Association for Sexual Health
ART	Assisted Reproductive Technology
IVF	In Vitro Fertilization
IVM	In Vitro Maturation
ICSI	Intracytoplasmic Sperm Injection
IVF/ET	In Vitro Fertilization/Embryo Transfer
ICMART	The International Committee for Monitoring Assisted Reproductive Technology
BPS	Bio-Psycho-Social
BPSS	Bio-Psycho-Social Systems
FST	Family Systems Theory
SCP	Social Construction Perspective
CCFL	Childbearing for the Continuation of the Family Line
FPI	Fertility Problem Inventory
MSQ	Multi-dimensional Sexuality Questionnaire
DAS	Dyadic Adjustment Scale
KMSS	Kansas Marital Satisfaction Scale
ANOVA	Analysis of Variance

TABLE OF CONTENTS

DECLARATION	I
ACKNOWLEDGE	II
ABSTRACT	IV
LIST FIGURES	VI
LIST OF TABLES	VII
LIST OF ABBREVIATIONS	X
CHAPTER 1: INTRODUCTION	1
1.1 General Context	1
1.1.1 Infertility’s occurrence, treatment and consequences	1
1.1.2 Growing infertility in China.....	3
1.1.3 Infertility and the Chinese family.....	3
1.2 Significance of the Study	4
1.3 Conceptual Framework Guiding the Study	5
1.3.1 Bio-psycho-social systems model	6
1.3.1.1 A BPSS perspective on the cause of infertility	7
1.3.1.2 A BPSS approach to the treatment of infertility	8
1.3.1.3 A BPSS perspective on the experience of infertility.....	9
1.3.2 Family systems theory.....	10
1.3.2.1 FST in understanding infertility stress	11
1.3.2.2 FST in understanding infertile couple’s relationship.....	12
1.3.3 Social construction perspective.....	13
1.3.3.1 Cultural meanings of infertility	14
1.3.3.2 Infertility experience as socially constructed	15
1.4 Aim, Objectives and Research Questions	16
1.4.1 Aim.....	16
1.4.2 Objectives.....	16
1.4.3 Research questions	16
1.4.3.1 Main questions for quantitative study	17
1.4.3.2 Main questions for qualitative study	17
1.5 Thesis Structure.....	17
CHAPTER 2: LITERATURE REVIEW	19
2.1 Introduction.....	19
2.2 Paper-1: Investigating marital relationship in infertility: a systematic review of quantitative studies.....	21
2.3 Paper-2: The impact of infertility on sexuality: a literature review	40
2.4 Discussion and Implications.....	55
2.4.1 Limitations in previous study on infertile couples’ marital relationship.....	55

2.4.2 The gap of understanding sexuality in infertility	57
2.4.3 Link between sexuality and marital well-being in infertile couples.....	59
2.5 Summary	59
CHAPTER 3: RESEARCH METHODOLOGY.....	61
3.1 Study Design	61
3.1.1 Mixed method model	61
3.1.2 Rationale of the mixed method used in the study.....	62
3.2 Methods.....	63
3.2.1 Quantitative and qualitative approach.....	63
3.2.1.1 Setting	63
3.2.1.2 Participants.....	64
3.2.1.3 Sampling	64
3.2.1.3.1 Sample size for the quantitative study.....	64
3.2.1.3.2 Sample size in qualitative research	65
3.2.2 Research instruments	66
3.2.2.1 Instruments in quantitative approach	66
3.2.2.1.1 Dyadic Adjustment Scale (DAS).....	66
3.2.2.1.2 Kansas Marital Satisfaction Scale (KMSS).....	67
3.2.2.1.3 Fertility Problem Inventory (FPI).....	68
3.2.2.1.4 Multi-dimensional Sexuality Questionnaire (MSQ).....	69
3.2.2.1.5 Pilot study.....	71
3.2.2.1.5.1 Paper 3: Testing the psychometric properties of Mandarin version of the Fertility Problem Inventory (M-FPI) in an infertile Chinese sample	72
3.2.2.1.5.2 Paper 4: The effects of translating the Multidimensional Sexuality Questionnaire from English to Mandarin: a test of reliability and validity	92
3.2.2.2 Interview guide.....	111
3.3 Data Collection and Analysis.....	111
3.3.1 Data collection and analysis in quantitative approach	111
3.3.2 Data collection and analysis in the qualitative approach.....	112
3.3.3 Integration of findings.....	114
3.4 Research Administration	114
3.4.1 Ethical considerations	114
3.4.2 Participants' consent and confidentiality	115
CHAPTER 4: RESULTS OF QUANTITATIVE SURVEY.....	116
4.1 Data Measurement	116
4.1.1 Dependent variables	116
4.1.2 Independent variables.....	116
4.1.2.1 Biosocial demographics variables	116
4.1.2.2 Perceived infertility related stress	117
4.1.2.3 Various aspects of sexuality	117
4.1.3 Control variables	118
4.2 Characteristics of the Sample.....	118

4.3 Results.....	120
4.3.1 Research Question 1: what is the relationship between biosocial demographics and infertility stress perceived by infertile couples?.....	120
4.3.1.1 Test of normality and homogeneity of variance	120
4.3.1.2 Results of analysis on husbands' infertility stress in relation to biosocial demographics	122
4.3.1.3 Results of analysis on wives' infertility stress in relation to biosocial demographics	127
4.3.1.4 Comparison of infertility stress between husbands and wives	129
4.3.2 Research Question 2: what is the relationship between biosocial demographics and various aspects of sexuality in infertile couples?.....	131
4.3.2.1 Test of normality and homogeneity of variance	131
4.3.2.2 Results of analysis on various aspects of sexuality in husbands from infertile couples	132
4.3.2.3 Results of analysis on various aspects of sexuality in wives from infertile couples	135
4.3.2.4 Comparison of sexuality between husbands and wives from infertile couples	137
4.3.3 Research Question 3: what is the relationship between biosocial demographics and marital well-being in infertile couples?	138
4.3.3.1 Test of normality and homogeneity of variance	138
4.3.3.2 Results of analysis on husbands' marital well-being (marital adjustment and marital satisfaction) in relation to biosocial demographics	139
4.3.3.3 Results of analysis on wives' marital well-being (marital adjustment and marital satisfaction) in relation to biosocial demographics	143
4.3.3.4 Comparison of marital well-being between husbands and wives from infertile couples	146
4.3.4 Research Question 4: are there any correlations between infertility stress, sexuality and marital well-being in infertile couples?.....	148
4.3.4.1 Question 4-1: are there any correlations between husbands' perceived infertility stress, wives' perceived infertility stress, dissimilarity in infertility stress of husband-wife dyad, husbands' sexuality, and husbands' marital well-being?	148
4.3.4.2 Question 4-2: are there any correlations between husbands' infertility stress, wives' infertility stress, dissimilarity in infertility stress of husband-wife dyad, wives' sexuality, and wives' marital well-being?.....	151
4.3.5 Question 5: what is the nature of the relationship between biosocial demographics, infertility stress, sexuality and marital well-being in infertile couples?.....	154
4.3.5.1 Question 5-1: are there any effects from biosocial demographics, infertility stress and sexuality on husbands' marital well-being?	154
4.3.5.1.1 Evaluation of assumptions for multiple regression analysis on marital well-being in husbands.....	156
4.3.5.1.1.1 Multicollinearity.....	156
4.3.5.1.1.2 Normality, linearity and homoscedasticity	159
4.3.5.1.2 Examining predictors of influencing husbands' marital well-being	160
4.3.5.2 Question 5-2: are there any effects from biosocial demographics, infertility stress and sexuality on wives' marital well-being?	161

4.3.5.2.1 Evaluation of assumptions for multiple regression analysis on wives' marital well-being.....	163
4.3.5.2.1.1 Multicollinearity.....	163
4.3.5.2.1.2 Normality, linearity and homoscedasticity	166
4.3.5.2.2 Examining predictors of influencing wives' marital well-being.....	167
Chapter 5: Results of Qualitative Study.....	170
5.1 Introduction.....	170
5.2 Biosocial Demographic Characteristics of Interviewees.....	171
5.3 Qualitative Research Question One: what is the experience on infertility of each partner/spouse of the infertile couple?	173
5.3.1 Frustration in carrying on the family lineage	173
5.3.2 Emotion stress	174
5.3.3 Decreasing social connection	175
5.4 Qualitative Research Question Two: what is the understanding of sexuality in the context of infertility held by each partner/spouse in infertile couples?.....	177
5.4.1 Self-identity.....	177
5.4.2 Communication on sex.....	178
5.4.3 Sexual life	180
5.5 Qualitative Research Question Three: how does infertility stress and sexuality affect the marital relationship in each partner/spouse of infertile couples?	181
5.5.1 Adjustment to infertility	181
5.5.2 Sexual satisfaction.....	183
5.5.3 Commitment to marriage	184
CHAPTER 6: DISCUSSION, RECOMMENDATIONS AND SUMMARY	186
6.1 Key Findings and Discussion for Quantitative Study	186
6.1.1 The effect of biosocial demographic factors on infertility stress, sexuality and marital well-being in infertile couples.....	186
6.1.1.1 Biosocial demographic factors' effect on infertility stress	186
6.1.1.2 Biosocial demographic factors' effect on sexuality.....	188
6.1.1.3 Biosocial demographic factors' effect on marital well-being.....	190
6.1.2 Correlations between infertility stress, sexuality and marital well-being in infertile couples	191
6.1.2.1 Correlation between sexuality and infertility stress	191
6.1.2.2 Marital well-being in correlation with sexuality and infertility stress.....	192
6.1.3 Predictors of marital well-being of infertile couples by biosocial demographics, infertility stress and sexuality.....	192
6.2. Discussion: Qualitative Part of Study	194
6.2.1 Perceived infertility impacted by traditional values on childbearing	194
6.2.2 The impact of infertility and cultural values on sexuality	196
6.2.3 Marital relationship related to infertility adjustment, sexual satisfaction and commitment to the marriage.....	198

6.3 Limitations and Strengths.....	200
6.4 Recommendations	201
6.4.1 Recommendations for research	201
6.4.2 Recommendations for practice.....	202
6.4.3 Recommendations for public education and advocacy	203
6.5 Summary	204
REFERENCES.....	207
APPENDICES	219
Appendix 1 Kolmogorov-Smirnov Test/Shapiro-Wilk Test of Normality on Specific Infertility Stress of the Sample for Different Biosocial Demographics.....	219
Appendix 2 Test of Homogeneity of Variance on Perceived Infertility Stress of the Sample for Different Demographical Variables	222
Appendix 3 Kolmogorov-Smirnov Test/Shapiro-Wilk Test of Normality on Various Aspects of Sexuality of the Sample For Different Biosocial Demographics	223
Appendix 4 Test of Homogeneity of Variance on Various Aspects of Sexuality of the Sample for Different Demographical Variables	226
Appendix 5 Test of Normality on Marital Adjustment and Marital Satisfaction in Men and Women for Different Demographical Variables	227
Appendix 5 Test of Normality on Marital Adjustment and Marital Satisfaction in Men and Women for Different Demographical Variables (continued).....	228
Appendix 6 Test of Homogeneity of Variance Marital Adjustment and Marital Satisfaction in Men and Women for Different Demographical Variables	230
Appendix 7 Basic Information Questionnaire.....	231
English Version	231
Chinese Version.....	232
Appendix 8 Dyadic Adjustment Scale	233
English Version	233
Chinese Version.....	236
Appendix 9 Kansas Marital Satisfaction Scale	238
English version.....	238
Chinese version	239
Appendix 10 Fertility Problem Inventory	240
English version.....	240
Chinese version	242
Appendix 11 Multidimensional Sexuality Questionnaire	244
English version.....	244
Chinese version	246
Appendix 12 Interview Questions.....	247
English version.....	247
Chinese Version.....	248
Appendix 13 Approved Letter from Human Research Ethics Committee of Curtin University	249

Appendix 14 Agreement Letter from the Ethical Committee of the First Clinical College, Harbin Medical University	250
Appendix 15 Informed Consent to Participate in Research	251
English version.....	251
Chinese version	253

CHAPTER 1: INTRODUCTION

This chapter presents an epidemiological overview of infertility, followed by specific information relating to infertility in China. The aim and significance of the study, objectives and research questions are outlined and the theoretical framework is presented.

1.1 General Context

Infertility, the inability to conceive after a year or more of regular, unprotected sexual intercourse is a complex issue that affects individuals, groups and society in different cultures and is regarded as a health issue worldwide (Heitman E. 1995; Fidler A.T. and Bernstein J. 1999; McDonald Evens 2004). According to the World Health Organization (WHO), infertility and sterility will be the third most serious disease worldwide in this century, after cancer and cardiovascular diseases. In developing countries, infertility is one of the most important and underappreciated reproductive health problems (Cai et al. 2011; Bergstrom 1992).

1.1.1 Infertility's occurrence, treatment and consequences

Based on the WHO definition (Schmidt et al. 2003), infertility is designated as being primary if the couple has never conceived despite cohabitation and exposure to pregnancy (absence of contraception) for a period of one or more years. Secondary infertility, is when a couple fails to conceive following a previous pregnancy, despite cohabitation and exposure to pregnancy (in the absence of contraception, breastfeeding or postpartum amenorrhoea).

It is difficult to compile accurate data for the incidence of global infertility; the estimate for the prevalence of infertility is extremely variable in the literature, and its occurrence varies from continent to continent. The limited data indicates the 12-month prevalence rate ranges from 6.9-9.3% in less-developed countries. Substantial geographical differences in the prevalence are noted, and these differences are largely explained by different environmental, cultural and socioeconomic influences (Boivin et al. 2007). It is believed that infertility affects 70

million couples in the world at least, the majority of whom are from developing countries (Ombelet W et al. 2008; Fathalla 1992). The WHO estimates that, globally, 8–12% of couples of reproductive age experience difficulty conceiving a child (Levin, Sher, and Theodos 1997). In addition, infertility is believed to account for over 50% of cases seen in gynaecology clinics in the developing countries (Mogobe 2005). Currently, the incidence of global infertility is now estimated to affect one in seven couples (Ledger 2009). As for the aetiology and risk factors for infertility, it is estimated that female factors (e.g., tubal factors, endometriosis, pelvic adhesions, etc) contributes to 40% of infertility in couples, whereas 20-40% is attributable to male factors (e.g., low sperm count, erectile dysfunction, genetic causes, gonadotropin, deficiency, anatomic defects, immunologic causes, and idiopathic). The remaining causes are attributable to interactional factors between the two partners, of which 5-10% is not attributable to either partner, this type of infertility is referred to as “normal”, “idiopathic” or “unexplained” infertility (Thonneau et al. 1991; Inhorn 2003).

Although infertility is not a life threatening condition, it has serious implications for the mental and social wellbeing of those involved (World Health Organization 1992). The inability to procreate is frequently considered a personal tragedy and a threat for the couple, impacting on the entire family and even the local community. Negative psychosocial consequences of childlessness are common and often severe (Daar A. and Merali Z. 2002; Umezulike and Efetie 2004). With the development of the assisted reproductive technology (ART) significant improvements in health care exist for infertile couples, in vitro fertilization (IVF) is now an established treatment for a wide range of infertilities. Infertile females with abnormal ovulation can be treated by in vitro maturation (IVM) which is a method of using mature oocytes in vitro in preparation for IVF (Younis et al. 1991). In addition, intra-cytoplasmic sperm injection (ICSI) can rectify a number of male factor infertility difficulties with low sperm count (Nasr-Esfahani et al. 2008; Nasr-Esfahani, Deemeh, and Tavalae 2010). Even though ART plays a critical role in reducing infertility, the pregnancy rate of IVF treatment is between 20% and 50% (Orvieto et al. 2004). An ongoing concern is for infertile males whose sperm are unable to activate oocytes, despite ICSI, or unexplained male factor infertility (Redgment et al. 1994). The world report from the International Committee for Monitoring Assisted Reproductive Technology (ICMART) indicates the total number of babies conceived through ART in 53

countries during the year 2002 may be estimated to range between 219,000 and 246,000 (de Mouzon et al. 2009). Infertility is more than a medical condition, however, which can affect how individuals feel about themselves, their relationships, and their perspective on life (Hart 2002). For this reason thus the management of infertility should not totally depend on medications and assisted reproductive technology.

1.1.2 Growing infertility in China

The literature on the prevalence of primary infertility in China is limited; few studies have examined the prevalence of primary infertility at the population level. The first cohort study in 1987 in Shanghai reported the results after following up 7,872 newly married couples for 5 years. Nearly 9% of couples did not have a pregnancy after 12 months, 5% after 24 months, and 3% after 5 years (Che and Cleland 2002). In addition, the National Family Planning Commission conducted a survey on the infertility rate among a random sample of first married Chinese women during 1976-1985 (two-per thousand-population sampling survey) in 29 Chinese provinces, which indicated a 6.89% prevalence of infertility (Zhang Yan, Yang Qing, and Mao Zongfu 2005). Currently, infertility in China is quickly catching up with the rate in developed countries. Over the past two decades, the country's infertility rate has climbed from 3%, among the lowest in the world, to 12.5%, close to the 15-20% range in developed countries (Berg and Wilson 1991).

ART has developed dramatically on the Chinese mainland since the first IVF baby was born in Beijing in March 1988. Currently, more than 10 million couples need ART and the infertility rate is still 'on the rise' (Peterson, Newton, and Rosen 2003). A number of factors are deemed to be responsible for the increasing levels of infertility. These include: increased levels of sexually transmitted diseases, poor sperm quality caused by environmental factors, and lifestyle (Hefeng 2003). Infertility is not only a complex medical condition, but is also related to the changing society, e.g., the delaying of childbearing is also associated to a rising infertility level especially in the current Chinese society.

1.1.3 Infertility and the Chinese family

In China, population control has been an important policy. However, infertility is a serious problem in Chinese society, with child bearing specifically emphasized as

the meaning of human existence and considered the most important goal of marriage. The family is the center of Chinese society (Lee SH et al. 1995), where in-laws play an important part in a marriage. More importantly, bearing children as a family value is highly emphasized for continuing the genetic family line, and considered as a compulsory duty for the couple.

The stigma of childlessness is common in the Chinese culture (Chou and Chi 2004). Chinese people with Confucian or Buddhist beliefs consider infertility as retribution for wrongdoing either by the man, woman or even ancestors (Qiu 2002). For most Chinese couples, conception and childbearing is taken as the critical part and the expected outcome of their marital relationship (Lee and Kuo 2000). Although China has been in the process of industrialization and globalization, this perspective is still widely-spread. Moreover, in the absence of social security systems, children are expected to support their parents, who completely depend on their children when facing economic issues. These belief systems create major stress among infertile Chinese couples who often feel inferior to couples with children. The relationship between the infertile couple and their in-laws may change due to the family function affected by infertility. Research in Chinese society shows that infertility can devastate marital relations. The probability of divorce among infertile couples was found to be 2.20 times (95% CI 1.52-3.18) that of fertile couples (Che and Cleland 2002). In addition, domestic violence was common among infertile couples (Xin et al. 2006).

1.2 Significance of the Study

Infertility is often a turning point in the life course of an individual and in a marriage (Schmidt et al. 2005). It has long been recognized as an extremely stressful situation, which is related to marital problems and conflicts, and has serious implications for the mental and social wellbeing of those involved (Wortham 1996; Laffont I and Edelman RJ. 1994). This can be problematic as the marital relationship is seen as the most important source of support in the management of infertility.

The WHO guidelines concerning the psycho-social aspects of infertility clearly state the importance of enhancing the quality of life of infertile couples, and asks medical staff to go beyond diagnosis and clinical interventions of fertility disorders

(Craib 1997). The marital relationship as a dynamic concept can embody the nature and quality of people's relationships (Larson and Holman 1994), and play a critical role of influencing a person's quality of life. It is helpful, therefore, to explore issues related to marital well-being. In addition, research identifies the quality of marital relationship as a significant predictor of overall happiness and well-being, as poor marital quality is associated with many family and community problems (Aldous and Ganey 1999; Ren 1997; Bradbury, Fincham, and Beach 2000). The infertile couple is likely to suffer from various psychosexual problems caused by unsuccessful treatment, continuing lack of conception and childbearing. The absence of role as a parent may have a negative impact on marital relations (Sherrod 2004; World Health Organization 1992; Monga et al. 2004). However, little is known regarding the psychosexual aspects of infertility from the documented literature, even though sexuality with a multidimensional nature is central to psychological well-being and quality of life ("The World Health Organization Quality of Life Assessment (WHOQOL): Position Paper from the World Health Organization" 1995).

It has been acknowledged that social and cultural aspects should be given more consideration in the infertile couple's life, while exploring the impact of infertility and assisted reproductive technology (Hardy and Makuch 2002). In China, the management of infertility is predominantly from a bio-medical perspective, and there is a paucity of available literature on the marital well-being of infertile couples. The present study provides a preliminary understanding of Chinese marital well-being in the context of infertility, and its associated factors. Furthermore, this knowledge may be used to assist and promote the well-being of infertile couples in China.

1.3 Conceptual Framework Guiding the Study

This chapter provides an overview of three theoretical frameworks, namely the bio-psycho-social system model, family systems theory, and social construction perspective. These are deemed appropriate to conceptualize infertility-related stress and its relationship to - marital satisfaction and adjustment. In order to facilitate understanding of these theories and their relevance to this study are presented and discussed separately.

1.3.1 Bio-psycho-social systems model

George Engel proposed the bio-psycho-social model (BPS) of medicine which featured the comprehensive idea that biological, psychological, and social processes are integrally involved in physical health and well-being (Engel 1977). This model is different from the biomedical model attributing disease to its biochemical factors and regarding disease as the consequence of certain malfunctions of the human body. In addition, the bio-psycho-social model acknowledges and accommodates diversity and respect for individual differences. Conversely, the biomedical model is largely responsible for the physician's preoccupation with the body and with disease, and a corresponding neglect of the patient as a person (Engel 1980). Compared with the biomedical model, the BPS model has been an influential paradigm in family practice.

The initial purpose of the BPS model is to draw a contrast with the biomedical model, which assumes disease to be fully explained by biological (somatic) variables. In addition, the BPS model considers different dimensions which interactively effect health, such as biological, psychological and social dimensions, or from individual and community/institutional dimensions. The effect of these different dimensions on health are considered as hierarchical (Engel 1977). Over time McDaniel, et al (McDaniel, Hepworth, and Doherty 1992) added the term "systems" to Engel's BPS model "to go beyond using the model as a framework for arranging the hierarchical levels of biological, psychological, and social levels to help explain the interactions across the levels of the multiple social systems involved in health and illness". As the extension of Engel's model, the bio-psycho-social systems model (BPSS) focuses on the interaction among a wide range of factors that have been associated with health and illness (Mrdjenovich, Bischof, and Menichello 2004) taking into account all relevant determinants of health and disease, facilitating the integration of biological, psychological and social factors in the assessment, prevention and treatment of diseases (Havelka, Lucanin, and Lucanin 2009). This model has been adopted in theoretical discussions and empirical research in the management of health, medical treatment and intervention (Sadler and Hulgus 1992; Cassileth and Drossman 1993; Arnetz 1996; Cheatle and Gallagher 2006; Adler 2009; Wittmann, Foley, and Balon 2011; Tanaka et al. 2011; Lasker et al. 2011; Da Costa, Zummer, and Fitzcharles 2011; Alvarez, Pagani, and Meucci 2012; Mrdjenovich, Bischof, and Menichello

2004), providing a better understanding of individuals and their health.

Multiple factors are involved in infertility, including organic and psychological factors, as well as the dynamics of interactions between the male and female (Kainz 2001). The BPSS was used in the present study because its holistic dimension facilitates the simultaneous consideration of multiple factors from different subsystems in infertility. Briefly, the biological subsystem refers to an individual's physiological processes, while the psychological subsystem refers to an individual's cognitions, knowledge, beliefs, and emotions. In addition, each individual operates within several larger social systems such as the couple or interactional system, networks of friends, family and co-workers, as well as political, economic, historical and cultural systems (Williams, Bischoff, and Ludes 1992).

1.3.1.1 A BPSS perspective on the cause of infertility

Based on the biomedical paradigm and its evaluation, infertility is classified into four categories: female factor infertility, male factor infertility, combined male and female factor infertility, and unexplained factor infertility (Stanton et al. 1991).

Basically, the biological cause of infertility includes anatomical, genetic, endocrinological and immunological problems (Daar A. and Merali Z. 2002). Specifically, the common physiological causes for the female factor infertility are tubal blockage, abnormal ovulation, pelvic adhesions, congenital malformation, and endometriosis. The causes of the male factor infertility include sperm count, motility, quality and ejaculatory dysfunctions. Although modern diagnostic methods have detected more physical causes of infertility, there still are some unknown and unexplained factors for infertility. However, the association between negative psychological factors and unexplained factor infertility has been proposed in some studies (Cwikel, Gidron, and Sheiner 2004; Tarabusi et al. 2000). Some well-known organic infertility factors are already confirmed, while some psychological factors have also been shown to affect the reproductive ability of both partners due to elevated prolactin levels, disruption of the hypothalamic-pituitary-adrenal axis, and thyroid dysfunction involved in the depressed state (Deka P.K. and Sarma S. 2010).

Several studies proposed that cognitive weariness is associated with male infertility (Sheiner et al. 2002). Low well-being, possibly related to depression and an inability to cope with stress, may negatively affect sperm characteristics and

pregnancy outcome (Zorn et al. 2008). Psychological stress in females may have a negative effect on the occurrence of a natural pregnancy (Sanders and Bruce 1997). Furthermore, other preventable factors related to social context such as sexually transmitted infections, lifestyle factors, advancing maternal age, and environmental and occupational hazards may contribute to the development of infertility (Daar A. and Merali Z. 2002).

It should be noted that there may be interactions between the above factors. That is, the social factors may trigger the change in physiological and psychological functions of individuals (Velupillai et al. 2008). Furthermore, although infertility primarily is a physical condition, the BPSS approach recognizes infertility as a complex condition with biological, psychological and social causes and influences.

1.3.1.2 A BPSS approach to the treatment of infertility

In the medical field, two options are provided for infertility treatment. One is to use fertility drugs to stimulate super-ovulation, (the development and release of more than one egg per ovulatory cycle), and intrauterine insemination, a process by which sperm are placed inside a woman's cervix to facilitate fertilization and pregnancy. The other is to adopt ART and ICSI which involves the handling of human eggs or sperm for the purpose of helping a woman become pregnant (Templeton 1995; Awonuga and Nabi 1997). Infertility treatment involves various diagnostic procedures, pharmacological and surgical therapies, and repeated interventions, all of which can result in conception, but influenced by multiple factors such as patient age, diagnosis, length of infertility, number of previous IVF attempts, and the quality of the facility where treatment is being provided (Fidler A.T. and Bernstein J. 1999) .

Based on the BPSS model, the biological treatment for infertility would be tied to psychosocial issues and may have psychosocial implications. For instance, depression and depressive symptoms may be barriers to seeking medical advice for recognized infertility (Herbert D. L., Lucke J. C., and Dobson A. J. 2010). A different response and attitude between the couple, prior to infertility treatment, might also influence therapeutic work (Merari, Chetrit, and Modan 2002). Furthermore, undergoing IVF/ET and other assisted reproductive technologies involves a physical and emotional burden associated with considerable strains, high levels of depressive symptoms and anxiety because of invasive procedures and hard

choices (Mori et al. 1997; Ogawa, Takamatsu, and Horiguchi 2011; Chang and Mu 2008; Boivin and Takefman 1995). The success in IVF treatment may change with the differential modes of coping with anxiety and depression due to hormonal or endorphin mediation (Merari et al. 1992). Unsuccessful treatment may also lead to a state of lasting sadness and anxiety (Fisher and Hammarberg 2012). Furthermore, psychosocial distress related to infertility is not only a problem due to failed parenthood (Wright et al. 1991), it may also impact on the conception rates of IVF (Demyttenaere et al. 1992; Cousineau and Domar 2007) as women may not pursue a second IVF cycle after a failed cycle because of financial pressure (Goldfarb et al. 1997). Hence, it is interesting to note that infertility treatment and psychological distress may be reciprocal. These two dimensions are considered in the bio-psycho-social systems approach.

Given the detrimental effect that infertility may have on interpersonal relationships (Abbey, Andrews, and Jill 1992), it is important to have a good understanding of a couple's relationship profile prior to starting IVF treatment in order to provide them with the best available support (Kondaveeti et al. 2011). For medical treatment providers, an understanding of couple dynamics as part of a holistic intervention for infertile patients is essential. For example, an understanding of the interactional patterns between the couple and each individual's capacity for engaging in and maintaining interpersonal relationships, and their beliefs regarding infertility provides useful insights.

1.3.1.3 A BPSS perspective on the experience of infertility

As postulated so far, infertility is not exclusively a medical condition. It is associated with substantial levels of stress experienced by individuals and couples (Cousineau and Domar 2007; Schneider and Forthofer 2005).

Infertile patients experience depression (Kedem et al. 1990; Domar A. D. et al. 1992), anxiety (Domar, Zuttermeister, and Friedman 1993; Anderson K. M. et al. 2003), decreased self-esteem (Johnson 1996; Shindel et al. 2008), strain in the sexual relationship (Smith et al. 2009; Khademi et al. 2008), and marital conflicts (Monga et al. 2004; Hirsch 1989). These psychological reactions experienced by infertile patients may be related to a variety of factors. For example, high levels of cumulative stress may result from a history of prolonged infertility and physiological changes

due to treatment (Deka P.K. and Sarma S. 2010). Then there is the impact on self-respect and self-identity (Hirsch and Hirsch 1995; Fisher, Baker, and Hammarberg 2010). Additionally, over a period of time the interaction with medical services may frustrate and bewilder the infertile couple (Daniluk 2001), who may feel discouraged or unable to ask questions (Atwood and Dobkin 1992). There may be concerns about the provision of privacy in the treatment setting (Blenner 1992), and role overload related to frequent hospital visits (Callan and Hennessey 1989). Moreover, stress might also be associated with the couple or individual efforts to find the time for the medical examinations, deciding treatment options, and planning the payment for expensive treatment procedures (Klempner 1992). The situation may be further aggravated by uncertainty of treatment consequences (Schneider and Forthofer 2005). This highlights the fact that infertility is also a social condition (Schmidt 2009). It may impact on social relationships beyond the family circle, promoting a sense of isolation and stigmatization. Social support is deemed important when dealing with childlessness and its consequences (Daniluk 2001; Hirsch and Hirsch 1995; Boivin, Scanlan, and Walker 1999). For instance, the infertile couple with higher levels of social support from family or friends experience increased self-esteem and higher levels of marital and sexual satisfaction (Hirsch and Hirsch 1995). Biological, psychological, and social phenomena interact in complex ways (Gove and Carpenter 1982), and should be given adequate consideration.

Based on the BPSS model, the experience of infertility can be understood from a holistic perspective that includes biological, psychological, social, cultural factors, and their interplay. In this study, biosocial demographics were considered as study variables.

1.3.2 Family systems theory

Family systems theory (FST) is a theory of human behavior that views the family as a unit and uses systems thinking to describe the complex interactions within the unit (Michael G. B. and Samuel S. 2008). This theory includes emotional and relationship systems. A family comprises a small group of interrelated and interdependent individuals (Mehta, Cohen, and Chan 2009). Each member in a family system is strongly influenced by the system's structure, organization, and transactional patterns (Miller et al. 2000). FST, focuses primarily on the interaction

between members of the family, and their influence on each other in predictable and recurring ways (Van Velsor and Cox 2000).

Within a family system, there are spousal, parental and sibling subsystems with two or more family members interrelating. Each family member may be part of a variety of different subsystems (Mehta, Cohen, and Chan 2009). Thus, a family system might not be composed exclusively of one subsystem. In addition, there are different types of contact between the different subsystems, and the extent to which this contact occurs serve to define and understand their boundaries (Pauline B. et al. 1993). Based on the holistic concept, the family systems is understood as a whole unit, where individual behavior is explored through the interactions of family members and the repetitive patterns that emerge from these, rather than an examination of individual members or subsystems in isolation from each other (Artinian; James H. B. and Mark S. 2009).

FST, a method of working with families that provides a better understanding of individual behavior in a given situation (Fingerman and Bermann 2000) enhances our understanding about infertility as it involves family members. Importantly, the application of FST in this present study may provide comprehensive intervention for marital relationships in infertile couples.

1.3.2.1 FST in understanding infertility stress

Infertility is a shared reality of the couple, shaped by both medical variables and specific social context. When a couple discovers that they may not be capable of having biological children, their life changes (Greil 1997; Okonufua 1997). Given that infertility is an unexpected and stressful life event, both partners are impacted. FST argues a family system includes the interrelated parts; that is, the changes in one individual impact on others within and beyond the immediate family sub-system.

The meaning of fertility and its relationship to marriage are influenced by culture (Lee and Kuo 2000), and in some cases, societal expectations may bring about extra stress. FST can provide a framework to explore infertile couples' stressful experiences related to infertility and their attempts to solve this critical problem. Most research into infertility-related stress has focused on individuals' reaction to childlessness with a corresponding lack of investigation of how the partner reacted to the same situation and the extent to which the partner's response to

infertility was affected by the other partner (Greil 1997). As thus, the level of congruence between the partners' perceived infertility-related stress should be explored, including its effect on marital relations. Though the perspective of family systems was adopted in some studies related to infertility (Peterson, Newton, Rosen, and Schulman 2006; Merari, Chetrit, and Modan 2002; Covington et al. 2011; Peterson, Newton, and Rosen 2003), these studies involved coping process, mental health, emotional reaction of couples, and couple relationship. Most studies, however, were conducted in Western countries. In addition, some studies demonstrated differential infertility stress perceived by infertile couples referred for IVF treatments, with women showing greater stress levels than their partners (Peterson, Newton, Rosen, and Skaggs 2006; Newton, Sherrard, and Glavac 1999; Schneider and Forthofer 2005; Slade et al. 2007). However, two studies of Thai couples and Vietnamese couples found there was no gender difference for infertility stress (Sreshthaputra O., Sreshthaputra R. A., and Vutyavanich 2008; Wiersema et al. 2006). This contradictory result suggests the need to further explore infertility stress within infertile couples in different cultures.

In China, almost no studies on infertility are guided by the framework of FST. Most studies emphasize the female's experience of infertility. In order to have a better understanding of infertility stress perceived by Chinese couples, and to explore its association with marital relations, this present study employs FST.

1.3.2.2 FST in understanding infertile couple's relationship

FST operates in a circular pattern, which means the effects of the individual on the family feed back into the system, creating a cycle of interaction (Minuchin 1985). Furthermore, this reciprocity of influence might produce an ongoing process of relationship adaptation in infertile couples, specifically when each partner has to make an individual adjustment in the face of infertility. The stress of infertility may challenge the couple to maintain a viable and mutual relationship (Andrews F. M., Abbey A., and Halman L. J. 1991), as infertility impacts on couple relationship.

Given infertility is not a problem exclusive to the patient, a partner's adjustment to infertility is likely impacted by the systemic nature of the couple relationship (Peterson, Newton, Rosen, and Schulman 2006). Thus, the infertile couple's relationship might not be understood well if emphasis is placed on only one partner

and that partner's adjustment to the experience of infertility. Studies have demonstrated that mutual participation in a relationship is known to be an essential part of relationship functioning and development (Genero et al. 1992), which provides a clear implication for the use of FSM.

Some studies discuss the effect of infertility on marital and sexual relations, and psychosocial adjustment (Laffont and Edelman 1994; Hirsch and Hirsch 1995; Bringhenti et al. 1997; McMahon et al. 1997; Hynes et al. 1992). However, they mainly examine the issues with a focus on the infertile subject. FST is used in a few studies on marital relations (Gameiro et al. 2011; Chachamovich et al. 2009; Gillett, Daniels, and Herbison 1996; Peterson, Newton, Rosen, and Schulman 2006; Peterson, Newton, and Rosen 2003) but with little attention given to the couples' congruence or discord in marital adjustment or marital satisfaction. There is also a scarcity of qualitative research considering the constructed meaning of infertility experienced by couples. Thus, in this present research the experience of both partners is examined, guided by a systems theory perspective.

1.3.3 Social construction perspective

Social construction perspective (SCP) focuses on social processes through which people's description of, and explanation for, their world take place (Franklin 1995). It emphasizes the importance of the human capacity to tell narratives that give meaning to life (Cheung 1997). It postulates the idea that human reality is formed by, and has its being in, discourse (Baillie and Corrie 1996). In particular, SCP considers social and cultural contexts informing the way a person perceives or makes sense of his or her world (Wortham 1996). SCP is a conceptual framework for cultural and societal aspects of phenomena widely thought to be exclusively natural (Conrad and Barker 2010). This framework can provide a way of understanding how people become what they are through the interaction of the socio-cultural processes with personal ideas, beliefs and experiences (Craib 1997). In brief, SCP emphasizes that realities are socially and culturally constructed. Generally, culture is defined as learned, shared, transmitted intergenerational group values reflected in beliefs, norms, practices, patterns of communication, familial roles, and other social regularities (Pierce 2001). Society is composed of social groups that stand in relations of power and status to one another, with meaning derived from people's engagement in symbolic interaction (Hogg and Abrams 1988).

Compared with other health and illness issues, the employment of a SCP model is more striking in the case of infertility (Greil, McQuillan, and Slauson-Blevins 2011) because it can helpfully examine a society's views and values about infertility. In addition, the SCP approach can facilitate understanding of how infertile couples experience infertility through their enculturation. In this present study, SCP is used with qualitative exploration of cultural beliefs, social influences and construction of the meaning of infertility, as well as matters of infertile couple sexuality. All of these were to gain insights for understanding the influence of infertility and sexuality on the marital relationship in the Chinese socio-culture context.

SCP provides a shift from a biological focus by taking into account the socio-cultural aspects of infertility. In this present study, however, SCP does not deny or undermine the importance of the biological aspects. Both are considered essential to an in-depth understanding of infertility and its impact on couples. In essence, the biological aspect is examined alongside socio-cultural issues of gender, age, economic condition, education, culture, societal values, etc. The basic principles adopted from social construction theory are briefly discussed as follows.

1.3.3.1 Cultural meanings of infertility

The status of infertility is culturally defined; culture can mould individuals' perceptions and expressions of infertility, their coping response, behaviors, and the meanings they ascribe to infertility.

Cultural differences generate different interpretations of infertility. In some cultures such as modern, individualistic countries, infertility is a less important issue and can be acceptable, at least, to society (Van Balen F. and Inhorn M.C. 2002; van Balen F. and Bos H. M. W. 2004). This might be related to reproduction being considered a self-chosen goal or a personal choice made by an individual or couple in such countries, without any associated moral imperative. In these societies culture impresses no strong constraints and pressures on women to have children (Pennings 2008). But cultures in traditional and transitional countries consider children important for social and economic reasons (van Balen F. and Bos H. M. W. 2004). Infertility is stigmatized as role failure (Papreen et al. 2000; Slade et al. 2007). In Chinese culture, reproduction is one of the highest values linked with Confucian ethics such as filial piety and family lineage (Qiu 2002). Childlessness is not

acceptable. Infertility is perceived to be a problem, for all members of the extended family or the lineage as a whole, driving the couple to make every effort to seek infertility treatment and avoid the stigma attached to infertility.

1.3.3.2 Infertility experience as socially constructed

Since parenthood is taken as one of the essential roles in life, failure to achieve parenthood can be perceived as a sign of defectiveness (Greil 1997; Whiteford and Gonzalez 1995). A socially-constructed meaning of infertility such as this stigmatizes the infertile couple as failing to fulfill their social identity.

Gender roles play a major role in constituting the social meaning of infertility (Becker and Nachtigall 1992). Men and women react differently to the experience of infertility and manage it in different ways. For instance, most Chinese men equate their infertility with a loss of masculinity (Lee and Chu 2001). In most societies women's gender roles have been defined by motherly characteristics (Miles et al. 2009) with the result that women can perceive infertility as a threat to their sense of self. Compared with men, women tend to show their emotional reactions more visibly than men (Wright et al. 1991). This might be associated with the different upbringing and expectation imposed by society on men and women.

Infertile couples often experience marked isolation from the fertile world, which is due to social unacceptability and a lack of empathy from family and friends regarding their depth of despair (Cousineau and Domar 2007). SCP regards infertility as a dynamic, social and cultural process, accompanied by the individuals' unique experience of infertility.

However, research that considers how the meaning of infertility is constructed by the infertile Chinese couple is scarce. Little attention has been given to exploring how that construction influences their adjustment in marital and sexual relations, specifically in Chinese society. The theoretical perspective of social construction is the fundamental framework for understanding these issues in the qualitative approach of this present study.

1.4 Aim, Objectives and Research Questions

1.4.1 Aim

The study aimed to examine the relationships among biosocial demographics, infertility stress, sexuality (associated with sexual relationships) and marital well-being (marital adjustment and marital satisfaction). Further, the study aimed to identify factors associated with infertile couples' marital well-being. In turn, the methodology and results from the study were expected to direct further research related to marital well-being in infertile Chinese couples.

1.4.2 Objectives

In order to better understand the dynamics affecting marital well-being of infertile couples, and to enable the development of effective interventions and improved treatment of infertility the objectives of the present study were:

1. To identify different biosocial demographics' effect on infertile couples' perceived infertility stress, sexuality and marital well-being.
2. To examine the correlations between infertility, sexuality and marital well-being of infertile couples.
3. To explore the strength of various factors found to be predictive of marital well-being and to suggest explanations for these influences.
4. To provide implications of the findings for the effective management of infertility specifically in infertile couple's marital well-being.

To achieve these objectives, a quantitative approach was used to meet objective 1, and objective 2 and objective 3 were partly achieved by the same approach; In addition, a qualitative approach was employed to achieve the remaining of objective 2 and objective 3. Through the combination of quantitative and qualitative approach, objective 4 was achieved.

1.4.3 Research questions

Two sets of research questions were explored and answered through quantitative and qualitative approaches.

1.4.3.1 Main questions for quantitative study

1. Question 1: what is the relationship between biosocial demographics and infertility stress perceived by infertile couples?
2. Question 2: what is the relationship between biosocial demographics and various aspects of sexuality in infertile couples?
3. Question 3: what is the relationship between biosocial demographics and marital well-being in infertile couples?
4. Question 4: Are there any correlations between infertility stress, sexuality and marital well-being in infertile couples?
5. Question 5: What is the nature of the relationship between biosocial demographics, infertility stress, sexuality and marital well-being in infertile couples?

1.4.3.2 Main questions for qualitative study

1. Question 1: What is the experience of infertility held by each partner/spouse of infertile couples?
2. Question 2: What is the understanding of sexuality in the context of infertility held by each partner/spouse of infertile couples?
3. Question 3: How does infertility stress and sexuality affect the marital relationship in each partner/spouse of infertile couples?

1.5 Thesis Structure

Chapter 1: Introduction

This chapter introduces a general context of infertility, which includes definitions, epidemiological information and its status in Chinese context. In addition, this chapter describes in detail the study's significance and provides the conceptual framework that was the foundation of the design of the study. The chapter concludes with the research aim, objectives and research questions.

Chapter 2: Literature Review

This chapter presents the main findings, arguments and conclusions of relevant literature reviewed for psychosocial reactions to infertility, the link between infertility and sexuality, infertility's effect on marital well-being. The chapter postulates the theoretical perspectives on infertility, sexuality and marital well-being.

Chapter 3: Research Methodology

This chapter covers study design, quantitative and qualitative methods for research setting, participants and sampling. The chapter presents research instruments for quantitative study, an interview guideline for qualitative study, and provides details of two pilot studies undertaken to validate the instruments. In addition, this chapter gives full details of data collection and analysis. Research administration is also demonstrated in the final section.

Chapter 4: Results of Quantitative Survey

This chapter describes the results of the quantitative data. First, data measurement is described. Second, the characteristics of the sample are presented. Third, the results for research questions 1-5 are presented, involving the test of normality and homogeneity of variance for univariate variable analysis, and the evaluation of assumptions for multiple regression analysis.

Chapter 5: Results of Qualitative Interview

This chapter describes the qualitative results. First, the demographic characteristics of the interviewee are described. Then, the themes for qualitative research questions are presented. The findings are interpreted, summarized and presented in descriptive-narrative form.

Chapter 6: Discussion, Recommendations and Summary

This chapter discusses the key findings of the present study. The quantitative results are discussed followed by a discussion of the qualitative findings. In addition, the limitations and strength of the present study are discussed. Recommendations of this study and summary are provided.

CHAPTER 2: LITERATURE REVIEW

This chapter contains two literature review papers published in peer-reviewed journals and are reprinted here in their entirety. One paper addressed marital relationship in infertile couples. The other paper discussed the impact of infertility on sexuality. A discussion of the implications of the findings of both published papers concludes the chapter.

2.1 Introduction

Marital relationship is known to have a unique impact on quality of life and is more significant than other relationships (Whisman, Sheldon, and Goering 2000). Further, the quality of a marital relationship is associated with an individual's mental health (Overbeek et al. 2006), family and community problems (Amato and Rogers 1997) and physical health (Waite and Lehrer 2003). Though most studies on marital quality have focused on Western contexts, research conducted in Chinese culture revealed results similar to the Western studies (Chin-chun Yi and Wen-yin Chien 2006). However, the meaning of marriage and marriage relations has certain noteworthy features in a Chinese context. One specific feature is the parent-child axis which was given priority over the conjugal axis in marriage relationship (Li Yinhe 2011). With this variation in Chinese marital relationships extra attention to the impact of infertility on the quality of marital life deserved to be considered.

However, while a wide body of empirical studies explored infertility stress and its impact on individual's psychosocial functions (Seibel and Taymor 1982; Hirsch and Hirsch 1995; Cousineau and Domar 2007; Andrews F. M., Abbey A., and Halman L. J. 1991), few studies have investigated infertile couples' marital relationship and associated factors in China. It is therefore important to better understand marital relations in infertile Chinese couples, and seek more information about possible influencing factors.

In order to understand what is known and not known about marital relationships in the context of infertility, what research questions needed to be explored, and what

aspects needed to be enhanced, two separate and distinct literature reviews were conducted. Relevant research was identified through systematic evaluation of the methodology and the quality manifested in published reports. The first literature review addressed the relationship between marital well-being and infertility, mainly considering the effect of infertility stress. The second review discussed infertility's impact on sexuality. Both review papers provided a comprehensive overview of the existing literature relevant to the present study.

2.2 Paper-1: Investigating marital relationship in infertility: a systematic review of quantitative studies

Peng Tao^{1,2}, Rosemary Coates², Bruce Maycock³

¹ Research and Education Center in Sexual Health, Harbin Medical University, Harbin ,China

² Department of Sexology, Curtin University, Perth, Australia

³ Curtin Health Innovation Research Institute, Curtin University, Perth, Australia

Submitted: Oct. 11, 2011

Accepted: Jan. 28, 2012

Published: The Journal of Reproduction and Infertility, 2012; 13(2):71-80

Contributions: The present manuscript was compiled and written in full by the candidate of this thesis with suggestions and thorough proofreading by the co-authors.

ABSTRACT

Background: Infertility is a complex issue that affects individuals and groups, and also it has serious implications for the mental and social well-being of those involved. The aim of this review was to assess marital relationship in the context of infertility, using data from infertile individuals or both couples.

Methods: A literature search was undertaken using multiple databases (Medline, PsycInfo and Scopus) to identify and synthesize all relevant literature published from 1990 to 2011. All studies in the systematic review were confirmed using specific inclusion criteria; the methodological quality of these studies was examined according to a checklist.

Results: Of the potential 794 articles, 18 studies were included in the final analysis, of which 6 were graded as high quality and 12 as moderate. The results indicated male factor infertility did not have a negative marital impact. In addition, infertile male participants expressed higher marital satisfaction than their wives. Infertile females had significantly less stable marital relationship compared to fertile females, which was associated with their socio-demographics and treatment experience. For infertile couples, the infertile subjects or their partners' marital relationship was affected by either member's infertility, experience specifically coping strategies. Moreover other factors such as sexual satisfaction, age of the infertile couples, education level, and congruency of couples' perceptions of infertility were associated with the quality of marital relationship.

Conclusion: Although the review can provide an outline of marital relationship in infertility, future studies should focus on the perspective from both infertile couple, across a range of different infertility types, including extended sample sizes and longitudinal study designs. In addition, more consideration should be given to qualitative study.

Keywords: Infertile male; Infertile female; Infertile couple; Marital relationship.

Introduction

Infertility is medically defined as the inability to conceive after a year or more of regular, unprotected sexual intercourse (1). With an estimated prevalence, 8-12% of couples around the world experience difficulty conceiving a child (2). Although the extent of infertility varies considerably among countries, infertility has been recognized as a public health issue worldwide by the World Health Organization (WHO), and has the potential to threaten the stability of individuals, relationships and communities (3, 4).

Research has proved the quality of marital relationship is a significant predictor of overall happiness and well-being, while poor marital quality is associated with many family and community problems (5-7). Infertility has been associated with marital problems and conflicts, and has serious implications for the mental and social well-being of those involved. This can be problematic as the marital relationship is seen as the most important source of support in the context of infertility treatment (1, 8). Furthermore, the WHO guidelines concerning the psycho-social aspects of infertility, clearly state that the task of medical staff goes beyond diagnosis and clinical interventions and should include attention to the psychological aspects of fertility disorders and that attention should be paid to enhance the quality of life of infertile couples (9). Therefore, it is necessary to have better understanding of marital relationship in infertility, and an examination of its associated factors. Referring to the quality of marital relationship, it has frequently been described by marital benefit, marital distress, marital satisfaction and marital adjustment (10-13). Though, there were some studies (14-16) assessing the quality of marital relationship in infertility, but they did not have valid outcome due to weak and simple items used as quantitative measures, making it difficult to make comparison and draw general conclusion. In addition, while there were some studies with standard measures about marital relationship in infertility, the reported results were unclear and conflicting. Some research suggested that infertile individuals (both infertile males and females) experienced greater dissatisfaction with themselves, their marriages, and infertility-related stress and its treatment had a negative effect on the relationship

both directly and indirectly (17, 18).

Other authors indicated infertility might be stressful, but their shared condition made closer mutual support in the couple's thoughts and feelings, thus had positive effect on their relationship (19-21). Findings from earlier studies on marital relationship in infertile individuals, showed a significant correlation between stressful life events and marital quality (22). In addition, family studies indicated there was difference between the male's and female's perceptions of the aspects of marital relationship (23, 24). Moreover, the individual's marital relation was related to other characteristics such as socio-economic status (25), personality (26), mental health (27), communication (28) and duration of marriage (29). For both the infertile males and females, their marital relationship could be influenced by the above factors directly or indirectly. The reason for the latter finding was due to infertility as a mutual condition, and both partners shared the experience of childlessness (30). However, considering the interactions between couples that may be more important for marital quality than social or personal traits (31), the change in marital relationship in infertile couples should be given more attention to the couple's interaction patterns on relationship, not only analyze discrepant or congruent views in managing infertility stress. On the other hand, husbands' and wives' marital quality have been found to be significantly and positively correlated with each other (32), which suggested partner's marital quality should be discussed to explore its considerable effect on the other side.

In order to have a clear understanding of marital relationship in infertility, it is necessary to examine the determinants that might be involved differently affect marital relationship. Currently, no systematic review of this kind is available. The aim of this systematic review is to summarise the published findings on marital relationship and infertile subjects, specifically the original data were based on standardized instruments in infertile males, infertile females or both infertile couples.

Methods

Inclusion criteria: To be included in the review, the selected articles had to meet the following criteria: (1) peer-reviewed articles published in English between

1990 and 2011; (2) the primary or secondary objective was to assess marital relationship in the context of infertility; (3) the study participants comprised infertile individuals or infertile couples comprised infertile subjects and their partners. All participants were not in marital separation; (4) a relevant, validated instrument was used to assess marital relationship. Furthermore, studies needed to report original data. Thus, reviews, editorials, debates, letters, case reports, non-peer-reviewed articles, meeting abstracts and brief communications were excluded.

Search strategy: In this study, a systematic literature review was conducted using the following electronic databases as the most appropriate resources to identify published studies: MedLine (Ovid), PsycInfo (Ovid) and Scopus. The search was compiled using keywords and phrases separated by the Boolean word "OR": Marital Relationship "OR" Marital Quality "OR" Marital Satisfaction "OR" Marital Adjustment "OR" Marital Distress in combination with Infert* "OR" Childless* in the title, abstract, or keywords. Since some studies linked with marital relationship are explored in the context of clinical treatment, we included the following terms too: In-vitro Fertilization (IVF) "OR" Intra-cytoplasmic Sperm Injection (ICSI) "OR" Assisted Reproduction (AR). In addition, citations from these articles which appeared particularly relevant were also sought. Many of the searches generated duplicate articles, or articles which were unrelated to the study, these were not considered in the review. In the process of extraction, one of the investigators reviewed both the title of the citation and the abstract to determine its suitability for inclusion.

Extraction of data: Firstly, the titles and abstracts following with the search strategy were evaluated for the selection of eligible studies. Some studies were excluded at this stage as they were scarce of evidence with regard to the inclusion criteria. Secondly, the full text of selected studies was further evaluated to decide whether they fulfilled the inclusion criteria.

Quality assessment: The quality of the included studies was assessed using the criteria checklist (Table 1), which was derived from some systematic review studies (33-38), and adjusted to fit the research questions. The criteria for evaluating the

quality of studies included in our study were: the quality of the measure instrument, the profile of study participants, study design and main results. The criteria checklist comprised 16 items; each item was scored with one point if the study met a criterion and a score of zero if the study had an insufficient or no description of the item. The total maximum score was sixteen. Studies scoring 75% or more of the maximum attainable score (≥ 12 points) were considered to be of “high quality”. Studies scoring between 50 and 75% (between 8 and 12 points) were rated as “moderate quality”, and scores lower than 50% (≤ 7 points) were considered as “low-quality” studies.

Table 1 List of criteria for assessing the quality of studies on marital relationship in the infertile and/or their spouse/partners

Positive if
Marital relationship assessment
A. a psychometrically questionnaire is used.
B. a primary objective of the study is to examine the marital relationship.
C. standardized or valid self-report measurements are used to assess the marital relationship in the infertile and/or their spouse/partners.
Study participants
D. a description is included of at least two socio-demographic variables (e.g., age, sex, economical status, educational status, etc.).
E. a description is present of at least two clinical variables (e.g., type of infertility, duration of infertility, treatment method, etc.).
F. inclusion and/or exclusion criteria are provided.
G. the study describes predictors or influencing factors by using correlation analysis, multivariate analyses or structural equation model.
H. participation rates for the infertile groups and/or their spouses/partners are described (defined as the percentage of eligible patients who gave their informed consent) and these rates are exceeding 70%.
I. information is given about the ratio non-responders versus responders.
Study design
J. the study size is consisting of at least 50 patients.
K. the collection of data is prospectively gathered.
L. the design is longitudinal (more than 1 year).
M. the process of data collection is described (e.g., interview or self-report, etc.).
N. the follow-up period is at least 6 months.
O. the loss to follow-up is described and is less than $< 20\%$.
Results
P. the results are compared between two groups or more (e.g., health population, groups with different treatment stages, different types of infertility, or treatment types) and/or results are compared with at least two time points (e.g., pre- versus post-treatment).

*The criteria checklist was based on established criteria for systematic review reported in literature (15-20)

Results

Studies extracted: As can be seen in Figure 1, the initial search in the online databases identified 910 citations, comprising 65 articles from Med Line (Ovid), 329 from PsycInfo (Ovid) and 516 from Scopus. 116 articles were excluded due to the extraction of duplicates. After applying the study inclusion criteria, the final number of articles eligible for inclusion was 18. The flowchart of study selection is shown in Figure 1.

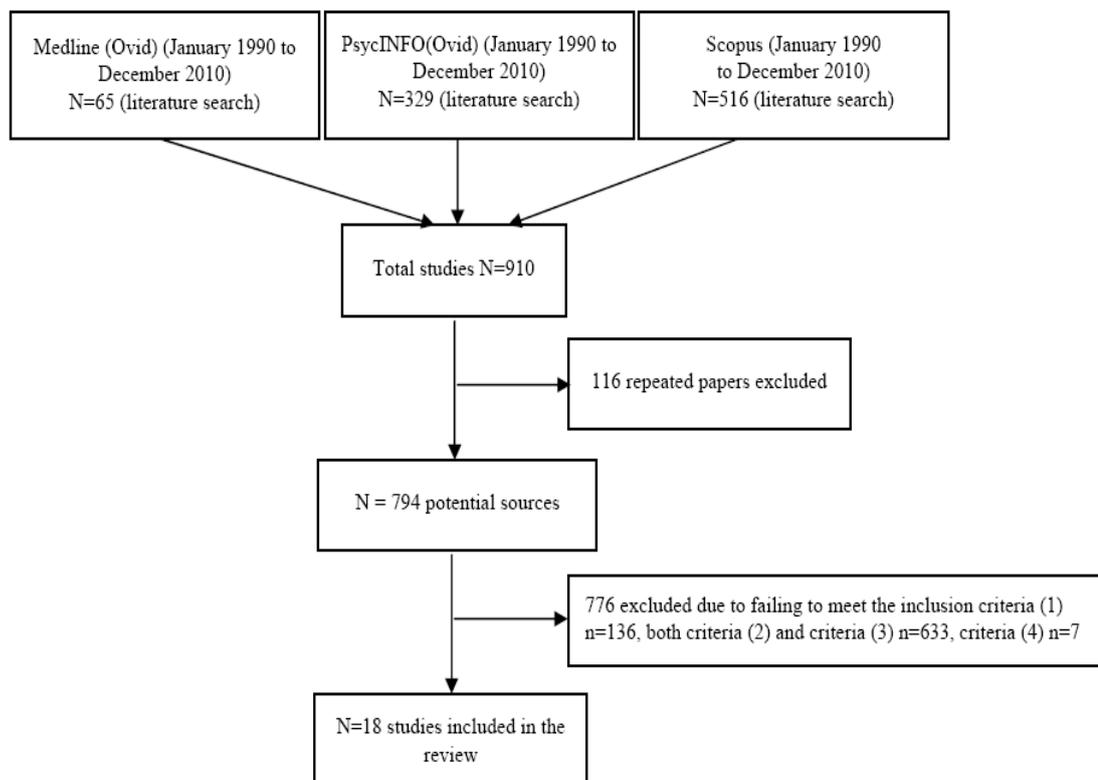


Figure 1. Flowchart of study selection progress

Characteristics of selected studies: Table 2 provided a summary of the 18 published studies that met the inclusion criteria. They included studies that investigated the status of marital relationship and its influence across different infertility types. The main results related to marital relationship were indicated. All studies had been conducted in a clinical setting, of which, thirteen studies (39-51) were cross-sectional, and five (52-56) were longitudinal. The sample sizes differed due to variations in research protocols. In the studies on infertile couples, the sample

sizes ranged from 20 (43) to 525 (46); and in studies on infertile individuals, the sample sizes ranged from 18 (47) to 520 (48). Participants included those who sought medical attention and/or treatment for assisted reproduction. The instruments were reliable and valid for the assessment of marital relationship in all of the reviewed studies.

Table 2 Studies examining marital relationship in infertility

Studies	Design	Sample characteristics	Assessment	Key findings related to marital relationship
Ulbrich et al (1990),(39)	Cross-sectional 1 study	Convenient sampling. 103 married couples from Resolve and physicians	Dyadic Adjustment Scale	Infertile couples are generally similar in the way of perceiving their marital adjustment, but they arrive at that view by different routes.
Berg et al (1991),(40)	Cross-sectional 1 study	Convenient sampling. 104 married couples from Resolve and clinic, with primary infertility currently involved in treatment	Locke-Wallace Marital Adjustment Test	<ol style="list-style-type: none"> 1. Couples experienced normal levels of marital adjustment, and with no significant gender differences. 2. Couples experienced the stable marital adjustment in the pursuing treatment of year 1 and year 2, but deteriorated after the third year.
Pepe et al (1991),(41)	Cross-sectional 1 study	Convenient sampling. 40 female patients had been diagnosed with primary or secondary infertility	Index of Marital Satisfaction	Infertility treatment was related to decreased marital satisfaction, but after the termination of treatment, the relationship returned to a level not significantly different from its pretreatment level.
Benazon et al (1992),(52)	A longitudinal study	Convenient sampling. During the 12 months of the study, all participants were categorized into two groups: 48 couples with pregnant, 117 couples with nonpregnant.	Dyadic Adjustment Scale	<ol style="list-style-type: none"> 1. Significant decreases in marital functioning were experienced by subjects as the treatment investigation progressed. 2. Greater levels of marital distress were observed in couples that did not conceive. Significant gender differences were observed.
Slade et al (1992), (54)	A longitudinal study	Convenient sampling, 28 couples with primary infertility	Dyadic Adjustment Scale	<ol style="list-style-type: none"> 1. For the infertile groups, marital adjustment tended to deteriorate over time, however, this was paralleled in the fertile groups. 2. Self-blame was correlated with marital difficulties in the females; self-blame and detachment was particularly linked with marital difficulties in the males.
Leiblum et al (1998),(53)	A longitudinal study	Convenient sampling, 75 infertile women were followed after the completion of infertility treatment, Group 1 (n = 41), successful IVF women; Group 2 (n = 16), unsuccessful IVF women who adopted; Group 3 (n = 18), unsuccessful IVF women who remained childless.	Locke-Wallace Marital Adjustment Test	<ol style="list-style-type: none"> 1. There were no significant differences between the three groups on the standardized measures of marital satisfaction. 2. Childless women reported that infertility had exerted a significantly greater negative impact on their marriages than that reported by the other two groups.

Table 2 Studies examining marital relationship in infertility(continued)

Studies	Design	Sample characteristics	Assessment	Key findings related to marital relationship
Markestad et al (1998),(43)	Cross-sectional study	Convenient sampling, 20 infertile couples	Dyadic Adjustment Scale	Length of time infertile couples have been seeking medical attention may not severely affect marital adjustment.
Levin et al (1997),(42)	Cross-sectional study	Convenient sampling, 46 couples undergoing different stages of infertility treatment.	Dyadic Adjustment Scale	Marital distress in the infertility population is impacted by the intra-couple coping method.
Lee et al (2000),(44)	Cross-sectional study	Convenient sampling, 59 infertile couples	Marital Satisfaction Questionnaire	The husbands' marital satisfaction was higher than that of the wives.
Lee et al (2001),(45)	Cross-sectional study	Convenient sampling, 138 infertile couples	Marital Satisfaction Questionnaire	Infertility diagnosis is an important factor in assessing the marital satisfaction between husbands and wives.
Verhaak et al (2001),(55)	A longitudinal study	Convenient sampling, 207 infertile women	Maudsley Marital Questionnaire	Marital satisfaction changed in both pregnant and nonpregnant women after the first IVF and ICSI cycle.
Peterson et al (2003),(46)	Cross-sectional study	Convenient sampling, 525 infertile couples	Dyadic Adjustment Scale	Both men and women in couples who perceived equal levels of social infertility stress reported higher levels of marital adjustment.
Monga et al (2004),(47)	Cross-sectional study	Not mentioned, Study group: 18 women being in infertile treatment; Control group: 12 women seeking elective sterilization.	Locke-Wallace Marital Adjustment Test	The Marital Adjustment Test scores for the women of the infertile couples were significantly lower than the scores of the controls.
Peterson et al (2006),(48)	Cross-sectional study	Convenient sampling, 506 infertile men, 520 infertile women.	Dyadic Adjustment Scale	No significant differences were reported between men and women for marital adjustment, but coping is related to marital adjustment.
Reporaki et al (2007),(56)	A longitudinal study	Convenient sampling. Study group: 367 couples with singleton IVF/ICSI pregnancies; Control group: 379 couples with spontaneous singleton pregnancies.	Dyadic Adjustment Scale	Successful ART does not constitute a risk for marital adjustment. The shared stress of infertility may even stabilize marital relationships
Wang et al (2007),(49)	Cross-sectional study	Convenient sampling. Two groups of infertile women, 100 registered for IVF, and 100 registered for ICSI; A control group of 100 women attending a gynecology clinic, who have no known history of infertility.	ENRICH (Evaluating & Nurturing Relationship Issues, Communication & Happiness) Marital Inventory	The stresses associated with infertility and IVF treatment had a negative impact on Chinese women's marital quality.
Drosdzol et al (2009),(50)	Cross-sectional study	Convenient sampling. Study group: 206 infertile couples; Control group: 190 fertile couples	Index of Marital Satisfaction	The risk factors of marital dissatisfaction in infertility include: female sex, age over 30, lower education level, diagnosis of male infertility, and infertility duration of 3-6 years. □
Smith et al. (2009),(51)	Cross-sectional study	Convenient sampling. 357 men in infertile couples	Marital Impact Scale	No significant differences were seen between infertility groups in terms of Marital Impact scores.

In total, all studies described at least two demographic variables and most described at least two clinical variables of interest. The most reported demographic variables were age, ethnicity, economical status, education and duration of the marital relationship. Frequently represented clinical variables were type of infertility, type of treatment, time interval since diagnosis and time of medical attention.

Quality assessment of selected studies: Quality scores ranged from 8 (low quality) (47) to 15 (high quality) (56). Six studies (33%) were graded as high and twelve (67%) as moderate. Among these 18 studies, over half had some limitations in methodological quality, 12 (66%) studies could not meet the criteria H “Participation rates for the infertile groups and/or their spouses were described (defined as the percentage of eligible patients who gave informed consent) and they exceeded 70%”, 13 (72%) studies could not meet the criteria I “Information was given about the ratio of non-responders versus responders”, 13 (72%) studies could not meet the criteria K “The collection of data was prospectively gathered”, 13 (72%) studies could not meet the criteria L “The design was longitudinal (more than 1 year)”, 13 (72%) studies could not meet the criteria N “The follow-up period was at least 6 months”, 17 (94%) studies could not meet the criteria O “The loss to follow-up was described and was less than <20%”.

Table 3 Methodological assessment of study quality

Studies	criteria for methodological assessment of study quality																Score
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	
Ulbrich et al (1990),(39)	+	+	+	+	+	+	+	+	-	+	-	-	+	-	-	+	11
Berg et al (1991),(40)	+	+	+	+	+	+	-	+	-	+	-	-	+	-	-	+	10
Pepe et al (1991),(41)	+	+	+	+	+	+	+	-	-	-	-	-	+	-	-	+	9
Benazon et al (1992),(52)	+	+	+	+	+	+	+	-	-	+	+	+	+	+	-	+	13
Slade et al (1992),(54)	+	+	+	+	+	+	+	-	-	-	+	+	+	+	-	+	12
Levin et al (1997),(42)	+	+	+	+	+	+	+	-	+	-	-	-	+	-	-	+	10
Leiblum et al (1998),(53)	+	+	+	+	+	+	-	-	-	+	+	+	+	+	-	+	12
Markestad et al (1998),(43)	+	+	+	+	+	+	+	-	-	-	-	-	+	-	-	+	9
Lee et al (2000),(44)	+	+	+	+	+	+	-	-	-	+	-	-	+	-	-	+	9
Lee et al (2001),(45)	+	+	+	+	+	+	-	-	+	+	-	-	+	-	-	+	10

Table 3 Methodological assessment of study quality(continued)

Studies	criteria for methodological assessment of study quality																Score
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	
Verhaak et al (2001),(55)	+	+	+	+	+	+	+	-	-	+	+	+	+	+	+	+	14
Peterson et al (2003),(46)	+	+	+	+	+	+	+	+	-	+	-	-	+	-	-	+	11
Monga et al (2004),(47)	+	+	+	+	+	+	-	-	-	-	-	-	+	-	-	+	8
Peterson et al (2006),(48)	+	+	+	+	+	+	+	-	-	+	-	-	+	-	-	+	10
Reporaki et al (2007),(56)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	+	15
Wang et al (2007),(49)	+	+	+	+	+	+	+	+	+	+	-	-	+	-	-	+	12
Drosdzol et al. (2009),(50)	+	+	+	+	+	+	+	-	+	+	-	-	+	-	-	+	11
Smith et al. (2009),(51)	+	+	+	+	+	+	+	+	-	+	-	-	+	-	-	+	11

Marital relationship of male participants with infertility: Three studies were on infertile males' marital relationship among the 18 studies, using a cross-sectional design.

One study demonstrated that male factor infertility did not have a negative marital impact after controlling for male age, partner's age, race, religion, educational level, employment status, prior pregnancy, duration of infertility, and prior paternity (51). Another study presented the incidence of partnership disorders within marriage was not different between infertile and fertile males, but the marital dysfunction of infertile males should be given more attention in males over 30, lower education and infertility lasting 3-6 years (50).

Findings of a third study on the effects of infertility diagnosis on marital relationship in Chinese society, indicated no significant differences between infertile males and their spouse regarding infertility stress, but infertile males expressed more marital satisfaction than their partners (45).

Marital relationship in infertile females: Studies on marital relationship of infertile females are reported either in specific studies (five papers) (41, 49, 50, 53, 55) or as part of investigations in couples (one paper) (45).

Among infertile females referred for ART, the findings indicated infertile females had less stable relationships than fertile females, and the condition was negatively correlated with advanced age, increased duration of infertility, and failed IVF-ICSI attempts in the past (49). Moreover, more partnership disorders seen

within marriage in infertile females appeared to be due to age over 30, lower education and infertility lasting 3-6 years (50). However, those women who became biological mothers through IVF were significantly more satisfied with their marital lives than women who were unsuccessful in IVF and remained childless (53), even though marital satisfaction changed in both pregnant and non-pregnant women after the first treatment cycle due to an increase in sexual dissatisfaction (55). As for the infertile female's marital satisfaction in different treatment periods, one study demonstrated that marital satisfaction during treatment was significantly lower compared with the periods before and after the treatment. In addition, the study found female initiation of treatment, partner's embarrassment for treatment termination, female's age and length of treatment period were negatively correlated with marital satisfaction in infertile females for all the three aforesaid periods, but no significant relationship was found between type of infertility (primary vs. secondary) and marital satisfaction (41).

Apart from the above studies, which directly selected infertile females as research subjects, another study selected infertile females from infertile couples as research subjects to explore marital relationship. The findings indicated that infertile females experienced significantly more distress than their husbands, and were less satisfied with their marriage than their husbands (45).

Marital relationship in infertile couples: Amongst the studies on marital relationship in infertile couples, one study (45) examined marital relationship affected by a gender-specific infertility diagnosis in Chinese society, and made comparison between husbands and wives. The findings indicated when both partners were infertile women expressed less marital satisfaction than their husbands. No differences in marital satisfaction between wives and husbands with unexplained infertility were seen, and only wives with a diagnosed female infertility expressed higher distress than their husbands.

In other studies, the data on marital relationship were mixed without differentiating gender-specific infertility diagnosis. One study suggested marital adjustment of the wives of infertile couples were significantly lower than the scores of controls, but no differences were noted in husbands of infertile couples (47). However, some studies further demonstrated various factors contributing to marital dissatisfaction in infertile couples, e.g., age of partners above 30 years, individuals with greater stress, higher emotional distress, lower education, lower income,

lengthier treatment, and unsuccessful treatment (39, 43, 44, 56). In addition, the level of sexual satisfaction in female partners was positively correlated to their marital satisfaction, but the level of infertility-related stress did not contribute significantly to fluctuations in their marital satisfaction. By contrast, marital satisfaction of male partners was influenced by the level of infertility stress, and not by their own degree of sexual satisfaction, nor by their wives becoming pregnant (52). Furthermore, coping strategies were emphasized to be correlated with marital relationship and coping strategies such as self-blame, were emphasized to be correlated with marital difficulties in both male and female partners (54). Both escape/avoidance and accepting responsibility coping strategies could diminish marital adjustment in both males and females, but seeking social support and planful-problem solving coping strategies could enhance or did not diminish their marital satisfaction (48).

Considering that infertility is a condition shared by both couples, other studies have suggested the intra-couple coping concordance might have different effects on marital relationship. One study demonstrated couples with high levels of congruence concerning infertility stress reported significantly higher levels of marital adjustment when compared to couples with different infertility-related stress (46). Another study showed that marital satisfaction was highest in couples where the males were using low levels of emotion-oriented coping, specifically the least satisfaction for women was evident when the woman was using less emotion-oriented coping than her partner or than when both partners were using more emotion-oriented coping strategies (42).

Discussion

In studies on infertility, marital issues are increasingly reported to be in part due to the impact of infertility per se, and also due to the importance of mutual support provided during the process of infertility treatment (8). The purpose of this systematic review was to provide an overview of studies that addressed the impact infertility diagnosis and subsequent treatment on marital relationship.

In all of the selected studies, we found very few studies on infertile males' marital relationship. The findings indicated infertile males' marital relationship was not seriously impaired by infertility diagnosis. The reasons might be related to the sampling methods in infertile males with newly diagnosed infertility or the short duration of marriage which might not develop infertility stress or marital strain. On

the other hand, the infertile males' perception of infertility could be another mediator and infertile men undergoing treatment held the optimism for conceiving a child (57). From theoretical perspective, infertility may place significant stress on a man's social and marital relationships (58), however, the insufficient response of infertile males in the selected studies was not helpful for correlation analysis on infertility and marital relationship. Therefore study on infertile males' marital relationship should be given more attention via increasing participants' response and implementing longitudinal studies to explore the marital relationship and factors influencing it.

Regarding marital relations in infertile females, most studies mainly focused on the effect of treatment, which indicated lower marital satisfaction to be very common in infertile females in comparison with their partners or with fertile females. However, only two longitudinal studies made comparison between successful and unsuccessful treatment in infertile female participants. Since unsuccessful treatment is frequently seen in infertility, longitudinal studies would be necessary to examine marital relationship and its determinants, specifically, among infertile females with treatment failure.

Correlation analysis was also used to explore certain factors related to marital relationship affected by infertility diagnosis or treatment but studies with multivariate analyses controlling for interaction among various variables' were very few. Therefore, though coping strategies were proved to be crucial in marital adjustment for infertile females with different treatment results, this conclusion might be weak if the studies neglect the effect from infertile females' sexuality, infertility experience, social-demographics and psychological well-being, etc. of infertile females.

As for the related studies on infertile couples, some findings showed treatment (process and outcome) to be related to the couples' level of marital satisfaction, but some were not; some findings reflected infertility-related stress could influence the males' level of marital satisfaction, but some suggested no relationship between females' marital satisfaction and infertility-related stress. The above conflicts or ambiguities could be explained by adoption of coping strategies, level of education, economical status, or the age of infertile couples.

Regarding the couple as the research unit, there is merit in analysing how each partner is both influenced by and influences the response by their partners. We

recommend future studies further explore marital relationships of infertile couple with male factor, female factor, a combination of male and female factors and unexplained factors through using marital pairs as the unit, especially exploring the congruency of couples' perceptions of infertility, intra-couple coping, and dyadic relationships.

In retrieving the literature, we found most studies had a predominately medical focus, and few studies explored the impact of infertility diagnosis on marital relationship from psychosocial, emotional and sexual perspectives. Obviously, further research on intimacy, sexuality, marriage and social functions is necessary to understand and provide improved services to infertile couples.

Moreover, there were other limitations in this systematic review, firstly the reviewed papers were confined to the English language literature, thus, and some relevant non-English language studies were missed. Secondly, the papers were reviewed by title, abstract, or keywords; therefore studies containing relevant marital relationship and infertility-related information as a minor part of the results could have been neglected. Thirdly, while all studies were selected strictly according to the inclusion criteria, there may still have been some bias due to the lack of a second, independent reviewer. Fourthly, most data were obtained from clinical settings and the study results might not be representative of the general infertile population. Given these methodological limitations, it is important to consider all aspects of a systematic review when evaluating their applicability.

Conclusion

The current review found most studies of high quality, but few studies were scarce of rigor in sample size and study design. However, these selected studies provide an outline for understanding the marital relationship in the context of infertility. We expect the future studies on marital relationship in infertility can be broadly implemented from both the perspective of infertile couples, across a range of different infertility types, extended sample sizes and longitudinal research, specifically using qualitative methodologies to contribute information to this work.

Acknowledgement

The authors report no potential conflicts of interest. The authors are solely responsible for the content and writing of the paper.

References

1. World Health Organization. Recent advances in medically assisted conception. Report of a WHO Scientific Group. World Health Organization Technology Report Series. 1992; 820:1-111.
2. World Health Organization, Programme on Maternal and Child Health and Family Planning, Division of Family Health. Infertility: a tabulation of available data on prevalence of primary and secondary infertility. 1st ed. Geneva: World Health Organization; 1991. p. 964-8.
3. Boivin J, Bunting L, Collins JA, Nygren KG. International estimates of infertility prevalence and treatment-seeking: potential need and demand for infertility medical care. Hum Reprod. 2007; 22(6):1506-12.
4. Burns LH, Covington SN. Infertility counseling: A comprehensive handbook for clinicians. 2nd ed. Cambridge: Cambridge University Press; 2006. p.1.
5. Aldous J, Ganey RF. Family life and the pursuit of happiness the influence of gender and race. J Fam Issues. 1999; 20(2):155-80.
6. Ren XS. Marital status and quality of relationships: the impact on health perception. Soc Sci Med. 1997; 44(2):241-9.
7. Bradbury TN, Fincham FD, Beach SR. Research on the nature and determinants of marital satisfaction: A decade in review. J Marriage Fam. 2000; 62(4):964-80.
8. Laffont I, Edelmann RJ. Perceived support and counselling needs in relation to *in vitro* fertilization. J Psychosom Obstet Gynaecol. 1994; 15(4):183-8.
9. World Health Organization. Current practices and controversies in assisted reproduction. Report of a meeting on Medical, Ethical and Social Aspects of Assisted Reproduction. Geneva: World Health Organization; 2002. p. 128.
10. Shackelford TK, Besser A, Goetz AT. Personality, marital satisfaction, and probability of marital infidelity. Individ Differ Res. 2008; 6(1):13-25.
11. Dindia K, Baxter LA. Strategies for Maintaining and Repairing Marital Relationships. J Soc Pers Relat. 1987; 4(2):143-58.
12. Harper JM, Schaalje BG, Sandberg JG. Daily hassles, intimacy, and marital quality in later life marriages. Am J Fam Ther. 2000; 28(1):1-18.
13. Trief PM, Wade MJ, Britton KD, Weinstock RS. A prospective analysis of marital relationship factors and quality of life in diabetes. Diabetes Care. 2002; 25(7):1154-8.
14. Schmidt L, Holstein B, Christensen U, Boivin J. Does infertility cause marital benefit? An epidemiological study of 2250 women and men in fertility treatment. Patient Educ Couns. 2005; 59(3):244-51.
15. Abbey A, Andrews FM, Halman LJ. Provision and receipt of social support and disregard: what is their impact on the marital life quality of infertile and fertile couples? J Pers Soc Psychol. 1995; 68(3):455-69.
16. Chandra PS, Chaturvedi SK, Issac MK, Chitra H, Sudarshan CY, Beena MB. Marital life

- among infertile spouses: the wife's perspective and its implications in therapy. *Fam Ther.* 1991; 18(2):145-54.
17. Ramezanzadeh F, Aghssa MM, Jafarabadi M, Zayeri F. Alterations of sexual desire and satisfaction in male partners of infertile couples. *Fertil Steril.* 2006; 85(1):139-43.
 18. Hirsch AM, Hirsch SM. The effect of infertility on marriage and self-concept. *J Obstet Gynecol Neonatal Nurs.* 1989; 18(1):13-20.
 19. Chachamovich J, Chachamovich E, Fleck MP, Cordova FP, Knauth D, Passos E. Congruence of quality of life among infertile men and women: findings from a couple-based study. *Hum Reprod.* 2009; 24(9):2151-7.
 20. Schmidt L, Holstein BE, Boivin J, Tjørnhøj-Thomsen T, Blaabjerg J, Hald F, et al. High ratings of satisfaction with fertility treatment are common: findings from the Copenhagen Multi-centre Psychosocial Infertility (COMPI) Research Programme. *Hum Reprod.* 2003; 18(12):2638-46.
 21. Greil AL. Infertility and psychological distress: a critical review of the literature. *Soc Sci Med.* 1997; 45(11):1679-704.
 22. Williams LM. Associations of stressful life events and marital quality. *Psychol Rep.* 1995; 76(3 Pt 2): 1115-22.
 23. Shek DT. Gender differences in marital quality and well-being in Chinese married adults. *Sex Roles.* 1995; 32(11-12):699-715.
 24. Terry DJ, Scott WA. Gender Differences In Correlates Of Marital Satisfaction. *Aust J Psychol.* 1987; 39(2):207-21.
 25. Conger RD, Conger KJ, Elder Jr, Lorenz FO. Linking economic hardship to marital quality and instability. *J Marriage Fam.* 1990; 52(3):643-56.
 26. Chen Z, Tanaka N, Uji M, Hiramura H, Shikai N, Fujihara S, et al. The role of personalities in the marital adjustment of Japanese couples. *Soc Behav Pers.* 2007; 35(4):561-72.
 27. Afifi TO, MacMillan H, Cox BJ, Asmundson GJ, Stein MB, Sareen J. Mental health correlates of intimate partner violence in marital relationships in a nationally representative sample of males and females. *J Interpers Violence.* 2009; 24(8):1398-417.
 28. Ting-Toomey S. An analysis of verbal communication patterns in high and low marital adjustment groups. *Hum Commun Res.* 1983; 9(4):306-19.
 29. Karney BR, Bradbury TN. The longitudinal course of marital quality and stability: a review of theory, method, and research. *Psychol Bull.* 1995; 118(1): 3-34.
 30. Chachamovich JR, Chachamovich E, Ezer H, Fleck MP, Knauth DR, Passos EP. Agreement on perceptions of quality of life in couples dealing with infertility. *J Obstet Gynecol Neonatal Nurs.* 2010; 39(5):557-65.
 31. Booth A, Johnson DR. Declining health and marital quality. *J Marriage Fam.* 1994; 56(1):218-23.
 32. Newton TL, Kiecolt-Glaser JK. Hostility and erosion of marital quality during early

- marriage. *J Behav Med.* 1995; 18(6):601-19.
33. Mols F, Vingerhoets AJ, Coebergh JW, van de Poll-Franse LV. Quality of life among long-term breast cancer survivors: a systematic review. *Eur J Cancer.* 2005; 41(17):2613-9.
 34. Den Oudsten BL, Van Heck GL, De Vries J. Quality of life and related concepts in Parkinson's disease: a systematic review. *Mov Disord.* 2007; 22(11):1528-37.
 35. Jackson N, Waters E; Guidelines for Systematic Reviews in Health Promotion and Public Health Taskforce. Criteria for the systematic review of health promotion and public health interventions. *Health Promot Int.* 2005; 20(4):367-74.
 36. Pullens MJ, De Vries J, Roukema JA. Subjective cognitive dysfunction in breast cancer patients: a systematic review. *Psychooncology.* 2010; 19(11):1127-38.
 37. Kuijpers T, van der Windt DA, van der Heijden GJ, Bouter LM. Systematic review of prognostic cohort studies on shoulder disorders. *Pain.* 2004; 109(3):420-31.
 38. Wells J, Barlow J, Stewart-Brown S. A systematic review of universal approaches to mental health promotion in schools. *Health Educ.* 2003; 103(4):197-220.
 39. Ulbrich PM, Coyle AT, Llabre MM. Involuntary childlessness and marital adjustment: his and hers. *J Sex Marital Ther.* 1990; 16(3):147-58.
 40. Berg BJ, Wilson JF. Psychological functioning across stages of treatment for infertility. *J Behav Med.* 1991; 14(1):11-26.
 41. Pepe MV, Byrne T. Women's perceptions of immediate and long-term effects of failed infertility treatment on marital and sexual satisfaction. *Fam Relat.* 1991; 40(3):303-9.
 42. Levin JB, Sher TG, Theodos V. The effect of intracouple coping concordance on psychological and marital distress in infertility patients. *J Clin Psychol Med Settings.* 1997; 4(4):361-72.
 43. Markestad CL, Montgomery LM, Bartsch RA. Infertility and length of medical treatment effects on psychological, marital, and sexual functioning. *Int J Rehabil Health.* 1998; 4(4):233-43.
 44. Lee TY, Sun GH. Psychosocial response of Chinese infertile husbands and wives. *Arch Androl.* 2000; 45(3):143-8.
 45. Lee TY, Sun GH, Chao SC. The effect of an infertility diagnosis on the distress, marital and sexual satisfaction between husbands and wives in Taiwan. *Hum Reprod.* 2001; 16(8):1762-7.
 46. Peterson BD, Newton CR, Rosen KH. Examining congruence between partners' perceived infertility related stress and its relationship to marital adjustment and depression in infertile couples. *Fam Process.* 2003; 42(1):59-70.
 47. Monga M, Alexandrescu B, Katz SE, Stein M, Ganiats T. Impact of infertility on quality of life, marital adjustment, and sexual function. *Urology.* 2004; 63(1):126-30.
 48. Peterson BD, Newton CR, Rosen KH, Skaggs GE. Gender differences in how men and women who are referred for IVF cope with infertility stress. *Hum Reprod.* 2006;

21(9):2443-9.

49. Wang K, Li J, Zhang JX, Zhang L, Yu J, Jiang P. Psychological characteristics and marital quality of infertile women registered for *in vitro* fertilization-intracytoplasmic sperm injection in China. *Fertil Steril*. 2007; 87(4):792-8.
50. Drosdzol A, Skrzypulec V. Evaluation of marital and sexual interactions of Polish infertile couples. *J Sex Med*. 2009; 6(12):3335-46.
51. Smith JF, Walsh TJ, Shindel AW, Turek PJ, Wing H, Pasch L, et al. Sexual, marital, and social impact of a man's perceived infertility diagnosis. *J Sex Med*. 2009; 6(9):2505-15.
52. Benazon N, Wright J, Sabourin S. Stress, sexual satisfaction, and marital adjustment in infertile couples. *J Sex Marital Ther*. 1992; 18(4):273-84.
53. Leiblum SR, Aviv A, Hamer R. Life after infertility treatment: a long-term investigation of marital and sexual function. *Hum Reprod*. 1998; 13(12):3569-74.
54. Slade P, Raval H, Buck P, Lieberman BE. A 3-year follow-up of emotional marital and sexual functioning in couples who were infertile. *J Reprod Infant psychol*. 1992; 10:233-43.
55. Verhaak CM, Smeenk JM, Eugster A, van Minnen A, Kremer JA, Kraaimaat FW. Stress and marital satisfaction among women before and after their first cycle of *in vitro* fertilization and intracytoplasmic sperm injection. *Fertil Steril*. 2001; 76(3):525-31.
56. Repokari L, Punamäki RL, Unkila-Kallio L, Vilska S, Poikkeus P, Sinkkonen J, et al. Infertility treatment and marital relationships: a 1-year prospective study among successfully treated ART couples and their controls. *Hum Reprod*. 2007; 22(5):1481-91.
57. Boivin J, Shoog-Svanberg A, Andersson L, Hjelmstedt A, Bergh T, Collins A. Distress level in men undergoing intracytoplasmic sperm injection versus in-vitro fertilization. *Hum Reprod*. 1998; 13(5): 1403-6.
58. Newton CR, Sherrard W, Glavac I. The Fertility Problem Inventory: measuring perceived infertility-related stress. *Fertil Steril*. 1999; 72(1):54-62.

2.3 Paper-2: The impact of infertility on sexuality: a literature review

Peng Tao^{1,2}, Rosemary Coates², Bruce Maycock³

¹ Research and Education Center in Sexual Health, Harbin Medical University, Harbin, China

² Department of Sexology, Curtin University, Perth, Australia

³ Curtin Health Innovation Research Institute, Curtin University, Perth, Australia

Submitted: Sept. 29, 2011

Accepted: Nov. 27, 2011

Published: Australasian Medical Journal, 2011; 4(11):620-627

Contributions: The present manuscript was compiled and written in full by the candidate of this thesis with suggestions and thorough proofreading by the co-authors.



AMJ Paper of the Year 2011

Winner

Author

Peng Tao

Tao, Peng and Coates, Rosemary and Maycock, Bruce. 2011. The impact of infertility on sexuality: A literature review. Australasian Medical Journal. 4 (11): pp. 620-627.

Signed:

Moyez Jiwa

Editor in Chief

ABSTRACT

Background: Most studies address medical treatment of infertility and psychosocial outcomes caused by infertility-related stress, but few studies examine infertility's impact on sexuality.

Aim: A literature review was conducted to answer the questions: 1) How is sexual self-concept impacted in infertile individuals and their partners? 2) Does infertility have a negative impact on sexual relationships? 3) Is sexual function affected by infertility? In answering these questions, we may develop a better understanding of sexuality in the context of infertility, and thus better inform infertility management. Ultimately the aim is to improve the quality of life for infertile couples.

Method: A literature search was conducted for publications from 1990 to 2011 via the electronic databases PubMed, PsycInfo and Scopus, which focused on sexuality in infertile subjects or couples.

Results: In this review, all studies were descriptive quantitative studies which mapped the different aspects of sexuality in the context of infertility. The results suggested that infertility and its treatment approaches for fertilization could lead to changes in sexual self-esteem, sexual relationship and sexual function.

Conclusion: The literature substantiated that many infertile subjects experienced trouble in various aspects of sexuality. However, further research should examine the reciprocal relations between sexual self concept, sexual relationship and sexual function in the context of infertility. How these changes affect the partners of infertile subjects should also be addressed.

Key Words

Infertility, sexuality, IVF, Assisted Reproduction Technology (ART)

Introduction

Globally 8–12% of couples experience difficulty conceiving a child.¹ Although assisted reproduction technology (ART) provides the possibility of achieving pregnancy, almost 40% of people undergoing ART still cannot conceive.^{2,3} Infertility has been described as a stressor and a life crisis for individuals or couples, which results in a lower quality of life and marital conflicts.⁴⁻⁷ Furthermore, there is an increasing use of medical services for the infertile.⁸ Although many studies have been published about infertility diagnosis and treatments, and consensus in the literature demonstrating sexual problems as crucial contributing factors,⁹⁻¹² we feel that little is known regarding the psychosexual aspects of infertility. In particular little is known about the sexuality of infertile individuals or couples in the presence of a clinical diagnosis and treatment. Facing a childless status and experiencing medical treatment, the infertile couple is likely to suffer from various psychosexual problems. In addition, the diagnosis of infertility and contributing factors such as unsuccessful treatment, continuing lack of conception and childbearing, and the absence of the role as a parent may have a negative impact on marital relations,^{1,4,13} thus should be given careful consideration as part of an holistic approach to case management. Research is therefore necessary to understand and address these psychosocial sexual issues.

Healthy sexuality is central to psychological well-being and quality of life,¹⁴ both the World Health Organization (WHO)¹⁵ and the World Association for Sexual Health (WAS)¹⁶ state that sexuality is an integral part of being human, it is influenced by many factors, it is diverse and cannot be separated from the essential elements of human life. Historically, we found there is a lack of consensus concerning the definition of sexuality. Woods¹⁷ describes a holistic perspective on sexuality, which suggests sexuality is concerned with biological, psychological, sociological, spiritual, and cultural aspects of life. Furthermore, sexuality has three major dimensions including sexual self concept, sexual relationships and sexual function. McCabe et al¹⁸ suggest sexuality is an important aspect in people's lives; it involves a broad range of cognitions, emotions and behaviors. Master et al¹⁹ suggest that sexuality is a multidimensional phenomenon with biological, psychological, behavioral, clinical, moral, and cultural aspects. Similarly, Bernhard²⁰ also suggests sexuality as a multidimensional phenomenon, composed of biological, socioeconomic, psychological and spiritual components. In addition,

McCarthy et al²¹ suggest sexuality is more than the physical act of intercourse, as it influences self-identity, communication, sharing pleasure, deepening intimacy and may lessen stress in one's life. However, from the above mentioned definition of sexuality, we can have a clear understanding that sexuality is not just the state of being physically able to perform a sex act or to conceive a child, but as an integral component of human life with multidimensional content. In conclusion, Woods's perspective on sexuality provides a useful conceptual framework for holistic, sexuality research, also combining with clear definition on every dimension as follows:¹⁷ 1) sexual self-concept refers to the image one has of oneself as a man or a woman and the evaluation of one's adequacy in masculine or feminine roles, including body image, sexual self schema and sexual esteem; 2) sexual relationships as the interpersonal relationships in which one's sexuality is shared with another; 3) sexual function is about the ability of an individual to give and receive sexual pleasure, including various physical and psychological progresses in the sexual response cycle. These have been acknowledged by various studies.²²⁻²⁶

From the purpose of the study, in this paper Woods's conceptual framework of sexuality was used to make analysis pertaining to sexuality in infertile individuals or couples. We focused on changes in sexuality following infertility diagnosis and treatment and provide recommendations for future research. The following questions were addressed.

- (1) How is sexual self-concept impacted in infertile individuals and their partners?
- (2) Does infertility have a negative impact on the sexual relationship between infertile individuals and their partners?
- (3) Is sexual function affected by infertility?

Methods

Based on the purpose of this study, research articles for this literature review were searched via a range of databases, which were MedLine (Ovid), PsycInfo (Ovid) and Scopus. In addition, references lists from retrieved articles were also hand searched for relevance. Duplicated articles or those that did not meet inclusion criteria were excluded from the review.

Search strategy

The bibliography was compiled using Infertility "OR" Childless in the title, abstract, or keywords. Since some studies linked with sexuality are explored in the context of clinical treatment, so in our review study, in-vitro fertilisation (IVF) "OR"

intra-cytoplasmic sperm injection (ICSI) “OR” ART were also included as terms in the search strategy. All of these terms were in various combinations with infertile individuals or couples’ sexuality. These included sexual self concept, body image, sexual esteem, communication, intimacy, relationship, sexual function/dysfunction, sexual disorder, sexual health, sex life, sexual behavior or sexual problems. Furthermore, the databases were searched with combinations of infertile males, infertile females, infertile subject, infertile couples, spouses, or partner.

Inclusion and exclusion criteria

The literature search was based on a theoretical design rather than on a systematic review format. To be included in the review, the retrieved articles were confined to the following criteria:

Criteria 1: Peer-reviewed articles published in the English language between 1990 and 2011;

Criteria 2: The primary or secondary objective of the study was regarding sexuality in the context of infertility;

Criteria 3: The study participants comprised of infertile subjects, or infertile couples comprising infertile subjects and their partners;

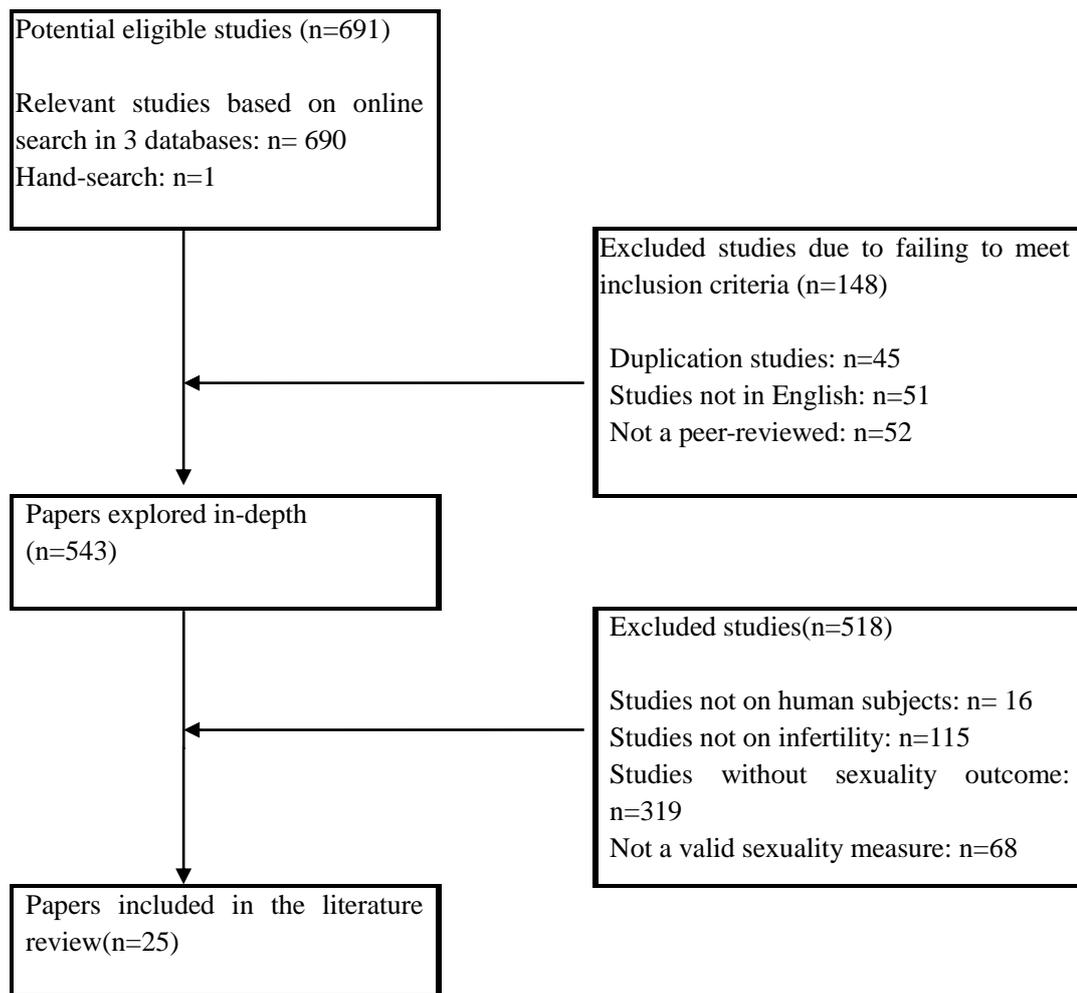
Criteria 4: The study needed to report originally collected data via the validated questionnaire. Reviews, editorials and debates, letters, case reports, non-peer-reviewed articles, meeting abstracts and brief communications were excluded.

In addition, studies that discussed infertility as a consequence of other conditions such as hysterectomy, tubal ligation or cancer were to be excluded because the changes of sexuality are intrinsically linked to the baseline status, and also different health conditions might affect the subjects’ sexuality.

Results

Through the literature retrieving strategy, finally 24 studies were sourced via online search. The results of this comprehensive search are outlined in Figure 1. In addition, through a hand search, one further research paper was found which met the selection criteria. Therefore, in total 25 studies were sourced which examined some aspects of sexuality in infertile individuals and couples.

Figure 1: Flowchart of literature searches performed



All papers selected were reviewed to ensure congruency with the aim of the study. The relationship between infertility and sexuality were discussed using the following themes.

(1) How is sexual self-concept impacted in infertile individuals and their partners?

Despite an extensive literature search, we found no sourced study that examined sexual self schema and body image of infertile individuals.

In some studies, infertile self-esteem was given more attention; the results demonstrated that infertile males had lower self-esteem,²⁷⁻²⁹ which was associated with changes in stress levels over the course of treatment.³⁰ Women on IVF were found to have lower self-esteem than controls prior to the treatment cycle,^{31,32} also associated with unsuccessful IVF treatment in infertile females,^{33,34} but effective adjustment to infertility could contribute to positive self-esteem.³⁵ Of all the

retrieved studies, two studies of infertile couples specifically focused on the term of sexual self-esteem, which suggested that infertility-related stress tended to decrease the sexual self-esteem of women more than their male partner.^{36, 37}

It is a fact that there is a scarcity of research about sexual esteem in infertile individuals and their partners, and self-esteem is addressed in more studies. This might be due to self-esteem being recognised as an important part of both a person's sexual confidence and adequacy.³⁸ However, sexual esteem mainly refers to the tendency to evaluate one's sexuality positively and is related to others³⁹ its discussion specifically in the context of infertility in the future will be helpful for better understanding the sexuality of infertile clients and their partners.

(2) Does infertility have a negative impact on the sexual relationship of infertile couples?

Infertile males had a lower sexual and personal quality of life compared with the male partners of couples without perceived male factor infertility.⁴⁰ It was also found that the male partner in infertile couples experienced less sexual satisfaction when compared with the female partner. It was hypothesised that this was due to the psychological pressure associated with efforts to conceive, or to the forced timing of intercourse around the female's ovulatory cycle.⁴ Furthermore, diagnosed male factor and infertility duration of 3–6 years contributed to higher relationship instability and lower sexual satisfaction in both females and males from infertile couples.⁴¹

The sexual satisfaction of infertile females was found to vary at different stages of treatment, with the most profound change occurring during treatment. This impacted most on the couple's sexual relations. Furthermore, other studies demonstrated that females with unsuccessful IVF treatment had a lower satisfaction with married life compared to those who subsequently conceived or adopted.^{33,42,43} In addition, Lee et al⁴⁴ suggested that the wives expressed less sexual satisfaction than their partners both in only male factor infertility and combining male-female factor infertility; also the results showed no difference in sexual satisfaction between wives and husbands in infertile couples with unexplained factor infertility; but the wives from infertile couples with female factor infertility had less sexual satisfaction than their husbands. However, other studies had contrary results which suggested infertility and its treatment did not have a negative influence on sexual relationship and satisfaction because the shared stress of infertility could make both

couples more involved jointly with the same problem.⁴⁵⁻⁴⁸

(3) Is sexual function affected by infertility?

Regarding sexual function in infertile subjects, most of the retrieved studies discussed premature ejaculation and erectile dysfunction, and in females sexual desire, sexual arousal, orgasm and sexual pain.

Generally the results of findings from the retrieved studies indicated that infertility could influence sexual activity in infertile couples, and that fertility problem stress tended to decrease frequency of intercourse.^{29, 36, 49} Frequency of coitus could be regarded as an acceptable indicator of sexual satisfaction in male partners of infertile couples.⁵⁰ As for the sexual function of infertile subjects, studies demonstrated premature ejaculation and erectile dysfunction were prevalent among male partners of infertile couples.⁵¹⁻⁵³ In addition, a cohort observational study reported 11% of males experienced problems with erection or orgasm after the diagnosis of abnormal semen parameters, which might be psychologically related in the evaluation of infertility.⁵⁴

Among infertile females, some studies demonstrated sexual dysfunctions, especially sexual arousal, as being very common.^{10, 53, 55-60} Another study indicated there was no statistically significant difference in sexual function between infertile females and females seeking elective sterilisation, but a trend was noted toward greater sexual problems in these two female groups.⁴

Discussion

In this review, all studies were descriptive quantitative studies which basically mapped sexuality in the context of infertility. Results suggested that infertility and associated treatment may lead to changes in sexual self-esteem, sexual relations and sexual function, which further affected the infertile couple's quality of life, and well-being.

For the infertile subjects, infertility affects self concept and role perceptions, and is a threat to personal identity. For infertile women, the negative impact on self-esteem has a greater effect on sexual confidence than it does in infertile men. Unfortunately, the retrieved studies do not record further analysis on these changes. It would be helpful if there had been an investigation of the extent and the perceived reasons for such changes. Almost no studies examine the impact of gender-specific diagnosis on changing sexual self concept in men and women, respectively. Such information would be useful along with a comparative analysis.

Sexual self concept is a core component of sexuality,⁶¹ it is necessary to give more attention to the experience of infertility and its influence on one's cognitive view of self and one's sexuality. Future studies should further address how infertility and its treatment have the potential to affect the sexual self concept. This should include issues such as female's body image and infertile subject's sexual esteem, in conjunction with how infertility affects partners.

Regarding sexual relations for infertile couples, some studies demonstrated there were no significant correlations between infertility and sexual relations but other studies suggested infertility impaired sexual relations. We postulate that this result might be explained by different aspects such as gender differences in the reaction to infertility, the different stages of infertility treatment and/or different social demographics. In order to have a comprehensive understanding of sexual relations in the context of infertility, it is necessary to further consider the association between sexual self concept and sexual relations, and the quality of communication in infertile couples. However, most retrieved studies focused on the assumption that infertility might negatively affect sexual relations. Future studies should investigate factors that might positively affect sexual relations in infertile couples.

Among the infertile subjects, we found the sexual dysfunction could be a consequence of the diagnosis, investigation and treatment of infertility. The main reason for the infertile male's sexual dysfunction was related to a perception of losing his masculinity.⁶² Problems associated with sexual pleasure appeared to be due to the mechanical and forced sexual activities for conception purposes, which included scheduled post-coital tests, and the optimal states for sexual intercourse during the female ovulatory period.⁶³ Sexual dysfunction was also prevalent in female partners of infertile couples, and positively correlated with the male partner's sexual function⁶⁴.

Although the retrieved studies provided some indication of the effect of infertility on sexuality, most focused on the physical aspects of sexuality such as sexual behavior, problems or disorders.^{4, 55, 60, 62, 65-74} These studies did not make further analysis on the influence of age, length of conjugal relationship, the period since diagnosis and treatment, treatment stages, general health status, and socio-demographic conditions. In addition, the studies of sexuality were confined to physical aspects, and failed to address the impact on the partner or the influence

this might have. Further, the studies rarely took a gender perspective to explore sexuality issues. In addition, we found very little research that focused on factors that might positively affect sexual self-esteem, sexual relationship and sexual function. It is our view that it is necessary to address sexual self concept and sexual relations and sexual function with a holistic approach.

Conclusion

The literature substantiates that sexuality can be greatly affected by infertility and its treatment, with infertile subjects experiencing difficulties in different aspects of sexuality. It is necessary for further research to examine the reciprocal relations between sexual self concept, sexual relationship and sexual function in the context of infertility. Moreover, the sexuality of infertile subjects might be influenced by their partner's reaction to the diagnosis.

References

1. World Health Organization. Recent Advances in Medically Assisted Conception. WHO Technical Report Series 820. Geneva: World Health Organization Publications 1992;1-7.
2. Collins JA, Garner JB, Wilson EH, Wrixon W, Casper RF. A proportional hazards analysis of the clinical characteristics of infertile couples. *Am J Obstet Gynecol* 1984;148(5):527-32.
3. Schmidt L. Infertility and assisted reproduction in Denmark. Epidemiology and psychosocial consequences. *Dan Med Bull* 2006;53(4):390-417.
4. Monga M, Alexandrescu B, Katz SE, Stein M, Ganiats T. Impact of infertility on quality of life, marital adjustment, and sexual function. *Urology* 2004;63(1):126-30.
5. Newton CR, Sherrard W, Glavac I. The Fertility Problem Inventory: measuring perceived infertility-related stress. *Fertil Steril* 1999;72(1):54-62.
6. Chachamovich J, Chachamovich E, Fleck MP, Cordova FP, Knauth D, Passos E. Congruence of quality of life among infertile men and women: findings from a couple-based study. *Hum Reprod* 2009;24(9):2151-7.
7. Klemetti R, Raitanen J, Sihvo S, Saarni S, Koponen P. Infertility, mental disorders and well-being: a nationwide survey. *Acta Obstet Gynecol Scand* 2010;89(5):677-82.
8. Templeton A, Fraser C, Thompson B. Infertility – epidemiology and referral practice. *Hum Reprod* 1991;6(10):1391-4.
9. Boivin J, Appleton TC, Baetens P, Baron J, Bitzer J, Corrigan E, Daniels KR, Darwish J, Guerra-Diaz D, Hammar M, McWhinnie A, Strauss B, Thorn P, Wischmann T, Kertenich H. Guidelines for counselling in infertility: outline version. *Hum Reprod* 2001;16(6):1301-4.
10. Audu BM. Sexual dysfunction among infertile Nigerian women. *Journal of Obstetrics & Gynaecology* 2002; 22(6):655-7.

11. Bar-Chama N, Schiff J, Yavorsky R, Diefenbach M. Erectile dysfunction and infertility. *Current Sexual Health Reports* 2007;4(1):20-3.
12. Herer E, Holzapfel S. The medical causes of infertility and their effects on sexuality. *Canadian Journal of Human Sexuality* 1993;2(3):113-20.
13. Sherrod RA. Understanding the emotional aspects of infertility: implications for nursing practice. *J Psychosoc Nurs Ment Health Serv* 2004;42(3):40-7.
14. World Health Organisation. The World Health Organization quality of life assessment (WHOQOL): Position paper from the World Health Organization. *Social Science & Medicine* 1995;41(10):1403-9.
15. World Health Organization. Report of a technical consultation on sexual health; 2002. Available online at http://www.who.int/reproductivehealth/publications/sexual_health/defining_sexual_health.pdf [verified August 2011].
16. World Association for Sexual Health. Working Definitions after WHO Technical Consultation on Sexual Health. Available online at <http://www.worldsexualhealth.org/resources> [verified July 2011].
17. Woods NF. Toward a holistic perspective of human sexuality: alterations in sexual health and nursing diagnoses. *Holist Nurs Pract* 1987;1(4):1-11.
18. McCabe MP, Cummins RA, Romeo Y. Relationship status, relationship quality, and health. *Journal of Family Studies* 1996; 2: 109-20.
19. Master WH, Johnson VE, Kolodny RC. What is human sexuality? In *Human Sexuality* Master WH, Johnson VE, Kolodny RC (eds.) New York: Harper Collins College Publishers 1999, 21–30.
20. Bernhard LA. Sexuality and sexual health care for women. *Clin Obstet Gynecol* 2002;45(4):1089-98.
21. McCarthy BW, Bodnar EL. The equity model of sexuality: navigating and negotiating the similarities and differences between men and women in sexual behaviour, roles and values. *Sexual and Relationship Therapy* 2005;20:225-35.
22. Newshan G. Sexuality and the HIV-positive individual. *SIECUS Report* 1992;20(5):1-3.
23. Krebs LU. Sexual assessment in cancer care: concepts, methods, and strategies for success. *Semin Oncol Nurs* 2008;24(2):80-90.
24. Krebs LU. Sexual assessment: research and clinical. *Nurs Clin North Am* 2007;42(4):515-29; v.
25. Bruner DW, Boyd CP. Assessing women's sexuality after cancer therapy: checking assumptions with the focus group technique. *Cancer Nurs* 1999;22(6):438-47.
26. Butler L, Banfield V, Sveinson T, Allen K. Conceptualizing sexual health in cancer care. *West J Nurs Res* 1998;20(6):683-99; discussion 700-5.
27. Kedem P, Mikulincer M, Nathanson YE, Bartoov B. Psychological aspects of male

- infertility. *Br J Med Psychol* 1990;63 (Pt 1):73-80.
28. Pasch LA, Dunkel-Schetter C, Christensen A. Differences between husbands' and wives' approach to infertility affect marital communication and adjustment. *Fertil Steril* 2002;77(6):1241-7.
 29. Slade P, Raval H, Buck P, Lieberman B. A 3-year follow-up of emotional, marital and sexual functioning in couples who were infertile. *Journal of Reproductive and Infant Psychology* 1992;10(4):233-43.
 30. Schneider MG, Forthofer MS. Associations of psychosocial factors with the stress of infertility treatment. *Health Soc Work* 2005;30(3):183-91.
 31. Hynes GJ, Callan VJ, Terry DJ, Gallois C. The psychological well-being of infertile women after a failed IVF attempt: the effects of coping. *Br J Med Psychol* 1992;65 (Pt 3):269-78.
 32. van Balen F, Trimbos-Kemper TC. Long-term infertile couples: a study of their well-being. *J Psychosom Obstet Gynaecol* 1993;14 Suppl:53-60.
 33. Bryson CA, Sykes DH, Traub AI. *In vitro* fertilization: a long-term follow-up after treatment failure. *Hum Fertil (Camb)* 2000;3(3):214-20.
 34. Cox SJ, Glazebrook C, Sheard C, Ndukwe G, Oates M. Maternal self-esteem after successful treatment for infertility. *Fertil Steril* 2006;85(1):84-9.
 35. Koropatnick S, Daniluk J, Pattinson HA. Infertility: a non-event transition. *Fertil Steril*. 1993 Jan;59(1):163-71.
 36. Andrews FM, Abbey A, Halman LJ. Stress from infertility, marriage factors, and subjective well-being of wives and husbands. *J Health Soc Behav* 1991;32(3):238-53.
 37. Lee TY, Sun GH. Psychosocial response of Chinese infertile husbands and wives. *Arch Androl* 2000;45(3):143-8.
 38. Burgoyne D. How self-esteem affects sexual behavior. *Medical Aspects of Human Sexuality* 1982;16(12):70D-H.
 39. Snell WE, Fisher TD, Walters AS. The Multidimensional Sexuality Questionnaire: An objective self-report measure of psychological tendencies associated with human sexuality. *Annals of Sex Research* 1993;6:27-55.
 40. Smith JF, Walsh TJ, Shindel AW, Turek PJ, Wing H, Pasch L, Katz PP. Sexual, marital, and social impact of a man's perceived infertility diagnosis. *Journal of Sexual Medicine* 2009;6(9):2505-15.
 41. Drosdzol A, Skrzypulec V. Evaluation of marital and sexual interactions of Polish infertile couples. *Journal of Sexual Medicine* 2009;6(12):3335-46.
 42. Benazon N, Wright J, Sabourin S. Stress, sexual satisfaction, and marital adjustment in infertile couples. *Journal of Sex & Marital Therapy* 1992;18(4):273-84.
 43. Pepe MV, Byrne T. Women's perceptions of immediate and long-term effects of failed infertility treatment on marital and sexual satisfaction. *Family Relations: An*

Interdisciplinary Journal of Applied Family Studies 1991;40(3):303-9.

44. Lee TY, Sun GH, Chao SC. The effect of an infertility diagnosis on the distress, marital and sexual satisfaction between husbands and wives in Taiwan. *Hum Reprod* 2001;16(8):1762-7.
45. Muller MJ, Schilling G, Haidl G. Sexual satisfaction in male infertility. *Arch Androl* 1999;42(3):137-43.
46. Repokari L, Punamäki RL, Unkila-Kallio L, Vilska S, Poikkeus P, Sinkkonen J, Almqvist F, Tiitinen A, Tulppala M. Infertility treatment and marital relationships: A 1-year prospective study among successfully treated ART couples and their controls. *Hum Reprod* 2007;22(5):1481-91.
47. Oddens BJ, den Tonkelaar I, Nieuwenhuysen H. Psychosocial experiences in women facing fertility problems – a comparative survey. *Hum Reprod* 1999;14(1):255-61.
48. Oei SG, Helmerhorst FM, Bloemenkamp KW, Keirse MJ. Effect of the postcoital test on the sexual relationship of infertile couples: a randomized controlled trial. *Fertil Steril* 1996;65(4):771-5.
49. Jindal UN, Dhall GI. Psychosexual problems of infertile women in India. *Int J Fertil* 1990;35(4):222-5.
50. Ramezanzadeh F, Aghssa MM, Jafarabadi M, Zayeri F. Alterations of sexual desire and satisfaction in male partners of infertile couples. *Fertil Steril* 2006;85(1):139-43.
51. Shindel AW, Nelson CJ, Naughton CK, Mulhall JP. Premature ejaculation in infertile couples: Prevalence and correlates. *Journal of Sexual Medicine* 2008;5(2):485-91.
52. Shindel AW, Nelson CJ, Naughton CK, Ohebshalom M, Mulhall JP. Sexual function and quality of life in the male partner of infertile couples: prevalence and correlates of dysfunction. *J Urol* 2008;179(3):1056-9.
53. Jain K, Radhakrishnan G, Agrawal P. Infertility and psychosexual disorders: relationship in infertile couples. *Indian J Med Sci* 2000;54(1):1-7.
54. Saleh RA, Ranga GM, Raina R, Nelson DR, Agarwal A. Sexual dysfunction in men undergoing infertility evaluation: a cohort observational study. *Fertil Steril* 2003;79(4):909-12.
55. Millheiser LS, Helmer AE, Quintero RB, Westphal LM, Milki AA, Lathi RB. Is infertility a risk factor for female sexual dysfunction? A case-control study. *Fertil Steril* 2010;94(6):2022-5.
56. Tayebi N, Ardakani SMY. The prevalence of sexual dysfunctions in infertile women. *Middle East Fertility Society Journal* 2007;12(3):184-7.
57. Carter J, Applegarth L, Josephs L, Grill E, Baser RE, Rosenwaks Z. A cross-sectional cohort study of infertile women awaiting oocyte donation: the emotional, sexual, and quality-of-life impact. *Fertil Steril* 2011;95(2):711-6 e1.
58. Oskay UY, Beji NK, Serdaroglu H. The issue of infertility and sexual function in Turkish

- women. *Sexuality and Disability* 2010;28(2):71-9.
59. F. Abbasalizadeh, Z. Fardy-Azar, F. Ranjbar-Koucheksaray. Correlation of Infertility and Sexual Dysfunction. *Research Journal of Biological Sciences* 2008;3(1):52-6.
 60. Khademi A, Alleyassin A, Amini M, Ghaemi M. Evaluation of sexual dysfunction prevalence in infertile couples. *Journal of Sexual Medicine* 2008;5(6):1402-10.
 61. Andersen BL. Surviving cancer: the importance of sexual self-concept. *Med Pediatr Oncol* 1999;33(1):15-23.
 62. Lenzi A, Lombardo F, Salacone P, Gandini L, Jannini EA. Stress, sexual dysfunctions, and male infertility. *J Endocrinol Invest* 2003;26(3 Suppl):72-6.
 63. Elia J, Delfino M, Imbrogno N, Mazzilli F. The impact of a diagnosis of couple subfertility on male sexual function. *Journal of Endocrinological Investigation* 2010;33(2):74-6.
 64. Nelson CJ, Shindel AW, Naughton CK, Ohebshalom M, Mulhall JP. Prevalence and predictors of sexual problems, relationship stress, and depression in female partners of infertile couples. *Journal of Sexual Medicine* 2008;5(8):1907-14.
 65. Bar-Hava M, Azem F, Yovel I, Lessing JB, Amit A, Abramov L, Militscher I, Chen J. The interrelationship between coping strategies and sexual functioning in *in vitro* fertilization patients. *J Sex Marital Ther* 2001;27(5):389-94.
 66. Coeffin-Driol C, Giami A. The impact of infertility and its treatment on sexual life and marital relationships: review of the literature. *Gynecol Obstet Fertil* 2004;32(7-8):624-37.
 67. Fagan PJ, Schmidt CW, Jr, Rock JA, Damewood MD, Halle E, Wise TN. Sexual functioning and psychologic evaluation of *in vitro* fertilization couples. *Fertil Steril* 1986;46(4):668-72.
 68. Leiblum SR, Aviv A, Hamer R. Life after infertility treatment: a long-term investigation of marital and sexual function. *Hum Reprod* 1998;13(12):3569-74.
 69. Shindel AW, Nelson CJ, Naughton CK, Ohebshalom M, Mulhall JP. Sexual function and quality of life in the male partner of infertile couples: prevalence and correlates of dysfunction. *J Urol* 2008;179(3):1056-9.
 70. Nelson CJ, Shindel AW, Naughton CK, Ohebshalom M, Mulhall JP. Prevalence and predictors of sexual problems, relationship stress, and depression in female partners of infertile couples. *Journal of Sexual Medicine* 2008; 5(8):1907-14.
 71. Janssen OE, Hahn S, Tan S, Benson S, Elsenbruch S. Mood and sexual function in polycystic ovary syndrome. *Semin Reprod Med* 2008;26(1):45-52.
 72. Drosdzol A, Skrzypulec V. Quality of life and sexual functioning of Polish infertile couples. *Eur J Contracept Reprod Health Care* 2008;13(3):271-81.
 73. Boorjian S, Hopps CV, Ghaly SW, Parker M, Mulhall JP. The utility of sildenafil citrate for infertile men with sexual dysfunction: a pilot study. *BJU Int* 2007;100(3):603-6.
 74. Nene UA, Coyaji K, Apte H. Infertility: a label of choice in the case of sexually dysfunctional couples. *Patient Educ Couns* 2005;59(3):234-8.

2.4 Discussion and Implications

2.4.1 Limitations in previous study on infertile couples' marital relationship

The first review paper identified a growing number of studies on marital relationships in the context of infertility, however, there were some limitations in the available literature.

A marital relationship is commonly defined as the subjective evaluation of a married couple's relationship on a number of dimensions and evaluations (Spanier and Lewis 1980). It is a hybrid concept with its lineage reflected in both marital adjustment tradition and marital satisfaction tradition (Sabatelli 1988). There are two major approaches for evaluating marital relationship. One is the measure of marital adjustment to look at the relationship itself. The other is the measure of marital satisfaction to look at the individual feelings of the people in the relationship (Glenn 1998). Specifically, marital adjustment is suggested as the process of modifying, adapting or altering the individual and the couple's pattern of behavior and interaction. Relationships become successfully established when individual behavior is modified to accommodate mutual needs and interests. This leads to a sense of fulfillment and reassurance that the marriage is meeting expectations (Anderson, Russell, and Schumm 1983; Zuo 1992; Crawford et al. 2002; Sabatelli 1988). Marital satisfaction focuses on the individual's perception of marriage, and the subjective feeling of satisfaction with the marital relationship. Subsequently, to measure marital well-being, most researchers have developed quantitative instruments to assess the different dimensions of marital satisfaction such as the Relationship Assessment Scale (Hendrick 1988), the Marital Satisfaction Scale (Roach, Frazier, and Bowden 1981), the KANSAS Marital Satisfaction Scale (Schumm et al. 1986), the Marital Satisfaction Inventory (Snyder 1979) and the ENRICH Inventory (Fowers and Olson 1993). Other instruments including the Locke-Wallace Short Marital Adjustment Test (Locke and Wallace 1959) and the Dyadic Adjustment Scale (Spanier 1976) are used for marital adjustment. Most studies in the first literature review only used one instrument and focused on the linkages between infertility-related stress and marital satisfaction or marital adjustment respectively, and did not combine them to discuss marital well-being. Given some measures for assessing the marital relationship were found to be relatively weak (Abbey, Andrews, and Halman 1995), it is evident that the

exploration of marital relations of infertile couples was less than comprehensive. Therefore, in this present study, the Dyadic Adjustment Scale (DAS) and the KANSAS Marital Satisfaction Scale (KMSS) were used together to evaluate infertile couples' marital relationship. A strong reason for this decision was that these two measures had been validated in the Chinese language and met the requirement of brevity, psychometric validity and reliability. Further, they provided a broad profile of the marital relationship of infertile couples.

Of the studies retrieved in the first review paper, few studies examined the association between different aspects of infertility stress and marital relationship. Due to the multi-factorial nature of infertility stresses, future studies should explore this aspect in depth. Although the review found reports of spouse and/or partner assessments of marital satisfaction or adjustment, those studies still considered each partner separately; very few took into account the views of both partners simultaneously. Given the interdependent relationship that occurs between husband and wife, and the influence they have on each other, infertility is viewed as a dyadic problem rather than an individual one. The association between infertility and the marital relationship not only includes the effect on the infertile individual and their sense of marital well-being, it also involves the impact on the spouse. It is therefore necessary to conduct a comprehensive analysis of both partners' adjustment to their marriage and their self-perception of marriage satisfaction. One study from the retrieved studies was found to examine the level of congruence between partners' infertility stress related to depression and marital satisfaction in infertile couples (Peterson, Newton, and Rosen 2003). This provided further understanding on the relationship between infertility and marital well-being. However, with the exception of this study, to date, there has been no study on the dissimilarity of infertility stress between spouses and its relation to marital well-being. Since the infertility of one spouse will affect the other due to the experience of childlessness being shared by infertile couples, it is evident that the marital relationship cannot be understood by studying one spouse or partner in isolation from the other. Consequently, the current study was to investigate the effect of dissimilarity in infertility stress between husbands and wives on each person's marital well-being (marital adjustment and marital satisfaction), which has not been investigated in infertile Chinese couples. Furthermore, the study was also to explore the couples' congruence or discord in marital relationship.

The findings from the first review paper indicated almost no studies used a qualitative approach in investigating infertility-related stress within couples. Consequently, the marital relationship of infertile couples was not well understood. It is proposed that future studies adopt qualitative methodologies for further understanding of the dynamics of the marital relationship in the context of infertility. Moreover, most of the available studies were conducted in a Western context, only three studies discussed the effect of infertility on marital relationship in Chinese cultures, two of which were from Taiwan and one from the Chinese mainland.

The Chinese mainland has a different socio-economical context compared to Taiwan. Infertile couples face large personal expense for the related treatment which is not covered by medical insurance in mainland China. Another difference is that the management of infertility in mainland China is mainly concerned with treating physiological impairment. For these reasons, the marital well-being of infertile couples from mainland China should be examined further.

2.4.2 The gap of understanding sexuality in infertility

The World Association for Sexual Health (WAS) defines sexuality as an integral part of the personality of every human being (World Association for Sexual Health 1999), which is very complex, and generates within oneself and expands to relationships with others. Sexuality is commonly conceptualized as a combination of sexual drive, sexual act, and the psychological aspects of attitudes, emotions and relationships (Drench and Losee 1996), and not merely associated with reproductive function. It can serve as a means of giving and receiving pleasure, maintaining closeness within the couples, and helping them to feel good about themselves (Anderson and Wolf 1986). As fertility is one basic expression of sexuality, for the couple with the inability to conceive, more attention should be given to their sexual well-being.

Previous studies have focused on sexual dysfunction and reproductive tract diseases as factors contributing to infertility (Rantala and Koskimies 1988; Ruijs et al. 1990; Audu 2002). More recent research in various disciplines confirms that the sex lives of infertile couples were affected during the process of intrusive infertility treatments. This was expressed through decreasing sexual frequency (Jindal and Dhall 1990), lower sexual desire and sexual satisfaction (Lee, Sun, and Chao 2001; Drosdzol and Skrzypulec 2009; Ramezanzadeh et al. 2006), and the morbidity of

sexual dysfunction (Monga et al. 2004; Shindel et al. 2008; Elia et al. 2010; Saleh et al. 2003; Millheiser et al. 2010). Infertility stress posed a special threat to infertile couple's sexual identity and sense of self (Peterson, Newton, Rosen, and Schulman 2006), which may result in the changes of their sexuality such as thoughts, feeling, consciousness, motivation and relationship. There is a raised awareness that their sexual problems may induce infertility by contributing to limited or absent sexual activity (Palha A.P and Lourenço M.F 2011). Each of these points combines to demonstrate how important it is to explore the changes of sexuality in infertile couple. Yet, little is known from a psychosexual perspective. Moreover, the second literature found most investigators rarely explored sexuality beyond the physical dimensions. Whilst the second literature review indicated that infertility-related stress could lead to alteration in sexual self-esteem and sexual function, most research failed to address the sexuality of the infertile individuals' partner. Clearly, it is not sufficient to explore the relationship between infertility and sexuality of only one partner.

Few studies in the second literature review used the standard instruments to assess sexuality. Most utilized instruments with a unidimensional construct, which cannot fully express the complex substance of sexuality. Additionally, no study clarified the differences of sexuality in different biosocial demographics, nor did any discuss the correlation between sexuality, infertility and marital well-being. As the purpose of present study was to shed light on those areas, a standardized multi-item scale for sexuality was employed, involving:

- Sexual esteem (positive evaluation of a person's ability to engage sexually with others).
- Sexual consciousness (engagement in reflection about one's sexuality).
- Sexual motivation (desire to be involved in sexual relationships).
- Sexual satisfaction (feelings of satisfaction related to sexuality).

All of these aspects may have a contribution to better understanding of the nature of male and female sexuality (Snell, Fisher, and Walters 1993). It was anticipated therefore, that the study of these aspects may provide insight into the sexuality of infertile couples and reveal the correlation between infertility and marital relationship.

2.4.3 Link between sexuality and marital well-being in infertile couples

Sexuality has been shown to play an important role in the lives of people, and makes a major contribution to a person's quality of life (McCabe, Cummins, and Romeo 1996; Weijmar Schultz and Van de Wiel 2003).

Some empirical studies have indicated that marital satisfaction was positively related to the frequency of sexual behavior and self-esteem (Trudel 2002; Renaud, Byers, and Pan 1997; Luteijn 1994). Sexual satisfaction was regarded as an important aspect of marital satisfaction and was positively associated with marital adjustment, whereas sexual dysfunction predictor was associated with marital difficulties (Michael Y et al. 2000; Henderson-King and Veroff 1994; Lawrance and Byers 1995; Hurlbert, Apt, and Rabehl 1993; Guo and Huang 2005), also sexual dysfunction as one of predictors was associated with marital difficulties (Rust, Golombok, and Collier 1988). Other studies about chronic illness demonstrated that sexuality can be the barometer of health-related quality of life and conjugal relationships (Lew-Starowicz and Gellert 2009; Smith et al. 2007; LeMone 1993). It can be concluded that sexuality and marital well-being are related.

It is to be noted that some disagreement exists about the exact nature of the impact of infertility on marital relationships. The first review paper indicated influencing factors were biosocial characteristics, perceptions of infertility and personal coping strategies. Such disagreement can be partially explained by the effects of sexuality on the marital relationship being overlooked, effects which are likely to foster or detract from marital well-being due to their positive or negative effect. Because previous studies lack a comprehensive understanding of marital relations in infertility, the conclusions generated from those studies may be deficient. Consequently, it is necessary to reflect the dynamic features of infertile couples' sexuality and its impact on marital relations, in order to support infertile couples to protect their marital relationship from potential negative effects.

2.5 Summary

This chapter has presented an overview of the published research related to the current study and found most studies focused on infertility stress and its effect on the marital relationship. Though some retrieved studies discussed sexuality in

infertile couples, most addressed the effect on sexual function. There was a paucity of further analysis on changes to the various dimensions of sexuality and no related studies were conducted on sexuality as a predictor variable to influence marital well-being in the context of infertility.

A quantitative approach as the primary methodology was found to be employed in most studies related to infertility. No relevant qualitative studies were conducted on marital life experience from each partner/spouse of the infertile couple. Nor did the literature demonstrate an understanding of the impact of infertility on sexuality. A single quantitative method of approach did not adequately capture infertile couples' thoughts and feelings about infertility, and their subsequent effects on sexuality and the relationship. In order to gain meaningful details that cannot be gathered through quantitative studies alone, additional, qualitative data is necessary to facilitate the understanding of the complexity of infertility, sexuality and marital well-being.

Very little is known about infertile Chinese couples' marital well-being and its relationship with biosocial demographics, multi-factorial infertility stress, and multiple-dimension sexuality. It is important to understand these issues among infertile Chinese couples to guide future management of infertility in the Chinese context.

The methodology and research design adopted to answer the research questions is presented in Chapter Three.

CHAPTER 3: RESEARCH METHODOLOGY

This chapter introduces the methodological design mixed method, provides a rationale and describes the study setting, participants and sampling. The quantitative research instruments and qualitative interview are outlined. Two pilot studies in validating the effectiveness of the instruments are described. Data collection and analyses for both the quantitative and qualitative procedures are described. Ethical approval and informed consent issues are provided in the final section.

3.1 Study Design

3.1.1 Mixed method model

The overall aim of this study was to examine how the relationship between among biosocial demographics, infertility stress, sexuality and marital well-being influence infertile couples' marital well-being. This is achieved through quantitative and qualitative approaches employed to address the research objectives.

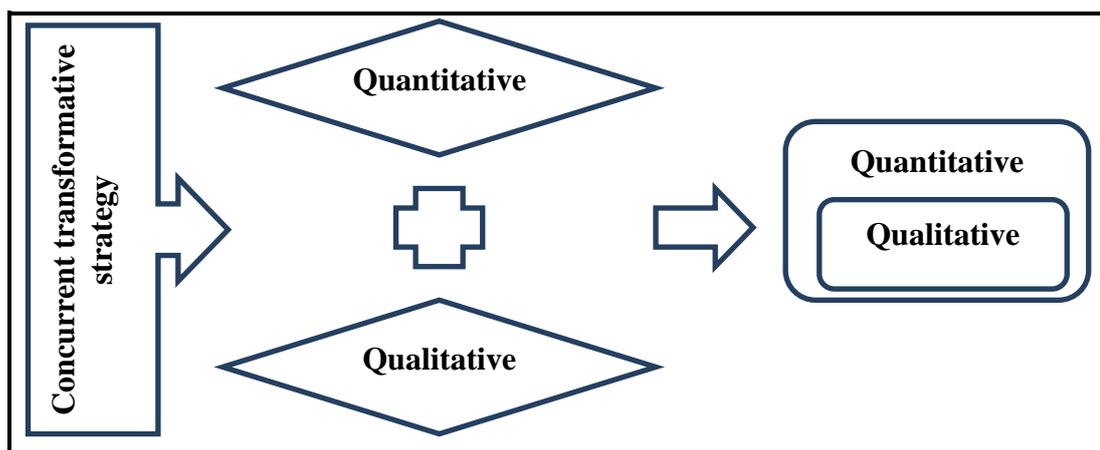
Each of these two methods has its own characteristics. Quantitative research is stated as “strategies of inquiry such as experimental and surveys, and collect data on predetermined instruments that yield statistical data” (Creswell 2003). It can measure the research subjects' response to a set of questions and quantify relationships between the independent and the dependent variables under investigation. In contrast, qualitative research is less likely to impose a priori classification on the collection of data, and is less driven by specific hypotheses and categorical frameworks, but is more concerned with emergent themes and idiographic descriptions (Cassell and Symon 1994). The quantitative approach fails to provide the researcher with information on the context of the situation for the phenomenon, such as the meanings, concepts, definitions, characteristics, metaphors, symbols, people's interactions and experience, and descriptions of things (Berg 2007). Each method has its own strengths and weaknesses (Ivankova, Creswell, and Stick 2006). Compared with a single method approach, the mixed method can provide a more comprehensive analysis of the research problem, and

has increasingly been perceived as a viable design. For these reasons, the current study employed a mixed method.

A mixed-method approach is defined as “The collection or analysis of both quantitative and/or qualitative data in a single study in which the data are collected concurrently or sequentially, are given a priority, and involve the integration of the data at one or more stages in the process of research” (Creswell et al. 2003). Briefly, six types of mixed methods strategies are commonly discussed: sequential explanatory, sequential exploratory, sequential transformative, concurrent triangulation, concurrent nested, and concurrent transformative (Hanson et al. 2005). A choice of mixed methods depends on the theoretical perspective for the study, priority, sequence and integration analysis.

This study employed three theoretical perspectives mentioned in Chapter 1, namely BPSS, FST and SCP, to guide the use of mixed methods. Although the quantitative approach was conducted first in this study, both quantitative and qualitative data were collected simultaneously during one data collection phase. Based on Creswell’s types of mixed methods(Creswell 2009), this study is a concurrent transformative design which is indicated in Figure 1 below. Through the mixed methods used in this study, infertile couples’ marital well-being can be understood deeply and broadly.

Figure 1 Model of concurrent transformative strategy in study



3.1.2 Rationale of the mixed method used in the study

Four tangible reasons support the present use of mixed methods. Firstly, the existing literature shows most infertility studies used quantitative methods alone; few studies integrated quantitative and qualitative approaches to explore infertility

and its effect on marital well-being. Secondly, it was anticipated that the mixed method would provide additional insights into the complexity of infertility, in response to previous findings that the impact of infertility on the marriage is unclear (Amir, Horesh, and Lin-Stein 1999). Thirdly, the present study considered the role of infertile couples' sexuality in their marital well-being by quantitative analysis. However, in order to investigate infertile couples' experiences and attitudes towards sexuality in the context of infertility, including their interaction dynamic process with marriage, the mixed method is valuable. Finally, the concurrent transform approach would aid data collection in the limited time available because both the quantitative and qualitative data could be collected at the same time.

For the quantitative data, a cross-sectional survey questionnaire was used, along with four standardized instruments including the Dyadic Adjustment Scale (DAS), the Kansas Marital Satisfaction Scale (KMSS), the Fertility Problem Inventory (FPI), and the Multi-dimensional Sexuality Questionnaire (MSQ) (outlined in Part 3.2.2 below). A basic information questionnaire (Appendix 7) was developed by the present researcher to identify the participants' biosocial demographic information. For the qualitative study, the in-depth interview was administered (Appendix 12).

3.2 Methods

3.2.1 Quantitative and qualitative approach

3.2.1.1 Setting

All participants were recruited from the Reproductive Medicine Centre in the First Hospital Affiliated Harbin Medical University (Harbin City, Hei Longjiang Province, China). This institute specializes in infertility clinical treatment, specifically in Hei Longjiang Province and due to the center's advanced technology and extensive experience, is the first one to be approved by the National Health Ministry to implement ART such as IVF/ET and ICSI. A formal agreement letter was obtained from the ethical board of this hospital. As a research setting, the hospital is suitable for the study's sampling, survey and interview procedures.

Data collection for one pilot study at this center began in November 2009, and finished September 2010. The formal field survey and interviewing proceeded from December 2010 until December 2011.

3.2.1.2 Participants

Couples attending the infertility clinic for treatment were invited to participate this study. Participation was voluntary and potential participants were fully informed of their rights. Volunteers were recruited according to specific inclusion and exclusion criteria to assure adherence to the specific focus and scope of this study.

The inclusion criteria were as follows: (1) The study participants are married and live together all the time (not living away for work), with no children by either member of the couple, but have desire for a child; (2) Only heterosexual couples experiencing primary infertility in their current relationship, and have been diagnosed with infertility for at least 1 year; (3) Have at least six years of education.

Exclusion criteria: (1) Those suffering from any additional major illnesses, not related to infertility, were excluded to prevent overlapping of illness symptoms and data ambiguity; (2) Either one of the partners of an infertile couple with a diagnosis of an organic sexual disorder.

As this study was conducted by the mixed method with concurrent transformative design, participants surveyed by quantitative methods were also recruited for the qualitative stage. For those couples who agreed to take part in the study, an interview time was organized at the clinic at a mutually convenient time.

3.2.1.3 Sampling

3.2.1.3.1 Sample size for the quantitative study

A purposive sampling method was employed, which is a non-probability sampling technique used in some special situations, especially when random sampling is not feasible (Fink 1995; Neuman 2006).

Considering the aim of a quantitative approach with the multiple regression of checking related variables, the sample size was estimated via a power analysis. In this study, quantitative research questions were analyzed by correlation and regression statistic methods. Based on the conceptual framework, there were 15 independent variables (6 variables in biosocial demographics, 5 variables in

infertility stress, and 4 variables in sexuality). The sample size was calculated by PASS¹, which is dedicated to performing statistical power and sample size. An estimated sample size of 179 achieves 90% power to detect, if in a multiple regression analysis using an F test with $\alpha=0.05$, a cumulative R^2 of 0.10, with 9 independent variables, adjusting for 6 additional control variables jointly contributing R^2 of 0.05 to the overall regression model. Allowing for a 10% non-response rate, the estimated sample size with 197 couples would be sufficient to meet the research objectives. On the other hand, an estimated sample size of 226 achieves 90% power to detect, if in a multiple regression analysis using an F test with $\alpha=0.05$, a cumulative R^2 of 0.10, with 15 independent variables, adjusting for 0 additional control variables jointly contributing R^2 of 0.05 to the overall regression model. Allowing for a 10% non-response rate, an estimated sample size of 249 couples would be sufficient to meet the research objectives. Based on different research objectives in this study, the minimum sample size for the quantitative research was 249.

3.2.1.3.2 Sample size in qualitative research

As for the sample size in qualitative studies, there is no set criteria. Qualitative sampling usually requires a flexible and pragmatic approach; an appropriate sample size for a qualitative study is one that adequately answers the research question (Marshall 1996).

For phenomenological research, interviews with up to 10 people are recommended; for a study based on grounded theory, interviews should be with 20-30 people (Creswell 1998). Further, 15 is recognized as the smallest acceptable sample size in all qualitative research (Bertaux 1981). As saturation is critical in the determination of sample size in qualitative studies, recruitment needs to be expanded if the obtainable data from the sampled participants is deemed insufficient, or participants cannot reflect on their experiences after several interviews fifteen is recognized as the smallest acceptable sample size in all qualitative research (Bertaux 1981). However, achieving saturation is critical in the determination of sample size in qualitative study, this means, the recruitment need to be expanded if the obtainable data from the sampled participants is deemed

¹ A specialized statistical computer package for the power analysis and sample size (PASS).

insufficient, or participants can not reflect on their experiences through interviewing for several times (Rice PR 1999; Sandelowski 1995). Thirty infertile couples were anticipated as a satisfactory sample size to achieve saturation.

3.2.2 Research instruments

3.2.2.1 Instruments in quantitative approach

In this present study, all four instruments were standard, validated instruments. The Dyadic Adjustment Scale (DAS) and Kansas Marital Satisfaction Scale (KMSS) were previously tested for reliability and validity in a Chinese context. The other two instruments, the Fertility Problem Inventory (FPI) and the Multi-dimensional Sexuality Questionnaire (MSQ) had not been used in a Chinese context prior to this study. The two instruments were translated into Mandarin, checked and back-translated to ensure accuracy. The researcher then conducted a pilot study to test for validity and reliability in the Chinese version. The results are presented as the published papers in this chapter.

3.2.2.1.1 Dyadic Adjustment Scale (DAS)

Spanier (1976) devised the DAS with a 32-item scale, which has been extensively used to assess the quality of adjustment to marriage and dyadic relationships. Most items of this scale are rated by a Likert-type method, with two items answered as yes or no. DAS (Spanier 1976) contains four subscales to measure different aspects of dyadic adjustment. The dyadic consensus subscale refers to the extent of agreement or disagreement on marital relations between an individual and his/her partner, there are 13 items with a score range of 0 to 65. The dyadic cohesion subscale with 5 items evaluates the degree of closeness and shared activities experienced by the couple, the score range of this subscale can be from 0 to 24. The affectional expression subscale consists of four questions which provide information on the degree of demonstrations of physical intimacy, affection and sexual relationships, with a possible score ranging from 0 to 12. The last subscale, the 10-item dyadic satisfaction is about the degree to which the couple is satisfied with their relationship, the score can range from 0 to 50. Generally, these subscales can be effective in the evaluation of agreement or discord in marriage, interaction with spouse, and adjustment in the relationship.

The original testing supported an internal consistency reliability of the DAS

total scale and its subscales, which presented 0.96 for the DAS total scale, and 0.90 for dyadic consensus, 0.94 for dyadic satisfaction, 0.86 for dyadic cohesion, and 0.73 for affectional expression (Spanier 1976). Other testing showed excellent convergent validity (high correlations among each other, $r=0.80-0.90$) and discriminant validity (low or not significant correlations with psychopathology subscales) (Heyman, Sayers, and Bellack 1994), with strong test-retest reliabilities ($r=0.73-0.84$ for subscales and 0.87 for total scale) (Carey et al. 1993). These four subscales can be used separately for different purposes (Kurdek 1992). Summative scores of the DAS theoretically range from 0-151, with a higher score indicating well-adjusted marital relationships, a lower score suggests more conflict in the couple relationship.

DAS has been translated into several languages and widely used in different culture groups, and proved to be satisfactory in psychometrics (Graham, Liu, and Jeziorski 2006). Also, the test results indicated DAS can be replicated as a reliable and valid instrument in a Chinese context. The results demonstrated the factor structure of the Chinese version of the DAS was stable, and that the concept of dyadic adjustment could be measured by the DAS. In general, the Chinese version of DAS had high internal consistency ($\alpha=0.91$), good validity in predicted directions, and at levels of significance with convergent factors and unassociated with discriminant factors unrelated to marriage (Shek 1995). In this study, the Chinese version of DAS (Shek 1994) was utilized, which included 32 items addressing essential concerns that are basic issues to most couples. This questionnaire with the English and Chinese versions is presented separately in Appendix 8.

3.2.2.1.2 Kansas Marital Satisfaction Scale (KMSS)

KMSS was devised by Schumm, Scanlon, Crow, Green, and Buckler (Schumm et al. 1983). It comprises three evaluative-type questions including: “How satisfied are you with your marriage?”; “How satisfied are you with your husband/wife as a spouse?” and “How satisfied are you with your relationship with your husband/wife?”. Each item is assessed by a Likert-type method with seven response categories, a score ranging from 1-7, with 1 representing “Extremely Dissatisfied” and 7 representing “Extremely Satisfied.”. A score on the KMSS could range from 3-21 with higher scores representing greater satisfaction. Tests

found Cronbach's alpha for the KMSS was 0.84, test-retest reliability with 0.71 and good criterion validity (Schumm W.R. et al. 1985) , convergent validity (Calahan 1997) and discriminate validity (Crane, Kenneth, and Roy 2000). A total score of 17 or above indicates the individual or couple is non-distressed, but a score of 16 or lower indicates some degree of marital distress (Crane, Kenneth, and Roy 2000).

KMSS has been translated into Chinese with evidence of reliability and validity. Compared with the original KMSS's internal consistency of Cronbach's alpha=0.93, the Chinese version also had high internal consistency (Cronbach's alpha= 0.92) (Shek and Tsang 1993). The Chinese version of KMSS showed good concurrent validity (significant correlations with the DAS and its subscales) (Shek 1998). In the current study, the Chinese version of KMSS was used to assess the respondent's satisfaction with the spouse and the marital relationship. This scale is presented in Appendix 9.

3.2.2.1.3 Fertility Problem Inventory (FPI)

Newton, Sherrard, and Glavac (1999) (Newton, Sherrard, and Glavac 1999) devised FPI with a 46-item questionnaire, using a six-point Likert scale ranging from "strongly disagree=1" to "strongly agree=6" to indicate participants' agreement with each item. This questionnaire is used to evaluate infertility stress in the domains of social concern (10 items), sexual concern (8 items), relationship concern (10 items), need for parenthood (10 items), and rejection of childless lifestyle (8 items). Also, FPI provides a total score for rating the global stress by summing the five subscale scores; the higher the score, the higher the infertility stress. Specifically, FPI's criteria score for global stress is 117 ± 29.3 (Mean \pm SD) in males, and with 134.4 ± 33.8 (Mean \pm SD) in females. For males and females, if their global stress score is over this value respectively, they are considered to experience more psychological stress than the average value of individuals for infertility treatment.

The five subscales are:

- Social Concern: sensitivity to reminders, comments, questions about infertility, feelings of alienation or isolation from peers, family, finding social activities difficult.
- Sexual Concern: loss of enjoyment of sexual relations, feelings of pressure to schedule sex, loss of sexual self-esteem.

- Relationship Concern: problems in communicating openly or constructively about infertility, difficulty accepting gender differences, concerns about the future of the relationship.
- Rejection of Childfree Lifestyle: negative view of childfree lifestyle or status quo, and future happiness dependent on having a child.
- Need for Parenthood: close identification with the role of parent, parenthood primary or essential life goal.

Newton, Sherrard, and Glavac (1999) showed each of these five subscales was relatively homogenous, with moderate to high internal consistency reliability (Cronbach's alpha) in each subscale. The results indicated consistency reliability of social concern with 0.87, sexual concern with 0.77, relationship concern with 0.82, rejection of childfree lifestyle with 0.80, need for parenthood with 0.84, and global stress with 0.93. Also, FPI has high test-retest reliability (global stress was 0.83 for women and 0.84 for men). Discriminant validity was indicated as the subscales measuring separate items, with low to moderate inter-correlations (ranging from 0.26-0.66). Convergent validity was satisfactory by assessing correlations between the FPI and other measures (Beck Depression Inventory, and DAS) (Newton, Sherrard, and Glavac 1999) .

Although FPI has been translated into several languages and utilized in clinical settings (Sreshthaputra O., Sreshthaputra R. A., and Vutyavanich 2008; Gourounti, Anagnostopoulos, and Vaslamatzis 2011), there was no validated Chinese version. In order to test the reliability and validity in a Chinese context, a pilot study was conducted in the research setting. The findings demonstrated that the Chinese version was a reliable and valid instrument for use with infertile Chinese couples in clinical assessment. The results of testing the psychometric properties are presented in Paper 3, published in a peer-reviewed journal, and reproduced in this chapter. The instrument (English and Chinese versions) is presented separately in Appendix 10.

3.2.2.1.4 Multi-dimensional Sexuality Questionnaire (MSQ)

MSQ was designed to measure different psychological tendencies related to sexual relationships. Sixty items contain 12 five-item subscales of human sexuality:

- Sexual Esteem (positive evaluation of a person's ability to engage

sexually with others).

- Sexual Preoccupation (tendency to engage in sexual obsession).
- Internal Sexual Control (belief that a person's sexuality is in his/her control).
- Sexual Consciousness (engagement in reflection about one's sexuality).
- Sexual Motivation (desire to be involved in sexual relationships).
- Sexual Anxiety (feelings of discomfort or anxiety about sexuality).
- Sexual Assertiveness (a person's ability to be assertive about his/her sexuality).
- Sexual Depression (negative feelings sexual aspects of a person's life).
- External Sexual Control (belief that a person's sexuality is outside of his/her control).
- Self-monitoring (awareness of public's view of a person's sexuality).
- Fear of Sex (fear of sexual relationships).
- Sexual Satisfaction (feelings of satisfaction related to sexuality).

(Snell, Fisher, and Walters 1993).

The participant's response on each item is to be rated through a 5-point Likert-type scale, from 0 (not at all characteristic of me) to 4 (very characteristic of me). Due to each subscale being comprised of five items, scores can range from 0-20 for each subscale. Higher scores in the subscale indicate a higher psychosexual tendency (Snell, Fisher, and Walters 1993). Snell (1993) provided evidence that the MSQ has high internal consistency with Cronbach's alpha ranged from 0.71-0.94, with an average of 0.85; test-retest reliabilities ranged from 0.50-0.86 (an average of 0.87). Additionally, the MSQ has satisfactory results for convergent, concurrent and discriminate validity. MSQ, as a multidimensional measure associated with men's and women's sexual relation, has been proved to have valid psychometric properties in assessing sexual working model from psychological perspective, thus MSQ can be used to demonstrate research participants' response to their psychosexual relationships, it is also helpful for understanding different dimension of sexuality in infertile couples. However, until recently, no reported studies focus on sexuality issues by MSQ in infertility study. Considering the research's purpose and innovation, the MSQ considered the most

appropriate instrument for the study.

Though the original questionnaire has established reliability and validity, there is no evidence to prove it can be used in the Chinese language. Thus it was necessary to test reliability and validity before utilization in the current study. Considering MSQ's length and the current study's scope, only four of the 12 subscales were drawn from the original questionnaire as they were most relevant to the overall investigation of sexuality in the current study. The subscales were: sexual esteem, sexual consciousness, sexual motivation, and sexual satisfaction. A pilot study of the psychometric properties of the translated questionnaire was conducted. Results are presented in this chapter as Paper 4, published in a peer-reviewed journal.

The available evidence suggests the Chinese version of Multi-dimensional Sexuality Questionnaire with 4 subscales is reliable. The English and Chinese versions are presented in Appendices 11.

3.2.2.1.5 Pilot study

Given that FPI and MSQ are applicable and useful for the current study, and taking into account their wide adoption in research published in English due to their validation, it was necessary to transfer them to a Chinese context as research instruments, not merely for the present study, but also as a contribution to the available knowledge and resources in infertility and sexuality research. The development of the Chinese versions of the FPI and MSQ were in accordance with principles of self-administration questionnaires adopted in cross-cultural research (Beaton et al. 2000).

Two pilot studies on the adequacy and suitability of FPI and MSQ were conducted with a Chinese group. Their psychometric properties were examined, and the test results are presented in the following two papers published by peer-reviewed journals. The findings confirmed that the instruments were valid and reliable to use in a Chinese context.

3.2.2.1.5.1 Paper 3: Testing the psychometric properties of Mandarin version of the Fertility Problem Inventory (M-FPI) in an infertile Chinese sample

Peng Tao^{1,2}, Rosemary Coates², Yun Zhao³, Bruce Maycock⁴

¹ Research and Education Center in Sexual Health, Harbin Medical University, Harbin, China

² Department of Sexology, Curtin University, Perth, Australia

³ Department of Epidemiology and Biostatistics, Curtin University, Perth, Australia

⁴ Curtin Health Innovation Research Institute, Curtin University, Perth, Australia

Submitted: Feb. 9, 2011

Accepted: Sept. 2, 2011

Published: Journal of Psychosomatic Obstetrics & Gynecology, 2011; 32(4):
173–181

Contributions: The present manuscript was compiled and written in full by the candidate of this thesis with suggestions and thorough proofreading by the co-authors.

ABSTRACT

The Fertility Problem Inventory (FPI) is an instrument to measure infertility-related stress, and has been widely used in a range of clinical settings. It has been translated into several languages, however there is no validated Mandarin version. The present study tests the psychometric properties of the Mandarin version of FPI (M-FPI). A hospital sample of 223 infertile Chinese couples (223 men and 223 women) completed the M-FPI along with other measures including demographics, Hospital Anxiety and Depression Scale, and Marlowe – Crowne Social Desirability Scale, which were used to assess the reliability and validity of the Mandarin version of FPI. Results showed that the M-FPI was best reduced to a five– factor solution, and all 46 items of the M-FPI showed moderate to high internal consistency. In addition, the test of convergent and discriminant validity from this study indicated satisfactory results. These results indicate that the M-FPI as an instrument is reliable and valid for use with infertile Chinese couples in clinical assessment.

Keywords: Fertility problem inventory, validity, reliability, infertile chinese couple

Introduction

Infertility is medically defined as the inability to conceive after a year or more of regular, unprotected sexual intercourse, generally one in ten couples experiences primary or secondary infertility [1]. In China, 9% of couples do not have a fertile pregnancy after 12 months of consistent trying, however it is confounded since the one child policy means less weight is given to secondary infertility in Chinese studies [2].

For many couples, infertility is a stressful experience, accompanied by various stressors such as disruptions in personal life, in the emotional and sexual relationship, and in social relationships with others [3]. Studies report the consequence of infertility can lead to mental health problems such as depression, anxiety, guilt, social isolation, decreased sexual esteem and sexual satisfaction in both men and women [4-7], which often results in lower quality of life, marital conflicts and medical treatment [8-11]. Previous infertility studies have used general questionnaires referring to anxiety and depression [4,12-16], however, these instruments may not capture specific issues related to infertility and thus have decreased sensitivity in assessing patients' different reactions caused by infertility due to their mainly focusing on emotional consequence, not referring to other changing caused by infertility. Although other questionnaires, such as the Infertility Self-Efficacy scale [17], Infertility Reaction Scale [18] and Coping Scale for Infertile Couples [19], are specifically designed for infertility, they cannot effectively characterize the multidimensional nature of infertility-stress due to their psychometric purpose and specific contents with uni-dimension, also Infertility Reaction Scale does not have evidence of reliability or validity [20]. Thus, it is crucial that the infertility-related stress should be assessed by using validated multidimensional instrument, which can be helpful for providing the effective strategies and interventions in couple's experiencing infertility by combining with evaluation of full spectrum of stressors associated with infertility. The Fertility Problem Inventory (FPI) [21] is an instrument to measure infertility-related stress and infertility-related problems in five dimensions (social concern, sexual concern, relationship concern, need for parenthood, and rejection of childfree lifestyle). As a validated instrument, FPI has been widely used in a range of clinical settings, and provides more meaningful results about infertility-related stress and its effect [11, 22-24].

In Chinese society, conception and childbearing are important issues and having children is still emphasized as the most important function of marriage [25], hence infertility as a research topic needs a reliable and valid instrument to examine the main problems linked with infertility. However, there are no validated Chinese instruments measuring infertility and no well-established inventory of stress linked with infertility. As such, the present study is to explore the possibility that the translated FPI could be used in Chinese culture, and to examine its psychometric properties among a hospital sample of infertile Chinese couples. The results of this study will be useful to clinical professionals, sexologists, psychologists, family therapists and social workers, who frequently work with infertile couples in clinical treatment, counseling and family therapy.

Methods

The study was approved by Human Research Ethics Committee of Curtin University (Perth, Australia) and the Ethical Committee of the First Clinical College of Harbin Medical University (China), all participants gave written consent, and were made aware of the voluntary nature of their participation and their right to discontinue participation at any time with no negative consequences to them. In addition, they were informed about the purpose of the study, and that the survey was confidential and anonymous.

Describing FPI

The FPI as valid and reliable instrument is a 46-item self-administered and multidimensional measure, which includes 5-subscales such as social concern (10 items), sexual concern (8 items), relationship concern (10 items), need for parenthood (10 items), and rejection of childless lifestyle (8 items) [21]. Respondents are asked to indicate their degree of agreement with each item using a six-point Likert scale ranging from 1 being rated as strongly disagree to 6 being rated as strongly agree. Among these 46 items, 18 items are reverse-scored. A global measure of perceived infertility-related stress is calculated by summing all five scales' score, where the higher the score, the higher the fertility-related stress.

Translation procedure

The Mandarin version of the FPI was developed according to the standard of back-translation techniques [26]. Firstly, after obtaining approval from Dr. Newton (the author of FPI), the FPI was translated into Mandarin by one researcher (native speaker of Mandarin). Subsequently it was back-translated into English by an

independent translator unaffiliated with the study. In order to ensure the Mandarin version was accurate in literal meaning and its conceptual structure was equivalent to the original version, Dr. Newton compared the back-translation with the original questionnaire and checked for any discrepancies.

After a preliminary translation of the FPI had been agreed upon, it was administered to 10 infertile couples by a nurse from the infertility clinic, who discussed any questions and ambiguities with the participants after their completion of the M-FPI. Using their feedback and comments on the M-FPI, some ambiguities in the text were modified, and then the M-FPI was checked by a qualified Chinese-language teacher again to ensure its appropriate comprehensiveness and to avoid any grammar mistakes.

Other measuring instruments

Demographics

All participants were asked to provide demographic information such as age, sex, educational level, economical level, also including the type of infertility.

Hospital anxiety and depression scale (HADS)

For the purpose of establishing the convergent validity of M-FPI, the correlation between M-FPI and HADS (Hospital Anxiety and Depression Scale) is considered. The reason of selecting this measure is its theoretical correlation with M-FPI based on infertility-related distress potentially leading to more generalized distress (anxiety and depression) [27-33].

HADS [34] is designed as a reliable instrument for screening for clinically significant anxiety and depression in patients attending a general medical clinic. It contains 7 items for depression and another 7 items for anxiety. The instrument is rated on four-point (0–3) scales. Among these 14 items, 6 items are reverse-scored. In this study, the Mandarin version of HADS is used, which has previously been tested in psychometrics and found to be a valid instrument [35].

Marlowe–Crowne social desirability scale

Social desirability means the tendency to present oneself in a socially desirable light, as opposed to being truthful in one's responses, which is a potential confounder in many studies involving report of sensitive behaviors [36]. Some research indicated social desirability can be used as the standard measure to control whether questionnaire responses are biased by desirable responding by comparing the correlations between social desirability response tendencies and the score of focal

scales. If the correlations is not substantial, the discriminant validity of focal scales is proved to be satisfactory [37-40].

In this study, a Chinese language short form of the Marlowe – Crowne social desirability scale [41] was used to check the discriminant validity of the M-FPI. It comprises 14 statements to which participants response ‘Yes’ or ‘No’ as it applies to themselves. Among these 14 items, 4 items are scored with one point each if answered in the affirmative, and the remaining items are scored with one point each if answered in the negative. The total score is calculated by summing all these 14 items’ score, a higher total score indicates a higher tendency in social desirability.

Participants and testing

All participants were recruited from the IVF center of the First Affiliated Hospital of Harbin Medical University, which is the first institution authorized by National Health Ministry for infertility treatment with IVF or other assisted reproductive technology in Hei Longjiang province, China.

The criteria for participation was: (1) Heterosexual couples who live together at all times, with no children, but have desire for a child. (2) Each one of the couple had at least 6 years of education (finishing primary school education) and diagnosed with primary infertility. (3) Neither one of the couple had any illness that directly impacted on infertility. (4) The couple were referred for, but had not yet begun IVF or other assisted reproductive technology treatment.

As the experience of infertility is a shared problem between members of a couple [24], the study took the infertile couple as research unit. During the recruitment period (from January 2010 to July 2010), a convenience sample of 252 infertile couples (252 males, 252 females) were invited to complete the survey. Of these, 223 couples (223 males, 223 females) provided effective responses. As the research unit comprised couples, we collected the data from the couples for the final analysis. If one or both partners refused participation they were to be categorized as non-respondents and were not included in the final data. Ultimately 29 infertile couples were excluded. This comprised 15 couples with 15 females not-responding, 9 couples with 9 males not-responding, and 5 couples with no-response from either partner. All participants were interviewed separately.

Analyses of data

To validate the Mandarin version of the Fertility Problem Inventory (M-FPI) in this study, the factor structure was tested by the method of a principal component

analysis, the internal consistent reliability was examined using Cronbach's alpha coefficient and the study also assessed whether each of five subscales from M-FPI represented a unique dimension. In addition, the convergent validity was tested by Pearson correlation coefficients between the M-FPI scores and the HADS. Moreover, the discriminant validity of the M-FPI was assessed as to whether the subscale of M-FPI was sensitive to differences in demographics, type of infertility and social desirability.

The Statistical Package for Social Sciences (SPSS: Version 17) was used for all of data analyses. A *p* value less than 0.05 was considered statistically significant through the analysis of the present study.

Results

Subjects' characteristics

A total of 223 infertile couples (223 males, 223 females) were asked about their age, education level, monthly family income and type of infertility by demographic questionnaire, their main characteristics were described in Table I.

Table I. Demographic characteristics of the research participants (N = 223 couples)

Characteristics	Value
Age in years [Mean \pm SD/(minimum–maximum)]	
Males	30.72 \pm 4.58 (23–49)
Females	29.33 \pm 4.48 (21–46)
Male educational level [<i>n</i> (%)]	
Junior middle school education	95 (42.60%)
Senior school education	46 (20.63%)
College education	47 (21.07%)
Beyond college education	35 (15.70%)
Female educational level [<i>n</i> (%)]	
Junior middle school	117 (52.47%)
Senior school education	45 (20.18%)
College education	30 (13.45%)
Beyond college	31 (13.90%)
Monthly family income [<i>n</i> (%)]	
<2000 CNY	68 (30.49%)
2000–3000 CNY	55 (24.66%)
>3000 CNY	100 (44.85%)
Infertility category [<i>n</i> (%)]	
Male factor	51 (22.87%)
Female factor	73 (32.74%)
Combined male and female factor	57 (25.56%)
Unexplained	42 (18.83%)

Factor structure analysis

Factor structure is verified by factor analysis, aiming to identify a small number of factors that explain most of the variance observed in a much larger number of manifest variables, a principal component analysis with a varimax rotation is most frequently reported factoring method. Criteria for extraction included: (1) Eigenvalues greater than 1.0, (2) Cattell's scree test, (3) the percentage of total variance explained at least 5% by each factor, and (4) factor loading (>0.3) above for each item which was loaded on each factor[42,43].

In this study, before the factor structure analysis was conducted, the factorability was assessed by the Kaiser–Meyer–Olkin (KMO) and Bartlett's test of sphericity. The KMO measure in this study was greater than 0.6 (KMO = 0.78), suggesting that the data were adequate for the factor analysis. The Bartlett test of sphericity was significant ($p < 0.05$), which indicated that the set of correlations in the correlation matrix was significantly different from zero, hence demonstrating the existing common factors and being suitable for factor analysis[44,45].

Responses to the 46-item were evaluated using a principal component analysis with a varimax rotation. The results showed all extraction communalities were in the moderate or high ranges 0.48 – 0.70, and 14 factors with an Eigenvalue greater than one, accounting for 57.65% total variance. However, when many variables are being factors analyzed, some unimportant factors will be associated with Eigenvalues as large as 1.0, thus it is necessary to decide how many factors should be retained for rotation by visually inspecting the scree plot, considering Eigenvalues, and balancing parsimony and plausibility [46-48]. The result suggested a five to six factor solution due to an elbow at the five to six factor level. Subsequently, a principal axis factoring with a forced six factor was conducted. The results showed the six factor solution explained 28.45% of the total variance. However, the examination of item loadings on these factors indicated that the sixth factor only with three items was not possible as an independent factor. After administering the extraction of principal components with five factors and varimax rotation, the results showed these five factors explained 34.267% of the total variance, and the five factors individually accounted for 7.67%, 6.70%, 6.68%, 6.60% and 6.37% of the variance, evenly distributed in the rotated solution. Forty-six items were assigned to different factors based on the factor loading. All of these five factors were meaningful due to their attribution in explaining at least 5% of the total variance [49]. Table II presents the factor analysis

for the M-FPI (M-FPI), along with factor loading (>0.30) for each item which was loaded on each factor.

Table II. Factor structure and loadings of the items of the M-FPI ($N = 446$)

Factor structure	Loading
Factor 1 Social concern (10 Items)	
40. When I see families with children I feel left out.	.680
30. I can't help comparing myself with friends who have children.	.604
39. I find it hard to spent time with friends who have young children.	.570
12. Family don't seem to treat us any differently.	.507
9. It doesn't bother me when I'm asked questions about children.	.423
43. I feel like friends or family are leaving us behind.	.403
14. The holidays are especially difficult for me.	.393
44. It doesn't bother me when others talk about their children.	.379
27. Family get-togethers are especially difficult for me.	.373
35. I still have lots in common with friends who have children.	.360
Factor 2 Relationship concern (10 Items)	
21. It bothers me that my partner reacts differently to the problem.	.592
36. When we try to talk about our fertility problems, it seems to lead to an argument.	.591
11. I can't show my partner how I feel because it will make him/her feel upset.	.497
16. My partner doesn't understand the way the fertility problem affects me.	.488
24. My partner is quite disappointed with me.	.435
18. My partner and I work well together handling questions about our infertility.	.402
46. When we talk about our fertility problem, my partner seems comforted by my comments.	.353
45. Because of infertility, I worry that my partner and I are drifting apart.	.339
33. I can't imagine us ever separating because of this.	.326
26. My partner and I could talk more openly with each other about our fertility problem.	.309
Factor 3 Need for parenthood (10 Items)	
23. Having a child is not the major focus of my life.	.571
10. A future without a child would frighten me.	.493
42. I will do just about anything to have a child.	.448
2. Pregnancy and childbirth are the two most important events in a couple's relationship.	.426
29. I have often felt that I was born to be a parent.	.411
19. I feel empty because of our fertility problem.	.390
8. It's hard to feel like a true adult until you have a child.	.387
5. For me, being a parent is a more important goal than having a satisfying career	.366
34. As long as I can remember, I've wanted to be a parent.	.304
6. My marriage needs a child.	.301
Factor 4 Rejection of childfree lifestyle (8 Items)	
41. There is a certain freedom without children that appeals to me.	.588
28. Not having a child would allow me time to do other satisfying things.	.561
20. I could visualize a happy life together, without a child.	.546
31. Having a child is not necessary for my happiness.	.508
15. I could see a number of advantages if we didn't have a child.	.494
25. At times, I seriously wonder if I want a child.	.461
1. Couples without a child are just as happy as those with children.	.370
38. We could have a long, happy relationship without a child.	.367

Table II. Factor structure and loadings of the items of the M-FPI (N = 446)[continued]

Factor structure	Loading
Factor 5 Sexual concern (8 Items)	
17. During sex, all I can think about is wanting a child.	.496
3. I find I've lost my enjoyment of sex because of the fertility problem.	.488
7. I don't feel any different from other members of my sex.	.463
4. I feel just as attractive to my partner as before.	.415
13. I feel like I've failed at sex.	.404
22. Having sex is difficult because I don't want another disappointment.	.393
37. Sometimes I feel so much pressure, that having sex becomes difficult.	.372
32. If we miss a critical day to have sex, I can feel quite angry.	.303

Note: Items loaded greater than 0.3 are shown on their assigned factor separately.

As shown, the first factor extracted was described as Social concern (10 items), the second factor was Relationship concern (10 items), the third was Need for parenthood (10 items), the fourth was Rejection of childfree lifestyle (8 Items), and the fifth factor was Sexual concern (8 Items).

Reliability

Cronbach alpha coefficient, a measure of the average correlation of items within a scale, is a statistic commonly used to assess internal reliability [43]. Cronbach's α ranges from 0 to 1, with higher scores suggesting good internal consistency, and the accepted minimal standard for internal consistency is 0.65 [50]. In this study, the internal consistency of the five subscales of M-FPI was determined by calculating Cronbach alpha coefficients.

These coefficients, presented in Table III, were computed for each of the five subscales for women and men separately and together. Each coefficient was based on different subscales which were based on the factor analysis results. For the social concern subscale, the alpha for men was 0.73, for women was 0.74, and for the combined alpha was 0.74. The alphas for relationship concern were: 0.72 for men, 0.68 for women and 0.70 for all subjects. The alphas for the need for parenthood subscale were: 0.76 for men, 0.73 for women and 0.75 for all subjects. The alphas for the rejection of childfree lifestyle subscale were: 0.74 for men, 0.69 for women and 0.71 for all subjects. The alphas for the sexual concern subscale were: 0.71 for men, 0.70 for women and 0.71 for all subjects. The alphas for the global stress were: 0.81 for men, 0.81 for women and 0.81 for all subjects. All of these five derived subscales showed moderate to high reliability (internal consistency), this suggested that each of the five subscales was composed of a relatively homogeneous set of items.

Table III. Cronbach alpha coefficients on the M-FPI

Subscales of M-FPI	Combined(n=446)	Men(N=223)	Women(N=223)
Social concern	0.74	0.73	0.74
Relationship concern	0.70	0.72	0.68
Need for parenthood	0.75	0.76	0.73
Rejection of childfree lifestyle	0.71	0.74	0.69
Sexual concern	0.71	0.71	0.70
Global stress	0.81	0.81	0.81

Convergent validity

Convergent validity can provide an indication that the instrument is related to that to which theoretically be related [50]. In this study, convergent validity of the M-FPI was evaluated by Pearson's correlation coefficients between the M-FPI and HADS (Hospital Anxiety and Depression Scale) for all subjects and also for each gender group, all of these correlations were statistically significant ($p < 0.05$).

In addition, all Pearson correlation coefficients presented the expected direction, indicating higher scores of Social concern, Relationship concern, Need for parenthood, Rejection of childfree lifestyle and Sexual concern were significantly associated with higher scores of anxiety and depression. In addition, the Global stress was also found positively significant correlated with anxiety and depression. The significant correlations of the M-FPI with measures of anxiety and depression provided evidence of convergent validity (see Table IV).

Table IV. Correlation between the Fertility Problem Inventory scale scores and measures of depression and anxiety

Subscales of M-FPI	Depression			Anxiety		
	Combined (N=446)	Men (N=223)	Women (N=223)	Combined (n=446)	Men (N=223)	Women (N=223)
Social concern	.14**	.15*	.16*	.16**	.18**	.16*
Relationship concern	.17**	.13*	.26**	.26**	.21**	.33**
Need for parenthood	.23**	.25**	.24**	.23**	.33**	.13*
Rejection of childfree lifestyle	.27**	.31**	.22**	.24**	.32**	.14*
Sexual concern	.20**	.13*	.32**	.16**	.14*	.21**
Global stress	.34**	.34**	.39*	.36**	.41**	.33**

** Correlation is significant at the 0.01 level. * Correlation is significant at the 0.05 level.

Discriminty validity

In order to check whether each of five subscales from M-FPI represents a unique dimension, intercorrelations among the M-FPI were tested. Table V shows there was no significant correlation between Relationship concern and both Need

for parenthood ($p=0.140$) and Rejection of childfree lifestyle ($p=0.872$). It also indicates Sexual concern was not significantly related with Need for parenthood ($p=0.066$), non with Rejection of childfree lifestyle ($p=0.295$). The intercorrelation of other subscales was statistically significant but the strength were weak (correlation coefficient ranged from 0.20 to 0.46, see in Table V). Based on these findings, these five subscales of M-FPI were almost independent and separated in the assessment of infertility-related stress. On the other hand, every subscale was moderate to strong correlated with the Global stress (correlation coefficient ranged from 0.51 to 0.69, see in Table V). In addition, The results in Table V showed correlations between the derived subscales of M-FPI scores and social disability was no significant ($p > 0.05$).

Table V. Subscales intercorrelations among and between the M-FPI and social desirability scale

	Social concern	Relationship concern	Need for parenthood	Rejection of childfree lifestyle	Sexual concern	Global stress
Social concern	1					
Relationship concern	0.23**	1				
Need for parenthood	0.27**	0.07**	1			
Rejection of childfree lifestyle	0.20**	-0.01	0.32	1		
Sexual concern	0.25**	0.46**	0.09	-0.05	1	
Global stress	0.69**	0.59**	0.62**	0.51**	0.52**	1
Social desirability	-0.09	-0.02	-0.01	0.07	0.06	-0.01

Influence of demographic characteristics

Using ANOVA tests, Table VI presented comparative results of the M-FPI (Mean \pm SD) by gender, age group, educational level, economical level, and type of infertility. Female rated social concern ($M=36.15$; $F=4.92$, $p<0.05$); relationship concern ($M=31.02$; $F=3.91$, $p<0.05$); and global stress ($M=157.86$; $F=6.12$, $p<0.05$) higher than male. In terms of age, the difference of sexual concern was statistically significant ($F=3.18$, $p<0.05$) among different age group, sexual concern rated by the age group of 21–25 years ($M=19.35$) was the highest as compared to the age group of 26–30 years ($M=18.57$), 36 years and older ($M=18.09$), and 31–35 years ($M=17.21$) separately, in addition, the age group of 21–25 years scored the highest ($M=160.49$) in the global stress, with statistically significant ($F=3.73$, $p<0.05$). No differences emerged between the different education level in the 5-subscale of M-FPI, but the difference in global stress was

statistically significant ($F = 2.92, p < 0.05$), and rated the highest ($M = 157.63$) by the participants with senior education level. No differences emerged between the different economical level in the 5-subcales of M-FPI, also in the global stress. Finally, the results indicated the difference was statistically significant ($F = 4.35, p < 0.05$), in sexual concern between the different type of infertility with different cause, the participants from infertile couples with female factor scored significantly highest ($M = 18.91$).

Table VI. Differences in the M-FPI by gender, age group, educational level, economical level, and type of infertility

	Social concern	Relationship concern	Need for parenthood	Rejection of childfree life style	Sexual concern	Global stress
Gender						
Male	34.52 ± 7.83	29.58 ± 7.44	37.39 ± 7.67	33.78 ± 7.01	17.87 ± 5.12	153.14 ± 20.56
Female	36.15 ± 7.66	31.02 ± 7.08	38.46 ± 7.15	33.58 ± 6.43	18.72 ± 4.73	157.86 ± 19.73
F	4.92*	3.91*	2.33	0.09	3.33	6.12*
Age group						
21–25 years	36.10 ± 6.87	31.56 ± 6.22	38.65 ± 7.33	34.83 ± 6.95	19.35 ± 4.78	160.49 ± 18.94
26–30 years	35.57 ± 7.58	30.20 ± 6.94	38.22 ± 7.40	33.91 ± 7.03	18.57 ± 4.84	156.47 ± 20.71
31–35 years	34.12 ± 8.57	29.81 ± 8.36	36.71 ± 7.47	32.90 ± 6.37	17.21 ± 4.97	150.75 ± 19.54
36 years and older	35.98 ± 7.82	29.80 ± 7.62	38.40 ± 7.45	32.93 ± 5.79	18.09 ± 5.18	155.20 ± 20.19
F	1.33	.97	1.42	1.51	3.18*	3.73*
Educational level						
Junior middle school education	34.96 ± 7.55	30.82 ± 6.86	38.72 ± 7.34	33.84 ± 7.00	18.70 ± 4.54	157.03 ± 19.78
Senior school education	36.79 ± 7.87	30.48 ± 7.18	37.51 ± 7.33	34.23 ± 6.50	18.63 ± 4.93	157.63 ± 19.12
College education	34.87 ± 7.64	28.78 ± 8.18	36.12 ± 7.94	32.96 ± 6.74	17.01 ± 5.78	149.74 ± 23.37
Beyond college education	35.11 ± 8.45	29.94 ± 7.74	38.06 ± 6.92	33.25 ± 6.11	18.01 ± 4.98	154.37 ± 18.50
F	1.34	1.53	2.47	.63	2.43	2.92*
Economical level						
<2,000 CNY	34.31 ± 7.47	30.15 ± 7.25	37.87 ± 8.14	33.14 ± 7.08	17.92 ± 5.02	153.39 ± 21.02
2,000–3,000 CNY	36.12 ± 7.91	30.35 ± 6.96	38.03 ± 7.34	34.18 ± 6.85	18.50 ± 4.93	157.17 ± 19.92
>3,000 CNY	35.21 ± 7.85	30.27 ± 8.02	37.82 ± 6.65	33.46 ± 5.98	18.39 ± 4.89	155.14 ± 19.84
F	1.84	0.41	0.09	0.86	0.81	1.48
Type of infertility						
Male factor	35.51 ± 8.00	28.79 ± 7.36	38.54 ± 7.99	32.59 ± 7.53	16.80 ± 4.85	152.24 ± 20.65
Female factor	35.15 ± 8.30	30.48 ± 8.03	37.51 ± 7.45	34.26 ± 6.76	18.91 ± 5.44	156.33 ± 21.33
Combined factors	35.54 ± 7.48	31.11 ± 6.89	38.45 ± 6.80	33.28 ± 6.02	18.40 ± 4.81	156.78 ± 19.31
Unexplained	35.18 ± 7.09	30.54 ± 6.29	37.19 ± 7.49	34.53 ± 6.42	18.87 ± 3.92	156.31 ± 19.05
F	0.083	1.98	0.843	1.86	4.35*	1.16

* $p < 0.05$.

Discussion

In this study, the 5-factor solution of M-FPI was derived, which were social concern, sexual concern, relationship concern, need for parenthood, and rejection of childless lifestyle. The items of the 5-subcales of the M-FPI presented satisfactory factorial loads (varying from 0.301 to 0.680). This contrasted with a Greek language study by Gourounti, in which the factor structure of FPI, suggested a 4-factor solution, Spousal concern, Social concern, Need for parenthood and Rejection of childfree lifestyle [51]. In addition, another study that validated FPI in Portuguese presented several items which were not retained in confirmatory analysis, but the five original domains were maintained with good reliability indexes [52]. However, the factorial result in our study was similar with that indicated in the original English version of FPI, which was confirmed by literature and tested in psychometric properties with satisfactory reliability and validity [21, 22].

In our study, the Cronbach's alpha coefficients of these five subscales were Social concern with 0.74, Sexual concern with 0.71, Relationship concern with 0.70, Rejection of childfree lifestyle with 0.71, and Need for parenthood with 0.75. Though the results of Cronbach's alpha coefficients (range: 0.70–0.75) was not high compared with those of the original FPI (range: 0.77–0.87) [21], the reliability still showed the five derived subscales have moderate to high reliability, with each of the five subscales composed of a relatively homogeneous set of items. Our findings revealed Cronbach's alpha coefficients were large enough to suggest the five subscales have relatively high internal consistency based on the requirement of Cronbach's alpha coefficient for the validated instrument [50].

Regarding the convergent validity, which was tested by using correlations of the M-FPI with HADS measuring depression and anxiety, the results indicated that all observed correlations were in the expected direction and statistically significant (most of p value were less than 0.01). As for the lower correlations between subscales of M-FPI and HADS (anxiety and depression), it may be influenced by the participants' characteristics who were just referred for IVF, but had not yet begun the related treatment, without experiencing more distress than those infertile couples in the period of treatment, also the infertile couple's coping with infertility could be as mediator influencing their distress [13, 53, 54]. On the other hand, in our study HADS was used in measuring anxiety and depression, which was different from State-Trait Anxiety, Beck Depression Inventory, or Center for Epidemiologic Studies

Depression Scale (CES-D) in other validated study of FPI for the correlation analysis between infertility-related stress and anxiety, depression [21,51]. However, we made further consideration whether the global stress (the total score of the 5-subcales) makes sense at all. The results of Pearson correlation coefficients indicated that the global stress correlated moderately ($r > 0.3$) with anxiety and depression, though there are low correlation between subscales, the global stress leveled the result. However, at least the results provided the evidence of M-FPI's correlation with other measures theoretically predicted.

Discriminant validity was tested by the assessment of the intercorrelations among the derived five subscales, even though some of them were significant, low to moderate degree of correlation (range: 0.20–0.46) were found between some subscale pairs, each of five subscales from M-FPI was proved to be a unique dimension. This results was similar to that of original FPI (range: 0.26–0.66) [21], and suggested each subscale of M-FPI can measure dimensions of infertility-related stress separately. Also, the correlation between the M-FPI and social desirability was no significant. After checking the demographics' influence on the M-FPI, the study found there were no significant difference in both education level and economical level, both social concern and relationship concern only showed difference in gender, and sexual concern was rated differently in different age and type of infertility. Thus, the results suggested that the M-FPI achieved discriminant validity.

There were some limitations in this study, such as non application of the test-retest with the M-FPI, which has made it impossible to evaluate the temporal stability of the M-FPI. Data collection was restricted in the clinical context, not including infertile couples in community after finishing treatment, so the results were not generalizable or necessarily representative for infertile couples from the general community. Moreover, the study did not compare the subscales score of the M-FPI between infertile and fertile couple, which aimed to test the discriminant validity of M-FPI. In addition, all the participants in the study were recruited as a convenience sample and were limited to Chinese-speaking patients from Hei Longjiang Province which is inhabited by a relatively larger proportion of lower socio-economic class families. It seems that for a more comprehensive evaluation of the applicability of the M-FPI in Chinese societies, studies with larger samples on different Chinese populations are needed in future.

Conclusion

To our knowledge, this is the first study that has validated a self-report FPI in Chinese language. More importantly, the study was not reliance on the individual to investigate the stress related to infertility, but took the infertile couple as research unit based on a dyadic perspective, which could be helpful for probing into psychological consequence caused by infertility and for better analysis of validating the M-FPI.

The results of study prove the M-FPI is a reliable and valid instrument with satisfactory psychometric properties, and can be used effectively with infertile Chinese couples.

Acknowledgments

We greatly appreciate Dr. Newton's approval of using Fertility Problem Inventory and contribution in 'back of translation' verification of the questionnaire. We also would like to thank the staff of IVF center at the First Hospital of Harbin Medical University, for their help in recruiting the study subjects. We also thank all the participants in this study.

Declaration of interest: The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

Current knowledge on this subject

- Up to now, no specific inventory linked with infertility-related stress is found to be used in Chinese context.
- Although the Fertility Problem Inventory (FPI) had been validated in several languages and used in some countries, it had not been validated in a Chinese context.

What this study adds

- The study takes the infertile couple as research unit, this is different from previous studies.
- Findings of the study validate the Mandarin version of the Fertility Problem Inventory (M-FPI) with satisfactory psychometric properties, which is recommended for use in infertile Chinese couples.
- The development of the M-FPI may enrich future research on infertility in Chinese context, also including cross-culture research.

References

1. Effy Vayena, Patrick Rowe, David Griffin, Paul Van Look, Tomris Tü,rmen. Forward. In: Vayena E, Rowe PJ, Griffin PD, editors. Current practices and controversies in assisted reproduction: Report of a WHO meeting. Geneva, Switzerland: 2001.
2. Che Y, Cleland J. Infertility in Shanghai: prevalence, treatment seeking and impact. *J Obstet Gynaecol* 2002; 22:643–648.
3. Peterson BD, Pirritano M, Christensen U, Schmidt L. The impact of partner coping in couples experiencing infertility. *Hum Reprod* 2008; 23:1128–1137.
4. Laffont I, Edelmann RJ. Psychological aspects of *in vitro* fertilization: a gender comparison. *J Psychosom Obstet Gynaecol* 1994; 15:85–92.
5. Eugster A, Vingerhoets AJ. Psychological aspects of *in vitro* fertilization: a review. *Soc Sci Med* 1999; 48:575–589.
6. Lukse MP, Vacc NA. Grief, depression, and coping in women undergoing infertility treatment. *Obstet Gynecol* 1999; 93:245–251.
7. Verhaak CM, Smeenk JM, Evers AW, Kremer JA, Kraaimaat FW, Braat DD. Women's emotional adjustment to IVF: a systematic review of 25 years of research. *Hum Reprod Update* 2007;13: 27–36.
8. El-Messidi A, Al-Fozan H, Lin Tan S, Farag R, Tulandi T. Effects of repeated treatment failure on the quality of life of couples with infertility. *J Obstet Gynaecol Can* 2004; 26:333–336.
9. Monga M, Alexandrescu B, Katz SE, Stein M, Ganiats T. Impact of infertility on quality of life, marital adjustment, and sexual function. *Urology* 2004; 63:126–130.
10. Cwikel J, Gidron Y, Sheiner E. Psychological interactions with infertility among women. *Eur J Obstet Gynecol Reprod Biol* 2004; 117: 126–131.
11. Cooper BC, Gerber JR, McGettrick AL, Johnson JV. Perceived infertility-related stress correlates with *in vitro* fertilization outcome. *Fertil Steril* 2007; 88:714–717.
12. Sherrod RA. Understanding the emotional aspects of infertility: implications for nursing practice. *J Psychosoc Nurs Ment Health Serv* 2004; 42:40–47.
13. Pook M, Krause W. The impact of treatment experiences on the course of infertility distress in male patients. *Hum Reprod* 2005; 20:825–828.
14. Pook M, Krause W. Stress reduction in male infertility patients: a randomized, controlled trial. *Fertil Steril* 2005; 83:68–73.
15. Fido A. Emotional distress in infertile women in Kuwait. *Int J Fertil Womens Med* 2004;49:24–28.
16. Dyer SJ, Abrahams N, Mokoena NE, Lombard CJ, van der Spuy ZM. Psychological distress among women suffering from couple infertility in South Africa: a quantitative assessment. *Hum Reprod* 2005; 20:1938–1943.
17. Cousineau TM, Green TC, Corsini EA, Barnard T, Seibring AR, Domar AD. Development

- and validation of the Infertility Self-Efficacy scale. *Fertil Steril* 2006; 85:1684–1696.
18. Collins A, Freeman EW, Boxer AS, Tureck R. Perceptions of infertility and treatment stress in females as compared with males entering *in vitro* fertilization treatment. *Fertil Steril* 1992; 57:350–356.
 19. Lee TY, Sun GH, Chao SC, Chen CC. Development of the coping scale for infertile couples. *Arch Androl* 2000; 45:149–154.
 20. Saito Y, Matsuo H. Trial development of the Cognitive Appraisal Scale for Infertility (CASI) (version 1). *Fertil Steril* 2009; 91:2596–2601.
 21. Newton CR, Sherrard W, Glavac I. The Fertility Problem Inventory: measuring perceived infertility-related stress. *Fertil Steril* 1999; 72: 54–62.
 22. Sreshthaputra O, Sreshthaputra RA, Vutyavanich T. Gender differences in infertility-related stress and the relationship between stress and social support in Thai infertile couples. *J Med Assoc Thai* 2008; 91:1769–1773.
 23. Boivin J, Schmidt L. Infertility-related stress in men and women predicts treatment outcome 1 year later. *Fertil Steril* 2005; 83:1745–1752.
 24. Peterson BD, Newton CR, Rosen KH. Examining congruence between partners' perceived infertility-related stress and its relationship to marital adjustment and depression in infertile couples. *Fam Process* 2003; 42:59–70.
 25. Lee SH, Kuo BJ. Chinese traditional childbearing attitudes and infertile couples in Taiwan. *J Nurs Scholarsh* 2000; 32: 54.
 26. Behling O, Lae KS. Translating questionnaires and other research instruments: problems and solutions. In: series Editor, editor.: Thousand Oaks, CA: Sage Publications Inc; 2002. pp 63.
 27. Slade P, O'Neill C, Simpson AJ, Lashen H. The relationship between perceived stigma, disclosure patterns, support and distress in new attendees at an infertility clinic. *Hum Reprod* 2007; 22:2309–2317.
 28. Aarts JW, van Empel IW, Boivin J, Nelen WL, Kremer JA, Verhaak CM. Relationship between quality of life and distress in infertility: a validation study of the Dutch FertiQoL. *Hum Reprod* 2011; 26:1112–1118.
 29. Boivin J, Griffiths E, Venetis CA. Emotional distress in infertile women and failure of assisted reproductive technologies: meta-analysis of prospective psychosocial studies. *BMJ* 2011; 342:d223.
 30. Klemetti R, Raitanen J, Sihvo S, Saarni S, Koponen P. Infertility, mental disorders and well-being—a nationwide survey. *Acta Obstet Gynecol Scand* 2010; 89:677–682.
 31. Damti OB, Sarid O, Sheiner E, Zilberstein T, Cwikel J. [Stress and distress in infertility among women]. *Harefuah* 2008; 147:256–60, 276.
 32. van Rooij FB, Van Balen F, Hermanns JM. Emotional distress and infertility: Turkish migrant couples compared to Dutch couples and couples in Western Turkey. *J Psychosom*

- Obstet Gynaecol 2007; 28:87–95.
33. Gulseren L, Cetinay P, Tokatlioglu B, Sarikaya OO, Gulseren S, Kurt S. Depression and anxiety levels in infertile Turkish women. *J Reprod Med* 2006; 51:421–426.
 34. Zigmond A, R. S. The hospital anxiety and depression Scale. *Acta Psychiatrica Scandinavica* 1983; 67:361–70.
 35. Zheng Leilei, Wang Yeling, Li Huichun. Application of Hospital Anxiety and Depression Scale in general hospital: an analysis in reliability and validity. *ShangHai Archive of Psychiatry* 2003; 15:264–6.
 36. Brody S. Body mass index but not pulse pressure is associated with lesser penile-vaginal intercourse frequency in healthy young men. *J Sex Med* 2010; 7:1853–1857.
 37. Foster SL, Cone JD. Validity issues in clinical assessment. *Psychological Assessment*. 1995; 7:248–60.
 38. Natasha Beretvas S, Jason L., Meyers, Leite WL. A reliability generalization study of the Marlowe-Crowne Social desirability scale. *Educ Psychol Meas* 2002; 62:570–89.
 39. Soon Ang, Linn Van Dyne, Christine Koh, et al. Cultural intelligence: Its measurement and effects on cultural judgment and decision making. *Cultural Adaptation and Task Performance Management and Organization Review* 2007; 3:335–71.
 40. Ster J. The Social Desirability Scale-17 (SDS-17): Convergent validity, discriminant validity, and relationship with age. *European Journal of Psychological Assessment* 2001; 17:222–32.
 41. Tao Peng, Guoying Dong, Brody S. Preliminary study of a Chinese language short form of the Marlowe-Crowne Social Desirability Scale. *Psychol Rep* 2009; 105:1039–46.
 42. Afsaneh Khademi, Ashraf Alleyassin, Marzieh Agha-hosseini, et al. Psychometric properties of Sexual Function Questionnaire: evaluation of an Iranian sample. *Iran J Reproduct Med* 2006; 4:23–8.
 43. Dixon JK. Factor analysis. In: Munro BH, editor. *Statistical methods for Health care Research*. New York: Lippincott. 2001:303–31.
 44. Eamonn Ferguson, Cox T. Exploratory factor analysis: A users' guide. *Int J Sel Assess* 1993; 1:84–94.
 45. Tinsley HA, Tinsley DJ. Uses of factor analysis in counseling psychology Research. *Journal of Counseling Psychology* 1987; 34:414–24.
 46. Fabrigar LR, Wegener DT, MacCallum RC, et al. Evaluating the use of exploratory factor analysis in psychological research. *Psychol Meth* 1999; 4:272–99.
 47. Costello AB, Osborne JW. Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis. *Prac Assess Res Eval* 2005; 10:1–9.
 48. Clemens EC, Carey JC, Harrington KM. The school counseling program implementation survey: initial instrument development and exploratory factor analysis. *Professional School*

- Counseling 2010; 14:125–34.
49. Hair JH, Anderson RE, Tatham RL, et al. Multivariate Data Analysis. In: series Editor, editor.: Upper Saddle River: Prentice Hall; 1998. pp 99–122.
 50. Nunnally JC, IH. B. Psychometric Theory.3rd edition. In: series Editor, editor. New York: McGraw Hill; 1994. pp 251–2.
 51. Gourounti K, Anagnostopoulos F, Vaslamatzis G. Psychometric properties and factor structure of the Fertility Problem Inventory in a sample of infertile women undergoing fertility treatment. *Midwifery* 2010; S0266–6138(10)00026-4.[pii] 10.1016/j.midw.2010.02.007.
 52. Martins MV, Peterson BD, Almeida VM, Costa ME. Direct and indirect effects of perceived social support on women’s infertility-related stress. *Hum Reprod* 2011;26:2113–2121.
 53. Greil AL, McQuillan J, Lowry M, Shreffler KM. Infertility treatment and fertility-specific distress: A longitudinal analysis of a population based sample of U.S. women. *Soc Sci Med* 2011; 73:87–94.
 54. Van den Broeck U, D’Hooghe T, Enzlin P, Demyttenaere K. Predictors of psychological distress in patients starting IVF treatment: infertility-specific versus general psychological characteristics. *Hum Reprod* 2010; 25:1471–1480.

3.2.2.1.5.2 Paper 4: The effects of translating the Multidimensional Sexuality Questionnaire from English to Mandarin: a test of reliability and validity

Peng Tao^{A,B,E}, Rosemary Coates^B, Yun Zhao^C and Bruce Maycock^D

^A Research and Education Center in Sexual Health, Harbin Medical University, Hei Longjiang 15001, China.

^B Department of Sexology, School of Public Health, Curtin University, Perth, WA 6845, Australia.

^C Department of Epidemiology and Biostatistics, School of Public Health, Curtin University, Perth, WA 6845, Australia.

^D Curtin Health Innovation Research Institute, Curtin University, Perth, WA 6845, Australia

^E Corresponding author. Email: pengtao1@china.com

Submitted: Jan. 21, 2011

Accepted: Oct. 30, 2011

Published: Sexual Health, 2012; 9(4): 304-313

Contributions: The present manuscript was compiled and written in full by the candidate of this thesis with suggestions and thorough proofreading by the co-authors.

ABSTRACT

Background: In China, sexuality studies using validated psychosexual instruments are limited, with no valid Mandarin language version of a sexuality inventory with psychometric properties available for use. Thus, the Mandarin version of the Multidimensional Sexuality Questionnaire (M-MSQ), comprising four subscales, originating from the Multidimensional Sexuality Questionnaire, was tested for its psychometric properties.

Methods: A convenience sampling technique was employed to recruit 200 oil workers (100 males and 100 females) in northern China. Originally, 158 participants (84 males and 74 females) completed the questionnaire; these accounted for 79% of the total study sample. From this group, a subsample of 50 participants (25 males and 25 females) was randomly selected to investigate the test–retest reliability. Of these, the responses of 33 participants (18 males and 15 females) were valid. The analysis on reliability was based on Cronbach’s α , Pearson’s correlation coefficient (r) and the intraclass correlation coefficient, also including evaluation on criterion validity and discriminatory validity.

Results: The M-MSQ was found to be homogeneous in factor structure, comparing well with the original questionnaire. Both the discriminatory validity and the criterion-related validity were satisfactory in the total sample and gender groups, in addition, the overall reliability of the M-MSQ was sound in internal consistency with Cronbach’s $\alpha = 0.900–0.931$. The results of the test–retest showed that the stability of the M-MSQ achieved a positive statistically significant standard assessed by Pearson’s coefficient and the intraclass correlation coefficient.

Conclusion: The M-MSQ is reliable in these four subscales, and may be used as a measure of sexual esteem, sexual consciousness, sexual motivation and sexual satisfaction in Mandarin speakers.

Additional keywords: China, psychometrics, sexuality studies.

Introduction

Sexuality is an important aspect in people's lives, involving a broad range of cognitions, emotions and behaviors. It is more than the physical act of intercourse, as it influences self-identity, communication, shared pleasure and depth of intimacy, and may reduce stress in one's life.^{1, 2} The World Health Organisation (WHO) states that sexuality is a central aspect of being human that is experienced and expressed in thoughts, fantasies, desires, beliefs, attitudes, values, behaviors, practices, roles and relationships.³ Sexuality research is increasingly attending to measuring the psychological aspects of relationships, emotions, attitudes and related problems for individuals and couples. Moreover, the assessment of sexuality through interviews, questionnaires and specifically designed standard tests are fundamentally important methods of further understanding clients' sexuality and related factors in clinical practice, psychological counselling and health promotion.⁴⁻⁹ The Multidimensional Sexuality Questionnaire (MSQ)¹⁰ is, as the name implies, a multidimensional instrument designed to assess an individual's psychological tendencies combined with sexual relationships. It was constructed to assess both male and female sexuality, and consists of 12 respective subscales. These subscales include sexual esteem, sexual preoccupation, internal sexual control, sexual consciousness, sexual motivation, sexual anxiety, sexual assertiveness, depression, external sexual control, sexual monitoring, fear of sex, and sexual satisfaction. The above subscales are independent from each other conceptually and can be tailored into different studies.¹¹⁻¹⁴

In China, Pan Suiming *et al.*¹⁵ conducted some empirical studies on Chinese sexuality using a structured questionnaire that covered different aspects of sexuality based on different research purposes. From these there were two influential studies. One was a nation-wide survey on Chinese people's sexual behavior and relationships;¹⁵ the structured sexuality questionnaire for this included sexual development, masturbation, premarital sex, multiple sexual partners, women's sexual status, sexual harassment and violence, homosexuality, pornography, commercial sex and sexual health. The other study was a 10-year longitudinal survey on sexuality among college students,¹⁶ where the structured questionnaire addressed diverse issues such as physical bodily growth, same-sex behavior, heterosexual interactions, perceptions of sex and love, relationships, the need for sexual education, sexual attitudes, sexual harassment and sexual norms. Both of

these two questionnaires consisted of a series of questions designed to obtain statistically useful information about a given topic, in which the items focussed mainly on the sexual history of respondents from a socio-sexological perspective. Thus they were not a good approach to measure an individual's psychological tendencies associated with sexual relationships. Even though the self-designed questionnaires in the indigenous studies were used and provided useful information, due to a lack of reported validity and reliability about these questionnaires, it is difficult to take them as standard instruments for psychological research into sexuality in China. In the face of the increasing attention on sexual health interventions and academic research related to sexuality, there exists a significant need for an instrument that reliably assesses sexuality from the psychosexual perspective. To our knowledge, reliable and valid studies of Chinese sexuality using a psychosexual measurement instruments are limited. Until recently, there have been no self-reporting instruments that meet basic psychometric criteria in collecting subjective data related to sexuality. Furthermore, there is a scarcity of valid Mandarin language versions of sexuality inventories with psychometric properties. A validation study of a Mandarin language instrument related to sexuality is essential in order to provide a psychosexual evaluation in a Chinese population and facilitate data reliability in cross-cultural research. The MSQ has never been used in a Chinese context; however, it has proved to have sustainable reliability and validity in general English-speaking populations.¹⁰ In addition, there are no validated measures to assess multidimensional sexuality in a Chinese-speaking population. Thus it is necessary to test the MSQ in a Chinese context.

To be validated, the translated questionnaire should be subjected to an evaluation of psychometric properties including validity, reliability and responsiveness. Briefly, the validity of a questionnaire refers to whether a questionnaire can measure what it intends to measure, reliability means a questionnaire's ability to take measurements in a reproducible fashion, and responsiveness is about a questionnaire's ability to assess whether it can detect clinically meaningful change.^{17, 18} The overall purpose of our study is to investigate sexuality issues in regional China; the testing of this instrument is a critical component of this larger study. The lead author has considerable experience researching sexuality issues in China and was concerned about Chinese attitudes

towards sexuality. Also of concern was the length of the original questionnaire (12 subscales with 60 items in total), which would be a barrier to participation. In the current study, only four subscales (sexual esteem, sexual consciousness, sexual motivation and sexual satisfaction) of the MSQ have been chosen to be translated into Mandarin, and tested for validity and reliability using a sample of native Mandarin speakers. These items were deemed to be the most relevant to the overall investigation of sexuality issues. It is our hope that other subscales will be used in future studies.

Aim of the study

The aim of this study was to translate four subscales derived from the MSQ into Mandarin and to undertake an analysis on the psychometric properties of the questionnaire.

Methods

Translation

After obtaining approval from the authors of questionnaire, Dr Snell and Dr Fisher, the MSQ was first translated into Mandarin by a native Mandarin-speaking researcher. Subsequently, it was translated back into English by another native speaker of Mandarin who also spoke fluent English. Dr Fisher compared the back-translation with the original questionnaire and checked for any discrepancies. The revealed discrepancies were discussed and amended to ensure the Mandarin version (see Appendix 1) was structurally equivalent to the original English version (see Appendix 2). The entire process followed the principles and requirements for translation and back-translation.¹⁹

Participants

The study was carried out in the Second Oil Drilling Group of No. 5 Oil Production Plant of Daqing Oilfield Co. Ltd, China. This group comprises 485 workers, with 287 (59%) males and 198 (41%) females. Prior to the implementation of the formal survey, the researcher provided information and a lecture related to sexuality and couple relationships, and approached some oil workers during this activity. These workers introduced other workers from their social circle to the researchers and the final sample was obtained. Potential participants received a brief explanation of the purpose of the study. In addition, the participants could obtain information related to sexual health or sexuality after they had submitted their answers.

A convenience sample of 200 oil workers (100 of each sex) were asked whether they wished to participate in a voluntary, anonymous survey. The inclusion criteria during this study were: (1) participants must be married; (2) participants must live in their usual, stable residence, and not be assigned to work offshore or away; (3) participants must be able to read and write Mandarin. From March to June 2010, 158 participants (84 males and 74 females) completed the MSQ with an effective response rate of 79%. In order to examine the test–retest reliability, the researchers reselected 50 workers from the entire group, using computer-generated random numbers. These 50 were invited to complete the questionnaires again after a 5-week interval. Of these, 42 returned the questionnaires by mail. Thirty-three (18 males and 15 females) were deemed valid for analysis.

Study instruments

Mandarin version of Multidimensional Sexuality Questionnaire (M-MSQ)

The MSQ¹⁰ is a valid and reliable instrument. It is a 60-item self-report instrument designed to measure 12 aspects of human sexuality using 12 subscales; each subscale and its meaning are listed as follows:

- (1) Sexual esteem: the tendency to evaluate one's sexuality and its relation to others positively;
- (2) Sexual preoccupation: the tendency to become absorbed with sexual thoughts;
- (3) Internal sexual control: the belief that one determines the sexual aspects in one's life;
- (4) Sexual consciousness: the tendency to think and reflect about the nature of one's sexuality;
- (5) Sexual motivation: the desire to be involved in sexual relationships;
- (6) Sexual anxiety: the tendency to be anxious about one's sexuality;
- (7) Sexual assertiveness: the tendency to be assertive about the sexual aspects of one's life;
- (8) Depression: the tendency to feel depressed about one's sex life;
- (9) External sexual control: the belief that one cannot control the sexual aspects of one's life;
- (10) Sexual monitoring: the tendency to be aware of the public impression of one's sexuality;
- (11) Fear of sex: a fear of engaging in sexual relations with another individual;

(12) Sexual satisfaction: the tendency to be satisfied with the sexual aspects of one's life.

Among 60 items of the MSQ, seven items are reverse scored. Respondents are asked to indicate how each statement is characteristic of them. A five-point Likert scale is used to collect data on peoples' responses, with each item being scored from 0 to 4 as follows: not at all characteristic of me = 0, slightly characteristic of me = 1, somewhat characteristic of me = 2, moderately characteristic of me = 3 and very characteristic of me = 4. The score of each subscale is calculated by summing each item's score (range = 0–20). Higher scores corresponded to greater levels of each of the respective sexual tendencies.

In our study, four subscales were derived from 12 subscales of the Mandarin version of Multidimensional Sexuality Questionnaire (M-MSQ), which were sexual esteem, sexual consciousness, sexual motivation and sexual satisfaction.

Marlowe–Crowne Social Desirability Scale

Social desirability means the tendency to present oneself in a socially desirable light, as opposed to being truthful in one's responses, which is a potential confounder in many studies involving reporting sensitive behaviors.²⁰ In this sense, social desirability is recognised as evidence supporting the validity of responses to psychological surveys, which can be used to compare the correlations between scores on the social desirability scale and scores on the focal psychological instrument. If the correlation is not substantial, it provides discriminant validity evidence for responses to the focal scales, and indicates that scores on the scale are not confounded by a respondent's tendency to answer in a socially desirable way.^{21, 22} In this study, a Mandarin language short form of the Marlowe–Crowne Social Desirability Scale²³ was used, which includes 14 statements, to be answered Yes or No, depending on whether the respondents felt the statement applies to them. Among these 14 items, four items are scored with one point each if answered in the affirmative, and the remaining items are scored with one point each if answered in the negative. The total score is calculated by summing the score of all 14 items and a higher total score indicates a higher tendency towards social desirability.

General Self-Efficacy Scale

The General Self-Efficacy Scale (GSES) can show an individual's feelings, thoughts and actions,²⁴ and reflects a generalisation across various domains of functioning in which people judge how efficacious they are, and describes

individuals' belief in their ability to exercise control over challenging demands and over their own functioning.²⁵ In this study, this scale was used to examine the criterion validity of the MSQ. The self-administered scale has 10 items and uses a four-point scale, with 1 being rated as not at all true, 2 = hardly true, 3 = moderately true and 4 = exactly true. Responses to all 10 items are summed to yield a final composite score with a range from 10 to 40. The GSES has been translated into Mandarin and, after testing, was found to have good reliability and validity properties.²⁶

Ethical considerations

The study was conducted in accordance with the principles of the Helsinki Declaration and with the approval of the Human Research Ethics Committee at Curtin University, Australia.

All participants were informed of the purpose and scope of the study, and the type of involvement required; that participation was voluntary; that they had the right to withdraw from the study at any time; and that confidentiality was respected.

Quality control of data

By the method of convenience sampling, all participants were approached on the basis of their accessibility and proximity to the researcher (and enrolled if married). Participants initially completed an informed consent sheet, and verbalised willingness to participate the survey. After they had an understanding of the questions, individuals completed the questionnaire survey independently. In addition, the initial survey was undertaken in the participant's workplace, thus ensuring there were no family members present, and that privacy and security were ensured. It was also made certain that the interviewer was of the same gender as the participant throughout the entire survey process. Furthermore, the participants in the retest survey were telephoned to remind them to return the questionnaire. All questionnaires with at least 10% missing responses were excluded.

Statistical analyses

All data analyses were facilitated by using Statistical Package for the Social Sciences ver. 17.0 (SPSS for Windows, SPSS Inc., Chicago, IL, USA). Descriptive statistics (mean, s.d. and range) were obtained for the relevant variables of interest. Factor analysis was carried out, and Cronbach's α coefficient, Pearson's correlation coefficient and intraclass correlation coefficients were computed to assess the

reliability and validity of the Mandarin version of the MSQ. A P-value less than 0.05 was considered statistically significant.

Results

Characteristics of participants

Among the individuals (100 males, 100 females) who were invited to participate in the study, there were 42 (21%) subjects (16 males and 26 females) who did not return their survey and were not included in the final sample. The mean age was 49.74 ± 4.13 years old (range: 43–57 years). The male-to-female ratio was 0.6. Regarding the highest level of educational attainment for non-respondents, 11 (26%) had achieved senior school education, 19 (45%) had achieved junior college education and 12 (29%) had achieved university level or above.

A total of 158 workers (84 males (53.2%), 74 females (46.8%)) completed and returned the questionnaire. Their mean age was 39.09 ± 6.05 years (range: 24–58 years). The male-to-female ratio was 1.1. All were married. In the male group, 13 (16%) respondents were in the 24- to 34-year-old age group, 53 (63%) respondents were in the 35- to 45-year-old age group and 18 (21%) respondents were 46 years or above. In the female group, 23(31%) respondents were in the age group 24–34 years, 40 (54%) respondents were in the age group 35–45 years, and 11(15%) respondents were aged 46 years or above. Regarding the highest level of educational attainment for male respondents, 48 (57%) respondents had achieved senior school education, 26 (31%) respondents had achieved junior college education and 10 (12%) respondents with university level or above; in the female group, 38 (51%) respondents had senior school education, 19 (26%) respondents had junior college education and 17 (23%) respondents had university level education or above. The results of Pearson's χ^2 -test indicated that the male group and female group did not differ significantly with regard to age and education level ($P > 0.05$), suggesting effective randomisation.

Factor analysis

In order to check whether the M-MSQ can explain the pattern of correlation within a set of observed variables, the factor structure of the questionnaire was evaluated by explanatory factor analysis for the principal components. The Kaiser–Meyer–Olkin (KMO) and the Bartlett's test of sphericity were conducted to test the sampling adequacy and zero correlation coefficient, respectively. The KMO measure of sampling adequacy for our data was 0.94,²⁷ and the Bartlett's test of

sphericity was highly significant ($\chi^2 = 2822.365$, $P < 0.001$), which indicated that the variables were correlated enough to provide a reasonable basis for an appropriate factor analysis.

Based on the statistical criteria for a principal component's confirmation with a factor loading greater than 0.40 and an eigenvalue exceeding 1.0, ²⁸, ²⁹ a four-component solution from 20 items was extracted. It accounted for 77.19% of the total variance. All loadings below 0.4 were omitted. Table 1 displays the varimax-rotated result, as can be seen by comparing them with the factor patterns of the original questionnaire: all 20 items are in the factor's frame and there is a perfect structure for the M-MSQ.

Table 1. Loadings of items on factors and components from rotated component matrix of the M-MSQ ($n = 158$)

No.	M-MSQ items	Components			
		1	2	3	4
Sexual motivation					
Q13	I have a strong desire to be sexually active.	0.839	–	–	–
Q15	I strive to keep myself sexually active.	0.794	–	–	–
Q12	I'm strongly motivated to devote time and effort to sex.	0.783	–	–	–
Q11	I'm very motivated to be sexually active.	0.731	–	–	–
Q14	It's really important to me that I involve myself in sexual activity.	0.694	–	–	–
Sexual satisfaction					
Q17	I am very satisfied with my sexual relationship.	–	0.853	–	–
Q19	My sexual relationship is very good compared with most.	–	0.830	–	–
Q18	My sexual relationship meets my original expectations.	–	0.819	–	–
Q20	I am very satisfied with the sexual aspects of my life.	–	0.771	–	–
Q16	I am very satisfied with the way my sexual needs are currently being met.	–	0.674	–	–
Sexual consciousness					
Q9	I'm very alert to changes in my sexual desires.	–	–	0.772	–
Q7	I'm very aware of my sexual motivations.	–	–	0.767	–
Q10	I am very aware of my sexual tendencies.	–	–	0.725	–
Q8	I tend to think about my sexual feelings.	–	–	0.687	–
Q6	I am very aware of my sexual feelings.	–	–	0.634	–
Sexual esteem					
Q1	I am confident about myself as a sexual partner.	–	–	–	0.840
Q2	I am a pretty good sexual partner.	–	–	–	0.798
Q4	I would rate myself pretty favourably as a sexual partner.	–	–	–	0.622
Q3	I am better at sex than most other people.	–	–	–	0.558
Q5	I would be very confident in a sexual encounter.	–	–	–	0.443
% of variance		21.365	21.132	19.516	15.177
Cumulative % of variance		21.365	42.497	62.013	77.190

Note: Only values >0.4 are shown

Validity

For validity analysis of the M-MSQ, the correlations between the obtained four subscales and the social desirability scale were computed. These were used to test the discriminatory validity of the questionnaire. Table 2 showed the Pearson's correlation coefficients between the obtained four subscales and the social desirability scale for the total sample, and for males and females respectively. No

any significant associations ($P > 0.05$) were found between social desirability and the subscales either in the total sample or in the gender groups. The criterion-related validity was tested by the GSES, and the Pearson correlation coefficients were used to measure the associations between the four subscales of the questionnaire and the GSES. The results indicated a significant correlation ($P < 0.05$) both in total sample, and in males and females (Table 3).

Table 2. Pearson’s correlation coefficient between the MSQ and the measure of social desirability

Group		Sexual esteem	Sexual consciousness	Sexual motivation	Sexual satisfaction
Combined ($n=158$)					
Social desirability	<i>r</i>	0.015	0.047	0.040	0.145
	<i>P</i>	0.851	0.559	0.614	0.069
Males ($n=84$)					
Social desirability	<i>r</i>	0.134	0.094	0.160	0.209
	<i>P</i>	0.224	0.395	0.146	0.056
Females ($n=74$)					
Social desirability	<i>r</i>	-0.076	0.056	-0.017	0.097
	<i>P</i>	0.522	0.636	0.883	0.411

Table 3. Pearson’s Correlation coefficient between the MSQ and the measure of general self-efficacy

Group		Sexual esteem	Sexual consciousness	Sexual motivation	Sexual satisfaction
Combined ($n=158$)					
General self-efficacy	<i>r</i>	0.378	0.313	0.278	0.324
	<i>P</i>	<0.001	<0.001	<0.001	<0.001
Males ($n=84$)					
General self-efficacy	<i>r</i>	0.284	0.290	0.218	0.382
	<i>P</i>	0.009	0.008	0.046	<0.001
Females ($n=74$)					
General self-efficacy	<i>r</i>	0.412	0.276	0.251	0.253
	<i>P</i>	<0.001	0.017	0.031	0.030

Reliability

Two means were used to test the reliability of the M-MSQ: one was the internal consistency of the questionnaire determined by Cronbach’s α coefficients; the other one was the test–retest reliability assessed by Pearson’s coefficient (r) and the Intraclass Correlation Coefficient (ICC).

The results provide evidence that the questionnaire had a high level of internal consistency, with Cronbach’s α coefficient exceeding 0.90 (Table 4). Based on the psychometrical rule that a higher coefficient means higher reliability,³⁰ the results suggest that each subscale comprises a relatively homogeneous set of items, indicating a satisfactory internal consistency for the instrument. In addition, there

was a significant difference in the subscales of sexual esteem, sexual consciousness and sexual motivation between males and females, but not for the subscale of sexual satisfaction ($P < 0.05$).

Table 4. Internal consistency coefficient (Cronbach's α) and the score of subscale (mean \pm s.d.) of the M-MSQ

Subscales	Cronbach's α coefficient	Gender		<i>t</i>	<i>P</i>
		Males (<i>n</i> = 84)	Females (<i>n</i> = 74)		
Sexual esteem	0.900	12.70 \pm 5.07	10.04 \pm 5.33	3.216	0.002
Sexual consciousness	0.901	12.99 \pm 4.39	10.45 \pm 4.94	3.424	0.001
Sexual motivation	0.931	12.85 \pm 5.12	8.69 \pm 4.99	5.147	0.000
Sexual satisfaction	0.929	13.26 \pm 5.27	11.93 \pm 5.53	1.546	0.124

Test–retest reliability was assessed by asking 33 participants (18 males and 15 females) to complete the M-MSQ again within a 5-week interval. The test–retest reliability coefficient was obtained by calculating the Pearson's coefficient (*r*) between the scores on the two occasions. Moreover, the ICC was computed in the male sample and the female sample separately, which was helpful for providing an accurate measure of reliability and detecting systematic error.^{31, 32} Basically, the test–retest reliability is better when the ICC exceeds 0.6.³³

Table 5 shows that the ICC was over 0.6 in females in all subscales. Males had a lower ICC in the subscale of sexual satisfaction, but the ICC of other subscales was greater than 0.6. However, all Pearson's *r* and ICC values demonstrated a significant relationship between the scores of the two rounds of the questionnaire ($P < 0.05$).

Table 5. Pearson's correlation coefficient (*r*) and the intraclass correlation coefficient (ICC) for the M-MSQ by test–retest

Subscale	Males (<i>n</i> = 18)				Females (<i>n</i> = 15)			
	<i>r</i>	<i>P</i>	ICC	<i>P</i>	<i>r</i>	<i>P</i>	ICC	<i>P</i>
Sexual esteem	0.685	<0.001	0.685	<0.001	0.833	<0.001	0.801	0.001
Sexual consciousness	0.743	<0.001	0.743	<0.001	0.726	<0.001	0.725	<0.001
Sexual motivation	0.781	<0.001	0.750	<0.001	0.718	<0.001	0.713	<0.001
Sexual satisfaction	0.547	<0.05	0.542	<0.001	0.747	<0.001	0.746	<0.001

Relationship to demographic measures

The relationship between the M-MSQ and demographic characteristics (age and education) was assessed. The results of one-way ANOVA indicated that there were no significant differences ($P > 0.05$) in the M-MSQ (sexual esteem, sexual consciousness, sexual motivation and sexual satisfaction) scores among the three

different age groups (24–34 years, 35–45 years and 46 years or above). Similarly, no significant differences ($P > 0.05$) were found among the education levels (senior school, junior college, and university or above) in the M-MSQ scores.

Discussion

In this study, we found the M-MSQ to be convenient to administer and simple to score, and had a response rate close to 80%. We suggest several reasons for such a good response rate. Prior to the implementation of the formal survey, we provided information and a lecture related to sexuality and couple relationships. Participants were informed about the purpose of the survey and its usefulness, and that anonymity was assured. The survey was implemented in the participants' free time. There were clear instructions on how to complete the survey when it was administered.

There was a 21% non-response rate due to participants not completely finishing the questionnaire, or refusing the survey due to poor health status or being away from the workplace. Although the literature suggests that follow-up of non-respondents is important for increasing response rates and decreasing non-response bias when using a questionnaire for the survey,³⁴ this study did not analyse non-response because it was not originally designed to check the impact of non-response bias. Factors related to response rates and non-response rates will be discussed in future studies, including their impact on results. In factor analysis of the M-MSQ, the extracted factors, including all four subscales (20 items in total) included in the M-MSQ, accounted for 77.19% of the total variance. Clearly, these are distinct from each other based on the results of the principal component factor analysis. In addition, the results from the discriminatory validity tested by social desirability indicated that the M-MSQ scores were largely independent of social desirability in both males and females. The criterion-related validity tested by the scale of self-efficacy showed a positive relation with the four subscales for both males and females. These results suggest that the M-MSQ had sound validity. As for the internal consistency, we found the M-MSQ was homogeneous, with a Cronbach's α exceeding 0.9; this confirms the acceptability of the M-MSQ. The item test–retest reliability is an important quality of an instrument designed to measure a stable characteristic or trait.³⁵ In this study, Pearson's correlation coefficient and ICC values of the M-MSQ showed moderate to high satisfactory results in scaling. Further, the results indicated that the M-MSQ was not found to

relate significantly to age or education. Results from preliminary analyses suggest that the M-MSQ has both reliability and construct validity at similar levels to those found in the original version, with high internal consistency, test–retest reliability, concurrent validity, discriminatory validity and convergent validity.¹⁰

The limitations of this study are acknowledged, and should be overcome in future studies even though the application of the M-MSQ to Chinese oil workers produced satisfactory results. The study was conducted using a relatively small sample with an educational background higher than high school level. Also, we found that most individuals willing to participate in a survey related to sexuality might be more open-minded and easy-going; we acknowledged that this may cause sample bias. It is also true that the sample is not representative of the entire population. In addition, for the test–retest study, we collected the data by self-administered questionnaires, not by face-to-face interviews, which might have reduced the reliability estimates. Moreover, the study did not assess the construction validity using structural equation modelling due to the size of the sample. Hence, further studies on the M-MSQ in China among larger and more representative samples, including retired people, those with poor health status, migrants, unemployed people and those living in rural areas, are needed. There should also be further discussion on combining different bio-psycho-social variables, and the test–retest reliability should be extended over a longer period. Although the authors anticipated potential response resistance due to Chinese attitudes towards sexuality, this did not manifest, with relatively few participants not responding to all items in the M-MSQ. The main reasons for non-response were that a participant was away from the workplace or was on sick leave.

This is the first validation study to select four subscales from the MSQ as a measure of sexual esteem, sexual consciousness, sexual motivation and sexual satisfaction in a Chinese population. Unfortunately, we did not find any study related to the MSQ being translated and tested in any other languages, and thus we have not been able to make comparisons. On the other hand, it is possible the adaptation of a Western instrument to a Chinese context has some limitations. Future qualitative research could investigate whether the items reflect the psychological tendencies of Chinese sexuality. However, we believe that the M-MSQ represents an important contribution to the research on the assessment of Chinese sexuality. Furthermore, it may encourage future cross-cultural studies.

Conclusion

The results from the analyses suggest that the M-MSQ demonstrates adequate psychometrics with sound validity and test–retest reliability that were not confounded by the age and education level of participants. The instrument is applicable in Chinese culture, and can be a good supplement to the questionnaire for the evaluation of how a Chinese population perceives their sexuality. Furthermore, the instrument can help health care providers, psychological counsellors, social workers and sexologists to understand a person’s sexuality better, thus providing a guide to pertinent therapy.

Conflicts of interest None declared.

Acknowledgements

We thank all the oil workers who took part in the study. We also thank Dr William E. Snell Jr. and Dr Terri D. Fisher for their permission to adapt the original English version of the Multidimensional Sexuality Questionnaire for use in a Mandarin-speaking population, especially for Dr Fisher’s valuable comments on the back-translation of the questionnaire.

References

- 1 McCabe MP, Cummins RA, Romeo Y. Relationship status, relationship quality, and health. *J Fam Stud* 1996; 2: 109–20.
- 2 McCarthy BW, Bodnar EL. The equity model of sexuality: navigating and negotiating the similarities and differences between men and women in sexual behaviour, roles and values. *Sex Relationship Ther* 2005; 20: 225–35.
- 3 World Health Organization (WHO). Report of a technical consultation on sexual health. Geneva: WHO; 2002. Available online at: http://www.who.int/reproductivehealth/publications/sexual_health/defining_sexual_health.pdf [verified August 2011].
- 4 Bouchard S, Godbout N, Sabourin S. Sexual attitudes and activities in women with borderline personality disorder involved in romantic relationships. *J Sex Marital Ther* 2009; 35: 106–21.

- 5 Gatti C, Del Rossi C, Lombardi L, Caravaggi F, Casolari E, Casadio G. Sexuality and psychosocial functioning in young women after colovaginoplasty. *J Urol* 2010; 184: 1799–803.
- 6 Kaptein AA, van Klink RC, de Kok F, Scharloo M, Snoei L, Broadbent E, *et al* Sexuality in patients with asthma and COPD. *Respir Med* 2008; 102: 198–204.
- 7 Lachowsky M, Grivel T, Lemaire A, Elia D. Couple, sexuality and sexual health. *Gynecol Obstet Fertil* 2005; 33: 326–30.
- 8 Launaz E. Sexuality, discussion and family planning. *Arch Gynecol Obstet* 1994; 255: S323–8.
- 9 Slob AK, Koster J, Radder JK, van der Werff ten Bosch JJ. Sexuality and psychophysiological functioning in women with diabetes mellitus. *J Sex Marital Ther* 1990; 16: 59–69.
- 10 Snell WE, Fisher TD, Walters AS. The Multidimensional Sexuality Questionnaire: an objective self-report measure of psychological tendencies associated with human sexuality. *Ann Sex Res* 1993; 6: 27–55.
- 11 Anderson PB, Newton M. Predicting the use of sexual initiation tactics in a sample of college women. *Electronic Journal of Human Sexuality* 2004; 7: 1–15.
- 12 Ismail-Pratt IS, Bikoo M, Liao LM, Conway GS, Creighton SM. Normalization of the vagina by dilator treatment alone in complete androgen insensitivity syndrome and Mayer–Rokitansky–Kuster–Hauser syndrome. *Hum Reprod* 2007; 22: 2020–4.
- 13 Jellis JB. Attachment style, working models of sexuality and their relation to safer sex behaviour in young adults. Ottawa: National Library of Canada ; 2001. Available online at: <http://library2.usask.ca/theses/available/etd-10212004-002330/unrestricted/NQ63881.pdf> [verified August 2011].
- 14 Liao L, Doyle J, Crouch NS, Creighton SM. Dilation as treatment for vaginal agenesis and hypoplasia: a pilot exploration of benefits and barriers as perceived by patients. *J Obstet Gynaecol* 2006; 26: 144–8.
- 15 Suiming P. Sexual behavior and relationship in contemporary China. Beijing: Social Sciences Documentation Publishing House; 2003.
- 16 Suiming P, Rui Y. Sexuality of Chinese college students: a ten-year longitudinal study. Beijing: Social Sciences Documentation Publishing House; 2004.
- 17 Bland JM, Altman DG. Statistics notes: validating scales and indexes. *BMJ* 2002; 324: 606–7.
- 18 Omotosho TB, Rogers RG. Shortcomings/strengths of specific sexual function questionnaires currently used in urogynecology: a literature review. *Int Urogynecol J Pelvic Floor Dysfunct* 2009; 20: S51–6.
- 19 Behling O, Law KS. Translating questionnaires and other research instruments: problems and solutions. London: Sage Publications Inc; 2002.

- 20 Brody S. Body mass index but not pulse pressure is associated with lesser penile–vaginal intercourse frequency in healthy young men. *J Sex Med* 2010; 7: 1853–7.
- 21 Beretvas SN, Meyers JL, Leite W. A reliability generalization study of the Marlowe–Crowne Social desirability scale. *Educ Psychol Meas* 2002; 62: 570–89.
- 22 Neeleman AJ. The relevance of sexuality in the treatment of borderline personality disorder. *Tijdschr Psychiatr* 2007; 49: 233–40.
- 23 Tao P, Guoying D, Brody S. Preliminary study of a Chinese language short form of the Marlowe–Crowne Social Desirability Scale. *Psychol Rep* 2009; 105: 1039–46.
- 24 Zulkosky K. Self-efficacy: a concept analysis. *Nursing Forum* 2009; 44: 93–102.
- 25 Luszczynska A, Scholz U, Schwarzer R. The general self-efficacy scale: multicultural validation studies. *J Psychol* 2005; 139: 439–57.
- 26 Caikang W, Zhongfeng H, Yong L. Evidences for reliability and validity of the Chinese version of general self-efficacy scale. *Chinese Journal of Applied Psychology* 2001; 7: 37–40.
- 27 Hutcheson GD, Sofroniou N. The multivariate social science scientist: statistics using generalized linear models. Thousands Oaks, CA: Sage Publications; 1999.
- 28 Klonoff-Cohen H, Natarajan L, Klonoff E. Validation of a new scale for measuring concerns of women undergoing assisted reproductive technologies (CART). *J Health Psychol* 2007; 12: 352–6.
- 29 Ismail K. Unravelling factor analysis. *Evid Based Ment Health* 2008; 11: 99–102.
- 30 Bland JM, Altman DG. Statistics notes: Cronbach’s alpha. *BMJ* 1997; 314: 572.
- 31 Yen M, Lo L.H. Examining test-retest reliability: an intra-class correlation approach. *Nurs Res* 2002; 51: 59–62.
- 32 Weir JP. Quantifying test-retest reliability using the intraclass correlation coefficient and the SEM. *J Strength Cond Res* 2005; 19: 231–40.
- 33 Wuyi Z, Bingyi H. Analysis on the reliability and validity of questionnaire. *Statistics & Information Forum* 2005; 20: 11–5.
- 34 Edwards P, Roberts I, Clarke M, DiGuseppi C, Pratap S, Wentz R, *et al* Increasing response rates to postal questionnaires: systematic review. *BMJ* 2002; 324: 1183–5.
- 35 van Agt HM, Essink-Bot ML, Krabbe PF, Bonsel GJ. Test–retest reliability of health state valuations collected with the EuroQol questionnaire. *Soc Sci Med* 1994; 39: 1537–44.

Appendix 1. Mandarin version of the multidimensional sexuality questionnaire: a measure of sexual esteem, sexual consciousness, sexual motivation and sexual satisfaction

指导语：下面列出的是一些关于性方面的描述，请仔细阅读每一条，然后决定哪种程度符合自己的特征。对描述中所提到的一些特定的性关系内容，请结合与现在伴侣的状况来回答；如果你目前还没有与任何人建立伴侣关系，请结合与曾经伴侣的状况来回答；如果你从没有和任何人有过性关系，请依据自己对这些条目的实际感受，尽可能对条目作出回答。

请针对每个条目，并使用如下的分类标准，对符合自己特征的程度作出选择。

- | | |
|------------------|------------------|
| (0) = 一点也不不是我的特征 | (1) = 轻微有一点我的特征 |
| (2) = 有几分我的特征 | (3) = 中等程度上有我的特征 |
| (4) = 非常有我的特征 | |

1. ___ 我对自己作为一个性伴侣很有信心。
2. ___ 我是一个非常好的性伴侣。
3. ___ 我在性方面比别人在行。
4. ___ 我认为自己是相当不错的性伴侣。
5. ___ 在性生活中，我是很自信的。
6. ___ 我很清楚我的性感受。
7. ___ 我很清楚我的性动机。
8. ___ 我常常考虑自己的性感受。
9. ___ 我对自己性欲望的变化是很敏感的。
10. ___ 我很清楚我的性倾向。
11. ___ 过性生活，我是非常积极的。
12. ___ 自己能积极地在性生活方面投入时间和精力。
13. ___ 自己在性生活方面主动性的愿望是非常强的。
14. ___ 对我来说，过性生活是非常重要的。
15. ___ 我一直努力保持自己在性生活方面的主动性。
16. ___ 我很满意自己的性需要目前得以满足的方式。
17. ___ 我对自己和配偶的性关系感到非常满意。
18. ___ 我和配偶的性关系符合我最初的期望。
19. ___ 我和配偶的性关系与大多数人相比是好的。
20. ___ 我很满意生活当中自己性方面的事情。

Appendix 2. English language of the multidimensional sexuality questionnaire: a measure of sexual esteem, sexual consciousness, sexual motivation and sexual satisfaction

Instruction: Listed below are several statements related to sexuality. Please read each item carefully and decide to what extent it is characteristic of you. Some of the items refer to a specific sexual relationship. Whenever possible, answer the questions with your current partner in mind. If you are not currently dating anyone, answer the questions with your most recent partner in mind. If you have never had a sexual relationship, answer in terms of what you think your responses would most likely be.

Please mark every statement, using the following response categories:

- | | |
|---------------------------------------|---------------------------------------|
| (0) = Not at all characteristic of me | (1) = Slightly characteristic of me |
| (2) = Somewhat characteristic of me | (3) = Moderately characteristic of me |
| (4) = Very characteristic of me | |

1. ___ I am confident about myself as a sexual partner.
2. ___ I am a pretty good sexual partner.
3. ___ I am better at sex than most other people.
4. ___ I would rate myself pretty favourably as a sexual partner.
5. ___ I would be very confident in a sexual encounter.
6. ___ I am very aware of my sexual feelings.
7. ___ I'm very aware of my sexual motivations.
8. ___ I tend to think about my sexual feelings.
9. ___ I'm very alert to changes in my sexual desires.
10. ___ I am very aware of my sexual tendencies.
11. ___ I'm very motivated to be sexually active.
12. ___ I'm strongly motivated to devote time and effort to sex.
13. ___ I have a strong desire to be sexually active.
14. ___ It's really important to me that I involve myself in sexual activity.
15. ___ I strive to keep myself sexually active.
16. ___ I am very satisfied with the way my sexual needs are currently being met.
17. ___ I am very satisfied with my sexual relationship.
18. ___ My sexual relationship meets my original expectations.
19. ___ My sexual relationship is very good compared with most.
20. ___ I am very satisfied with the sexual aspects of my life.

3.2.2.2 Interview guide

Individual in-depth interviews are widely used by health care researchers to co-create meaning with interviewees by reconstructing perceptions of events and experiences related to health (Dicicco-Bloom and Crabtree 2006). A qualitative semi-structured interview outline developed by the researcher was used in this study, which was composed of a set of open-ended questions (Appendix 12). The interview process was guided by these questions for exploring information related to the following issues:

- The experience of infertility.
- The understanding of sexuality in the context of infertility of each partner/spouse of the infertile couple.
- The perception of infertility stress and sexuality affecting marital well-being.

Individual in-depth interviews can capture the extent to which issues contribute to and/or impede infertile couples' marital well-being.

3.3 Data Collection and Analysis

Both quantitative and qualitative data analysis were firstly conducted separately, then the findings and related discussions were presented.

3.3.1 Data collection and analysis in quantitative approach

Quantitative data was collected by survey questionnaire. Husbands and wives from infertile couples were invited to complete, separately, a survey questionnaire in the waiting room. The field survey was coordinated by the researcher assisted by two nursing staff members.

SPSS (Statistical Package for Social Sciences, version 17.0) was used for data transformation, cleaning and analyses. A two-tailed p value of 0.05 and under was regarded as statistically significant in all analyses. Prior to univariate analysis, the assumption of normality and homogeneity of variance in study variables was tested. The reason for this was that the appropriateness of t-tests, ANOVA and regression analysis were impacted by the lack of normality and homogeneity of variance in study variables and non-balance sample size in each group of some categorical variables. Normality was checked by Kolmogorov-Smirnov's test (suggested for a sample size larger than 50), along with its correction of the Lilliefors test in the SPSS package, which provided a single index by combining the information in

skewness and kurtosis (Henson 1999). However, for a sample size less than 50, the Shapiro - Wilk Test can be employed for normality testing (Normadiah Mohd Razali and Yap Bee Wah 2011). In both of these two tests, the data is normally distributed when the p value is greater than 0.05. A histogram was compiled from the study data and visually examined. As none of the methods is absolutely definitive, the above-mentioned methods were employed together, specifically to check whether it was necessary to conduct data transformation or non-parametric testing. As for the homogeneity of variances, Levene's test was employed to check whether the groups had equality of variances (George and Mallery 2003). If the p -value of Levene's test is less than 0.05, the null hypothesis of equal variances is rejected, meaning there is a difference between the variances in different samples.

An analysis of variance (ANOVA) was carried out to test the effect of biosocial demographic factors on infertility-related stress, sexuality, and marital well-being. A Post-hoc test was computed, and a Zero-order correlations analysis was documented. If data was not normally distributed, non-parametric tests (Kruskal-Wallis test, Spearman rank correlations, Wilcoxon test) were used for analysis. If the data passed the normality test but failed the test for homogeneity of variances, non-parametric tests were used to check the research assumptions.

Taking the couple as one interactive unit, the study examined the difference between the spouses in infertility stress, sexuality, and marital well-being (marital adjustment and marital satisfaction). Dissimilarity scores of infertility stress were calculated and transformed into absolute difference scores, wherein 0 represented perfect congruence, and higher delta scores reflected higher incongruence. The Actor Partner Interdependence Model (APIM) (Cook and Kenny 2005) was adopted as the data analytic strategy to address the central questions in this study. Moreover, since the multivariate analysis can be helpful for finding the relative significance and degree of each independent variable in correlation with the dependent variable (Tabachnick and Fidell 2007a), multiple regression analyses were conducted.

3.3.2 Data collection and analysis in the qualitative approach

Based on the semi-structured interview guide, the researcher conducted a one-on-one in-depth interview with each participant. Interviews were undertaken in a private area of the research setting. The whole interview process was guided by

open-ended questions from the interview guide (Appendix 12), and each question was asked in a sequential pattern. The duration of the interviews varied from 60-90 minutes depending on the information provided by the interviewees. Interviewing ended when data saturation was reached.

To avoid inter-interviewer variation, all the interviews were conducted by the researcher. To avoid influencing the interviewee, an attitude of respect and neutrality was adopted by the present researcher when endeavoring to draw out issues that were of specific concern to the interviewee. Relaxed communication with the interviewee was emphasized to support free conversation related to research questions. Furthermore, the researcher listened carefully and did not interrupt the interviewee when he or she was speaking.

Each interview usually began with an introduction: "I am happy to meet you, to have a chance to communicate with you. Would you like to talk about your life? What's your concern? and What's your plan?" Specific topics were opened up with reference to the interview guide. In order to collect more detail, the following questions were asked: "Would you like to interpret this more?"; "Could you talk more about this? Thanks"; "Why do you consider this to be as you have just described it?" Participants' background information were also collected including sex, age, education level, economic status, infertility history, and the duration of marriage. Participants were able to pose any question when the interview was over. A digital audio-recorder recorded interviews when consent was given by the interviewees. Notes were taken by the researcher whether the digital recorder was used or not.

Transcripts, the primary source of interview data, were analyzed through thematic content analysis, "a research technique for making replicable and valid inferences from text (and other meaningful matter) to the context of their use"². Grounded theory (LaRossa 2005) was taken as the guide for the coding method used in the content analysis which involved the following steps:

(1) Audio-recorded interviews were transcribed. If the interviewee did not consent to be recorded the researcher analyzed notes taken during the interview.

² Krippendorff, K. (2004a). *Content analysis: An introduction to its methodology* (2nd ed.). Thousand Oaks: Sage. p18.

(2) Transcripts were checked with the Chinese version of NVivo (version 9)³, with items allocated a code and assigned to different categories.

(3) Themes were developed by aggregating similar codes and a narrative was constructed by connecting themes. Qualitative data analysis and interpretation were conducted in Chinese, and then translated them into English for the final qualitative report.

3.3.3 Integration of findings

A mixed method with concurrent transformative design was employed to collect both quantitative and qualitative data. Analysis of the quantitative data related to the infertile couples' perceived infertility stress, sexuality and marital well-being, their relationship to biosocial demographics as well as an analysis of influencing factors of marital well-being by correlation and regression. Qualitatively analysis identified specific features of infertile couples' marital well-being as experienced by infertile couples, and how different individuals reflect their infertility, sexuality and marriage relationship. The mixed-method approach provided a comprehensive way to achieve the objectives of the present study.

The results are presented in Chapter 4 (quantitative findings) and the other in Chapter 5 (qualitative findings). The two sets of results are discussed respectively, which are presented in Chapter 6.

3.4 Research Administration

3.4.1 Ethical considerations

Prior to starting the formal field study, approval for a study involving human participants was sought from the Human Research Ethics Committee at Curtin University. The application addressed issues of participant privacy and potential risks such as discomfort in answering the questionnaire, also participants were assured that the data would be used only for the study. Approval was granted (Appendix 13). Ethics approval was also granted by the ethical committee of the First Clinical College, Harbin Medical University, Hei Longjiang Province, China (Appendix 14).

³ NVivo (Version 9) is a computer programme designed to help in qualitative data analysis. This version can be available in simplified Chinese language.

3.4.2 Participants' consent and confidentiality

All participants who met the eligibility criteria were informed of the purpose of the study, and provided the Informed Consent to Participate in Research form (Appendix 15). The form stated participation was completely voluntary, and participants had the right to discontinue participating in the study at any time, without any consequence for their treatment. All participants were informed of any possible risks and benefits to participate in the study.

In consideration of the sensitive issues in the survey, confidentiality and anonymity were assured and strictly maintained at all times. All responses were anonymous, participants being identified only by number. All participants were asked to sign the consent form.

CHAPTER 4: RESULTS OF QUANTITATIVE SURVEY

This chapter will present the results of the quantitative approach in this study. Firstly, the dependent, independent, and control variables are described. Secondly, the biosocial demographic characteristics of the participants are summarized. Finally all the results of Questions 1-5 in the survey are presented.

4.1 Data Measurement

4.1.1 Dependent variables

Marital well-being, which includes marital adjustment and marital satisfaction was the focus of the present study. As was described in Chapter 3, the DAS and KMSS scores were regarded as indicators of marital well-being. In this present study, ANOVA and Kruskal-Wallis test were used to assess the relationship between biosocial demographics and each dimension of DAS: dyadic consensus, dyadic cohesion, dyadic satisfaction and affectional expression. The relationship between these specified dimensions of DAS, infertility stress and sexuality were examined by correlation analysis. The marital well-being for husbands and wives were discussed using multiple regression analysis respectively.

4.1.2 Independent variables

The following variables were regarded as potential determinants of marital well-being in the present study: (1) bio-social demographics; (2) perceived infertility related stress; (3) sexuality. Each variable was based on self-reported data derived from the questionnaires.

4.1.2.1 Biosocial demographics variables

Sex: All participants were heterosexual couples. Variable Sex is coded as 1 for male, 0 for female.

Age: Calculated by subtracting participants' date of birth from the date of the survey. It was measured as a continuous variable first and recoded as follows: 1=20-25 years; 2=26-30 years; 3=31-35 years; 4=36 years or more.

Education level: Coded in three categories: 1 for primary level with 6-9 years education experience, including primary school or junior high school; 2 for middle level with 10-12 years education experience, including senior high school or

vocational college; and 3 for high level with more than 12 years education experience, including university or above.

Economic level: Defined in this study as the estimated household monthly income. It was coded 1 for low class with less than or equal to 1,999RMB, 2 for medium class with 2,000 RMB - 2,999 RMB, and 3 for high class with 3,000 RMB or more.

Length of marriage: Measured in years from the date of marriage to date of the survey. This continuous variable was coded into three categories in data analysis, namely, 1 for 1-3 years, 2 for 4-6 years, and 3 for 7 years or more.

Type of infertility diagnosis: Coded 1 for male factor infertility, 2 for female factor infertility, 3 for combined factor infertility, and 4 for unexplained factors infertility.

Infertility duration: Estimated in years from the time of couple trying to get pregnant until the current date of treatment. This continuous variable was coded into three categories 1 for 1 - 3 years, 2 for 4 - 6 years, and 3 for 7 years or more.

4.1.2.2 Perceived infertility related stress

For the evaluation of FPI (see Chapter 3), five specific infertility stress scores were measured: (1) social concern, (2) sexual concern, (3) relationship concern, (4) need for parenthood, and (5) rejection of childless lifestyle. In addition, the scores for these five components were summarized as global stress. All of these continuous scores presented the degree to which husbands and wives perceived infertility.

Husbands' and wives' perceived infertility stress, as well as the difference of infertility stress between husband and wife, were taken as predictors in the regression model of marital well-being for husbands and wives separately. The congruence of their perceived infertility stress was also discussed in the model for their marital well-being.

4.1.2.3 Various aspects of sexuality

Few studies in the current literature discussed the relationship between infertile couples' sexuality and their marital well-being. As described in Chapter 3, the present study used MSQ to measure four primary variables of interest that addressed aspects of sexuality: sexual esteem, sexual consciousness, sexual motivation and sexual satisfaction. The associations between these variables with

biosocial demographics were assessed by one-way ANOVA and Kruskal-Wallis test. Their relationship with infertility stress and marital well-being (marital adjustment and marital satisfaction) were assessed by correlation analysis. Then, their effects on marital well-being from the perspective of the individual (husband and wife) were explored by multiple regression analysis.

4.1.3 Control variables

Some variables were controlled to avoid any confounding of relationships between the predictor variables and outcome variables. In this study, biosocial demographics on husbands' and wives' marital well-being were statistically controlled during multiple regression analysis to enable a rigorous conclusion on the relationship between infertility, sexuality and marital well-being.

4.2 Characteristics of the Sample

The original sample consisted of 268 infertile couples. Prior to conducting the analysis, all variables were examined for missing data and data consistency. With each infertile couple considered as a research unit in the study, a couple was excluded if either partner had missing data. Missing data was found for seven males and five females, all from different infertile couples. In addition, there was missing data for both partners in two couples. With 14 couples excluded, 254 infertile couples (254 males and 254 females) were retained for analysis. The descriptive statistics for the participant's biosocial demographics was summarized in Table 1 for individuals and Table 2 for couples.

Among the 254 infertile Chinese couples, the mean age of males was 30.28 years (SD=4.72) (range 22 - 48 years). The mean age of females was 28.63 years (SD=4.57) (range 21 - 42 years). Age was further coded to a categorical variable for both genders. For males, the frequency and corresponding percentage of the age groups 20 - 25 years, 26 - 30 years, 31 - 35 years and 36 years or more were 40 (15.7%), 103 (40.6%), 78 (30.7%) and 33 (13.0%), respectively. For females, the frequency and percentage of the age groups 20 - 25 years, 26 - 30 years, 31 - 35 years and 36 years or more were 70 (27.6%), 107 (42.1%), 50 (19.7%) and 27 (10.6%), respectively. Chi-square testing to explore the gender difference across the levels of age and education found significant difference in age group between the males and females ($\chi^2=14.983$, $df=3$, $p=.002$). Almost double the females (27.6%) than males (15.7%) were aged 20 - 25 years. Most males (40.6%) and females

(42.1%) were in the age group of 26 - 30 years. Few males (13.0%) and females (10.6%) were 36 years or more. The result of independent samples test (Table 1) indicated there was significant difference between the mean age of the males and females in the sample ($t=9.52$, $p<.001$). Additionally, most males (57.1%) and females (59.1%) were in primary education level. There was no significant difference in education level between males and females ($\chi^2=.691$, $df=2$, $p=.708$).

Table 1. Biosocial Demographics Data of Individuals in Quantitative Survey

Variables	Males [n (%)]	Females [n (%)]	p
Age group			
20 - 25 years	40 (15.7)	70 (27.6)	.002
26 -30 years	103 (40.6)	107 (42.1)	
31 -35 years	78 (30.7)	50 (19.7)	
36 years or more	33 (13.0)	27 (10.6)	
Education level			
Primary level	145 (57.1)	150 (59.1)	.708
Middle level	76 (29.9)	77 (30.3)	
High level	33 (13.0)	27 (10.6)	

Table 2. Biosocial Demographics Data of Couples in Quantitative Survey

Variables	N (%)	Variables	N (%)
Economic level		Length of marriage	
Low class	138 (54.3)	1 - 3 years	111 (43.7)
Medium class	58 (22.8)	4 - 6 years	80 (31.5)
High class	58 (22.8)	7 years or more	63 (24.8)
Type of infertility diagnosis		Infertility duration	
Male factor	96 (37.8)	1 -3 years	173 (68.1)
Female factor	38 (15.0)	4 - 6 years	50 (19.7)
Combined factors	23 (9.1)	7 years or more	31 (12.2)
Unexplained factors	97 (38.2)		

In terms of the economic status, most couples (54.3%) belonged to the low economic class. As for the length of marriage in infertile couples, nearly half of infertile couples (43.7%) had been married for 1-3 years, lower than one third of infertile couples (24.8%) with 7 years or more in marriage length. There were 96 couples (37.8%) diagnosed as infertile due to a male factor only, 38 couples (15.0%) diagnosed due to a female factor only, 23 couples (9.1%) diagnosed with both male and female factors, and the remaining 97 couples (38.2%) were diagnosed as infertile with unexplained factors. Amongst those who were infertile due to a male

factor, nearly 70% had low sperm count and the remainder were diagnosed with high semen viscosity or varicocele. The common female factors (85%) included fallopian tubes or a problem with ovulation and a few anovulation or endometrial problems. Additionally, over three fifths of infertile couples' infertility experience were less than 3 years, and 31.9% of infertile couples experiencing infertility more than 4 years.

4.3 Results

4.3.1 Research Question 1: what is the relationship between biosocial demographics and infertility stress perceived by infertile couples?

4.3.1.1 Test of normality and homogeneity of variance

The level of specific infertility stress in the respective biosocial demographical groups were assessed for normality using the Kolmogorov-Smirnov/Shapiro-Wilk tests. Both skewness and kurtosis were checked for being within the acceptable range (between -1.0 and +1.0), and a histogram was visually examined. In addition, each specific infertility stress was inspected by group for homogeneity of variance in husbands and wives separately. The results (Appendix 1) show some variables were departing from normal distribution across different biosocial demographics ($p < .05$). The detail information was provided below.

For husbands, the score for sexual concern, relationship concern, rejection of childless lifestyle and the need for parenthood were not normally distributed in one or two different age groups; sexual concern, relationship concern, rejection of childless lifestyle and global stress were not normally distributed in one of different education level groups; relationship concern, rejection of childless lifestyle and the need for parenthood were not normally distributed in one or two different economic level groups; relationship concern and rejection of childless lifestyle were not normally distributed in one of different length of marriage groups; social concern, sexual concern and rejection of childless lifestyle were not normally distributed in one of types of infertility diagnosis; finally, sexual concern, rejection of childless lifestyle and the need for parenthood were not normally distributed in one or two groups with different infertility duration separately. For wives, their score for social concern, sexual concern, and rejection of childless lifestyle were not normally distributed in one of age groups separately; sexual concern and relationship concern were not normally distributed in one or two different education level separately;

sexual concern, relationship concern and the need for parenthood not normally distributed in one economic level; sexual concern and global stress not normally distributed in one or two of length of marriage groups; social concern, sexual concern, and the need for parenthood were not normally distributed in one of types of infertility diagnosis; sexual concern was not normally distributed in one of infertility duration groups.

For homogeneity of variance assumption, Levene's test was conducted to examine whether the variances are equal for the respective biosocial demographical groups. The results (Appendix 2) reveal evidence that both sexual concern and rejection of childless lifestyle perceived by husbands were distributed with unequal variance across age groups, with $F=4.465$, $df=3$, $p=.004$ and $F=3.277$, $df=3$, $p=.022$ respectively. Infertility stress related to sexual concern did not meet the assumption of equal variance in type of infertility ($F=4.162$, $df=3$, $p=.007$). For wives from infertile couples, the distribution of relationship concern was not in equal variance across age groups ($F=3.658$, $df=3$, $p=.013$) and economic level ($F=6.799$, $df=3$, $p=.001$). Additionally, infertility stress related to the need for parenthood did not meet the assumption of equal variance in the group with different length of marriage ($F=7.191$, $df=3$, $p=.001$) and infertility duration ($F=4.652$, $df=3$, $p=.01$).

Based on these results from the test of normality and homogeneity of variance, the assumptions of the one-way ANOVA were found to be violated in some groups of biosocial demographics. Thus, non-parametric Kruskal-Wallis (K-Independent Samples Test) was employed to test the significant difference of infertility stress amongst these biosocial demographics groups for husbands and wives separately.

For husbands, Kruskal-Wallis test was used to analyze:

- Social concern across type of infertility diagnosis.
- Sexual concern across age group, education level, type of infertility diagnosis and infertility duration separately.
- Relationship concern across age group, education level, economic level and length of marriage.
- Rejection of childless lifestyle across all biosocial demographics.
- Need for parenthood across age group, economic level and infertility duration.
- Global stress across education level.

For wives, Kruskal-Wallis test was used to analyze:

- Social concern across age group and type of infertility diagnosis separately.
- Sexual concern across all biosocial demographics.
- Relationship concern across age group, education level and economic level.
- Rejection of childless lifestyle across age group.
- Need for parenthood across economic level, length of marriage, type of infertility diagnosis and infertility duration.
- Global stress across length of marriage.

One-way ANOVA was employed to test the significant difference of infertility stress amongst the biosocial demographic groups within which the assumptions of normality and equal variances can be assumed for husbands and wives separately.

4.3.1.2 Results of analysis on husbands' infertility stress in relation to biosocial demographics

Table 3 presents a summary of results obtained from one-way ANOVA and Kruskal–Wallis test examining differences in specific infertility stress in relation to age group, education level, economic level, length of marriage, type of infertility diagnosis and infertility duration in husbands.

For husbands from infertile couples, significant associations were found between sexual concern ($F=7.403$, $df=2$, $p=.025$), relationship concern ($\chi^2=9.484$, $df=2$, $p=.009$), rejection of childless lifestyle ($\chi^2=9.030$, $df=2$, $p=.011$) and education level respectively; relationship concern ($\chi^2=9.137$, $df=2$, $p=.01$), rejection of childless lifestyle ($\chi^2=10.006$, $df=2$, $p=.007$) and the need for parenthood ($\chi^2=9.820$, $df=2$, $p=.007$) were found to be significantly associated with economic level respectively. Also relationship concern ($\chi^2=8.933$, $df=2$, $p=.011$) was significantly associated with length of marriage; sexual concern ($\chi^2=11.709$, $df=2$, $p=.008$) was significantly associated with type of infertility diagnosis; and rejection of childless lifestyle ($\chi^2=9.356$, $df=2$, $p=.009$) was significantly associated with infertility duration. Furthermore, the results showed significant association between global stress and educational level ($\chi^2=7.171$, $df=2$, $p=.028$), global stress and type of infertility diagnosis ($F=3.256$, $df=3$, $p=.022$), and global stress and infertility

duration ($F=4.276$, $df=2$, $p=.015$). No significant association was found between any infertility stress scores and age group for husbands.

Table 3. Test on Husbands' Infertility Stress in Relation to Biosocial Demographics

Variables	Social concern	Sexual concern	Relationship concern	Rejection of childless lifestyle	Need for parenthood	Global stress
	F/χ^2	F/χ^2	F/χ^2	F/χ^2	F/χ^2	F/χ^2
Age group	1.912 ‡	.766 †	2.228 †	1.803 †	1.282 †	.505‡
Education level	2.400 ‡	7.40 3†*	9.48 4†**	9.030 †*	.365 ‡	7.171 †*
Economic level	.161 ‡	1.518 ‡	9.137 †*	10.006 †**	9.820 †**	.205 ‡
Length of marriage	.550 ‡	1.005 ‡	8.93 3†*	.410 †	.160 ‡	1.946 ‡
Type of infertility diagnosis	2.922 †	11.709†*	2.561 ‡	4.009 †	1.385 ‡	3.256 †*
Infertility duration	.975 ‡	4.483 †	1.95 4‡	9.356 †**	5.168 †	4.276 ‡*

Note: 1. “†” refers to χ^2 value in Kruskal–Wallis test; “‡” refers to F value in ANOVA.

2. * means $p<.05$; ** means $p<.01$.

When overall significant differences were confirmed by ANOVA, Post–hoc comparisons using the Fisher LSD test were conducted for examining which pairs of groups are different from each other; that is a further understanding of the differences of specific infertility stress among different subgroups. Based on Kruskal–Wallis testing results with statistically significant mean rank differences in different biosocial demographics, further, Mann-Whitney U-test was used for pairwise comparisons. The following analyses further demonstrated the association between infertility stress and biosocial demographics.

(1) Difference of sexual concern, relationship concern, rejection of childless lifestyle and global stress in husbands with different education level

In order to understand the difference within different education groups, Mann-Whitney U-test was conducted for pairwise comparisons. The results in Table 4 indicate that there was significant difference between the groups with respect to education level. Thus, husbands with primary level education had higher median value in sexual concern, relationship concern, rejection of childless lifestyle and global stress, compared with husbands with high level education.

Additionally, there were statistically significant difference between the middle level education group and high level education group in relationship concern, rejection of childless lifestyle and global stress, except for sexual concern. Thus,

husbands with middle level education had higher median value in relationship concern, rejection of childless lifestyle and global stress, compared with husbands with high level education.

Table 4. Difference of Sexual Concern, Relationship Concern, Rejection of Childless Lifestyle and Global Stress between Different Education Level

Groups	Sexual concern		Relationship concern		Rejection of childless lifestyle		Global stress	
	Mean rank	Z	Mean rank	Z	Mean rank	Z	Mean rank	Z
①	94.50	-2.72**	95.11	-3.05**	95.00	-2.99**	94.38	-2.65**
③	67.52		64.86		65.32		68.08	
②	58.27	-1.64	59.84	-2.43*	60.01	-2.51*	59.57	-2.29*
③	47.47		43.86		43.47		44.48	
①	114.42	-1.10	113.16	-.69	111.62	-.20	111.08	-.01
②	104.47		106.89		109.82		110.96	

Note: 1. ① refers to primary level education; ② refers to middle level education; ③ refers to high level education.

2. * means $p < .05$; ** means $p < .01$.

There was no statistically significant difference in these four reported infertility stress between husbands in primary level education groups and middle level education groups, however, the results indicated husbands in primary level education level groups had higher median value of these infertility related stress compared with those in the medium level education groups. This might indicate a trend that husbands experienced lower levels of these specific infertility stress with the increasing of education level.

(2) Difference of relationship concern, rejection of childless lifestyle and the need for parenthood in husbands from couples with different economic level

Table 5 reveals there was no statistically significant difference in reported infertility stress between low economic class group and medium economic class. Husbands from family with high economic class had the lowest median value of relationship concern and rejection of childless lifestyle, compared with other two economic level groups.

Additionally, it was interesting that husbands from family with high economic class had the highest median value in the need for parenthood, compared with other two economic level groups respectively.

Table 5. Difference of Relationship Concern, Rejection of Childless Lifestyle and the Need for Parenthood between Different Economic Level

Groups	Relationship concern		Rejection of childless lifestyle		Need for parenthood	
	Mean rank	Z	Mean rank	Z	Mean rank	Z
①	106.14	-2.92**	105.86	-2.81**	92.05	-2.46*
③	80.31		80.98		113.84	
②	64.44	-2.54*	67.32	-2.83**	48.66	-3.15**
③	42.56		49.68		68.34	
①	101.39	-1.10	96.99	.58	100.86	-.90
②	91.62		102.09		92.90	

Note: 1. ① refers to low economic class; ② refers to medium economic class; ③ refers to high economic class.

2. * means $p < .05$; ** means $p < .01$.

(3) Difference of relationship concern in husbands with different length of marriage

The results of Mann-Whitney U-test for pairwise comparison indicated there was statistically significant difference ($Z = -2.852$, $p = .004$) in relationship concern between husbands with 7 years or more of length of marriage and 1–3 years of length of marriage. Though there were no statistical significant differences found in other two pair groups ($p > .15$), the results of three pairwise comparisons indicated the trend that husbands had increasing median value of relationship concern, with the increasing of length of marriage.

(4) Difference of sexual concern and global stress in husbands from couples with different diagnosis of infertility

The results of Mann-Whitney U-test for pairwise comparison showed husbands from couples with male factor infertility had higher median value of sexual concern, compared with husbands from couples with female factor infertility ($Z = -3.257$, $p = .001$) and couples with unexplained factor infertility ($Z = -1.965$, $p = .049$) respectively. However, the results didn't find any statistically significant difference in the median value of sexual concern within other pairwise groups ($p > .05$).

Additionally, by Post-hoc comparisons using the Fisher LSD test, Table 6 indicates husbands from couples with unexplained factor infertility had the lowest global stress score. Husbands from couples diagnosed as male factor ($p = .007$) and female factor ($p = .015$) had significant higher global stress scores on average than

husbands from couples with unexplained factor respectively.

Table 6. Difference of Global Stress in Husbands from Couples with Different Infertility Diagnosis

Groups	N	Global stress (M±SD)	F	p
		①>④, ②>④		
① Male factor	96	157.98±23.20	3.256	.022
② Female factor	38	159.74±21.93		
③ Combined factors	23	153.39±24.98		
④ Unexplained factors	97	149.53±19.25		

However, no significant difference was found between husbands from couples diagnosed as combined factors and unexplained factor. No significant difference was found among husbands from couples with male factor infertility, female factor infertility and combined factors infertility. No significant difference was found between husbands from couples with combined factor infertility and unexplained factor infertility.

(5) Difference of rejection of childless lifestyle and global stress in husbands with different infertility duration

Mann-Whitney U-test for pairwise comparison was conducted, the results showed husbands with 1–3 years’ infertility duration had significantly lower median value of rejection of childless lifestyle than husbands with 4–6 years’ infertility duration ($Z=-2.954$, $p=.003$) and husbands with 7 years or over ($Z=-2.357$, $p=.046$) respectively. No significant difference was found between 4-6 years’ infertility duration and 7 years’ or over infertility duration ($Z=-.701$, $p=.484$).

In addition, the results of Post-hoc comparisons using the Fisher LSD test (Table 7) indicated husbands with 1–3 years of infertility had the lowest mean global stress score. Husbands with 4–6 years ($p=.01$) and 7 years or more ($p=.043$) of infertility duration had significant higher global stress score on average than husbands with 1–3 years of infertility respectively. No significant difference was found between husbands with 4–6 years and 7 years or more of infertility duration in terms of their mean global stress scores ($p=.32$).

Table 7. Difference of Global Stress between Different Infertility Duration

Groups	N	Global stress (M±SD)	F	p
		②>①, ③>①		
① 1– 3 years	173	151.88±21.73	4.276	.015
② 4– 6 years	50	160.96±24.11		
③ 7 years or more	31	159.51±17.40		

4.3.1.3 Results of analysis on wives' infertility stress in relation to biosocial demographics

For wives, some statistically significant difference were found in Table 8. For instance, the need for parenthood in relation to age group ($F=2.793$, $df=3$, $p=.041$); sexual concern in relation to education level ($\chi^2=6.809$, $df=2$, $p=.033$); rejection of childless lifestyle in relation to economic level ($F=3.251$, $df=2$, $p=.04$); need for parenthood in relation to length of marriage ($\chi^2=7.959$, $df=2$, $p=.019$); relationship concern in relation to type of infertility diagnosis ($F=2.674$, $df=3$, $p=.048$); need for parenthood in relation to infertility duration ($\chi^2=11.098$, $df=2$, $p=.004$). The results only showed significant association between global stress and educational level ($F=3.694$, $df=2$, $p=.026$).

Table 8. Test on Wives' Infertility Stress in Relation to Biosocial Demographics

Variables	Social concern	Sexual concern	Relationship concern	Rejection of childless lifestyle	Need for parenthood	Global stress
	F/χ^2	F/χ^2	F/χ^2	F/χ^2	F/χ^2	F
Age group	1.256 †	5.458 †	2.625 †	6.951†	2.793 †*	1.693 †
Education level	1.711 †	6.809 †*	5.210 †	2.939†	.557 †	3.694 †*
Economic level	2.884 †	2.469 †	4.996 †	3.251†*	2.162 †	3.021 †
Length of marriage	.877 †	.908 †	1.740 †	2.327†	7.959 †*	.916
Type of infertility diagnosis	2.451 †	4.091 †	2.674 †*	1.396†	5.203 †	1.543 †
Infertility duration	1.710 †	.475 †	.964 †	.217†	11.098 †**	2.453 †

Note: 1. "†" refers to χ^2 value in Kruskal–Wallis test; "‡" refers to F value in ANOVA.

2. * means $p<.05$; ** means $p<.01$.

(1) Difference of the need for parenthood in wives with different age group

The results of Post–hoc comparisons using the Fisher LSD test (Table 9) indicate wives aged 36 years or over had the higher mean score in the need for parenthood compared to women aged 20–25 years and 26–30 years respectively. Though no significant difference were found among other groups ($p=.16$), there was a trend that wives had more stress in the aspect of the need for parenthood with increasing of age.

Table 9. Difference of Need for Parenthood among Different Age Group in Wives

Groups	N	Need for parenthood (M±SD)	F	p
		④>①, ④>②		
① 20 – 25 years	70	39.67±10.45	2.793	.041
② 26 – 30 years	107	39.71±9.03		
③ 31– 35 years	50	41.24±7.89		
④ 36 years or over	27	45.07±9.17		

(2) Difference of sexual concern and global stress in wives with different education

The results of Mann-Whitney U-test for pairwise comparison show wives with primary level education had higher median value of sexual concern than wives with middle level education ($Z=-1.971$, $p=.049$) and wives with high level education ($Z=-2.145$, $p=.032$) respectively.

Additionally, the Post-hoc comparisons using the Fisher LSD test in Table 10 supported the findings that wives with primary level education had a higher mean score for global stress than middle level education ($p=.010$) and high level education respectively ($p=.046$). No other significant differences were found.

Table 10. Difference of Global Stress among Different Education Level in Wives

Groups	N	Global stress(M±SD)	F	p
		①>②, ①>③		
① Primary level	150	159.90±23.49	3.694	.026
② Middle level	77	150.94±26.23		
③ High level	27	152.93±25.62		

(3) Difference of rejection of childless life style in wives from couples with different economic level

ANOVA indicates (Table 11) that there was a significant difference in wives' perceived infertility stress on the rejection of childless lifestyle across different education levels ($F=3.251$, $df=2$, $p=.04$). Wives with high economic class had a lower mean score for rejection of childless lifestyle than women with low economic class ($p=.03$) and women with medium economic class ($p=.02$). No other significant difference was found. However, the mean score of wives' global stress indicates that higher economic level was correlated to lower mean score of infertility stress in rejection of childless lifestyle.

Table 11. Difference of Rejection of Childless Lifestyle between Different Economic Level

Groups	N	Rejection of childless lifestyle	F	p
		(M±SD)		
		①>③, ②>③		
① Low class	138	30.91±7.49	3.251	.04
② Medium class	58	28.93±7.40		
③ High class	58	28.12±8.07		

(4) Difference of the need for parenthood in wives with different length of marriage

The results of Mann-Whitney U-test for pairwise comparison show wives with

7 years or more of length of marriage had higher median value of the need for parenthood than wives with 1–3 years of length of marriage ($Z=-2.637$, $p=.008$) and wives with 4-6 years of length of marriage ($Z=-2.212$, $p=.027$) respectively. No significant difference was found between wives with 1–3 years of length of marriage and wives with 4–6 years of length of marriage ($Z=-0.790$, $p=.430$).

(5) Difference of relationship concern in wives with different infertility diagnosis

As shown in Table 12, ANOVA indicate that there was statistical significant difference in wives' perceived infertility stress on relationship concern across different infertility diagnosis ($F=2.674$, $df=3$, $p=.048$). The results of Post-hoc comparisons using the Fisher LSD test present wives from couples with female factor infertility had higher mean score in relationship concern than wives from couples with male factor infertility and unexplained infertility respectively.

Table 12. Difference of Relation Concern in Wives from Couples with Different Infertility Diagnosis

Groups	N	Relationship concern (M±SD)	F	p
		②>①, ②>④		
① Male factor	96	31.04±5.65	2.674	.048
② Female factor	38	33.34±6.92		
③ Combined factors	23	32.16±5.52		
④ Unexplained factors	97	29.61±4.98		

(6) Difference of the need for parenthood in wives from couples with different infertility duration

The results of Mann-Whitney U-test for pairwise comparison showed wives with 7 years or over of infertility duration had higher median value of the need for parenthood than wives with 1–3 years of infertility duration ($Z=-3.181$, $p=.001$) and wives with 4-6 years of infertility duration ($Z=-2.899$, $p=.004$) respectively.

4.3.1.4 Comparison of infertility stress between husbands and wives

In order to further understand the difference of infertility stress between husbands and wives, a paired samples t-test was employed. Firstly, the wives' value was subtracted from the husbands' value for each of the five specific infertility stress and global stress variables. Secondly, the Kolmogorov-Smirnov procedure in SPSS was conducted to assess whether or not the value differences between the husbands and wives were normally distributed. If the Kolmogorov-Smirnov results

were not significant ($p > .05$), it would indicate that the differences were normally distributed, and a paired samples t-test would be used to investigate the value differences. To the contrary, the Kolmogorov-Smirnov results were significant ($p < .05$), which indicated that the differences were not normally distributed, and Wilcoxon signed rank test was then used to examine the value differences. As Table 13 shows, the Kolmogorov-Smirnov test for the value difference of social concern, sexual concern, relationship concern, rejection of childless lifestyle and the need for parenthood was significant ($p < .001$) but was not significant for global stress ($p = .200$).

Table 13. Test on Normal Distribution for the Differences in Infertility Stress between Husbands and Wives

Variable difference	Skewness	Kurtosis	K-S	p
Social concern	.969	.359	.133	.000
Sexual concern	1.303	1.243	.129	.000
Relationship concern	1.130	1.500	.142	.000
Rejection of childless lifestyle	1.189	1.503	.142	.000
Need for parenthood	1.271	1.316	.151	.000
Global stress	.057	.448	.035	.200

These findings (Table 13) demonstrated a non-normal distribution for the differences on social concern, sexual concern, relation concern, rejection of childless lifestyle and the need for parenthood. Consequently, the Wilcoxon signed rank test was employed and the paired samples t-test was used for the differences for global stress, which followed a normal distribution.

The results in Table 14 and Table 15 revealed there was no statistical significance in the level of global stress between husbands and wives ($p = .295$), relationship concern ($p = .534$), rejection of childless lifestyle ($p = .541$) and the need for parenthood ($p = .865$). Additionally, Global stress score of both husbands and wives demonstrated they had moderately high stress due to both of their score was over 150. However, there was statistical significance in social concern and sexual concern between husband and wives, specifically wives' perceived social concern was significantly higher than that of the husbands' ($p = .003$), and husbands' perceived sexual concern was significantly higher than that of the wives' ($p = .036$).

Table 14. Difference between Husbands and Wives in Global Stress of Infertility

Variable	Husbands	Wives	Paired differences			t	p
	(M ±SD)	(M ±SD)	M	SD	SE		
Global stress	154.60±22.04	156.44±24.84	-1.84	27.90	1.75	-1.050	.295

Table 15. Difference between Husbands and Wives in Specific Infertility Stress

Variables	Ranks	N	Mean Rank	Sum of Ranks	Z	Asymp. Sig.(2-tailed)
Social concern	Negative	101	111.51	11263.00	-2.971	.003
	Positive	139	127.03	17657.00		
	Ties	14				
	Total	254				
Sexual concern	Negative	121	139.21	16752.50	-2.480	.036
	Positive	123	117.36	13293.50		
	Ties	10				
	Total	254				
Relationship concern	Negative	113	122.04	13791.00	-.622	.534
	Positive	127	119.13	15129.00		
	Ties	14				
	Total	254				
Rejection of childless lifestyle	Negative	116	116.00	13456.50	-.611	.541
	Positive	121	121.87	14746.50		
	Ties	171				
	Total	254				
Need for parenthood	Negative	120	123.99	14878.50	-.170	.865
	Positive	125	122.05	15256.50		
	Ties	90				
	Total	254				

4.3.2 Research Question 2: what is the relationship between biosocial demographics and various aspects of sexuality in infertile couples?

4.3.2.1 Test of normality and homogeneity of variance

Each dimension of sexuality across biosocial demographics was examined for normality and homogeneity of variance using the same method as for Research Question 1 (see Section 4.3.1.1). The results (Appendix 3 and Appendix 4) show that with regards to husbands' sexual esteem, the assumptions of one-way ANOVA were satisfied across marital duration groups, but were violated across other biosocial demographics groups. Furthermore, with regards to husbands' sexual consciousness, sexual motivation and sexual satisfaction variables, the assumptions of one-way ANOVA have been violated across all biosocial demographics groups. For wives, the assumptions for ANOVA were found to be violated in all biosocial demographics groups. In this case, non-parametric Kruskal-Wallis test was employed.

4.3.2.2 Results of analysis on various aspects of sexuality in husbands from infertile couples

Table 16 presents results based on ANOVA and Kruskal–Wallis tests examining differences of various aspect of sexuality in relation to biosocial demographics. The results indicate husbands’ age and the couple’s length of marriage had no significant effect on any aspect of sexuality.

Table 16. Test on Husbands’ Sexuality in Relation to Biosocial Demographics

Variables	Sexual esteem	Sexual conscious	Sexual motivation	Sexual satisfaction
	F/ χ^2	χ^2	χ^2	χ^2
Age group	3.649 †	2.724 †	2.807 †	5.987 †
Education level	16.017 †**	11.489 †**	8.186 †*	2.042 †
Economic level	1.812 †	2.309 †	7.609 †*	.146 †
Length of marriage	2.386 ‡	1.871 †	.483 †	4.106 †
Type of infertility diagnosis	7.981 †*	1.850 †	9.571 †*	36.963 †**
Infertility duration	2.570 †	7.206 †*	5.754 †	17.283 †**

Note: 1. “†” refers to χ^2 value in Kruskal–Wallis test; “‡” refers to F value in ANOVA.
2.* means $p < .05$; ** means $p < .01$.

The mean rank difference was statistically significance for the variables of husbands’ sexual esteem ($\chi^2=16.017$ $df=2$, $p=.000$), sexual consciousness ($\chi^2=11.489$, $df=2$, $p=.003$) and sexual motivation ($\chi^2=8.186$, $df=2$, $p=.017$) across different education levels; sexual motivation ($\chi^2=7.609$, $df=2$, $p=.022$) across economic levels; sexual esteem ($\chi^2=7.981$, $df=3$, $p=.046$), sexual motivation ($\chi^2=9.571$, $df=3$, $p=.023$) and sexual satisfaction ($\chi^2=36.963$, $df=3$, $p=.000$) across different types of infertility diagnosis; sexual consciousness ($\chi^2=7.206$, $df=2$, $p=.027$) and sexual satisfaction ($\chi^2=17.283$, $df=2$, $p=.000$) across different infertility duration. In order to understand the differences within different biosocial demographic groups, Mann-Whitney U-test was conducted, the results are presented below.

(1) Difference of sexual esteem, sexual consciousness and sexual motivation in husbands with different education level

Table 17 shows that husbands with high level education had statistically significant higher median value of sexual esteem, sexual consciousness and sexual motivation than husbands with primary level education, specifically husbands had higher median value of sexual esteem with the increasing of education level. Additionally, no significant difference was found in sexual consciousness and

sexual motivation variables between middle education level group and high education level group. Furthermore, there was no significance in the median value of sexual esteem, sexual consciousness and sexual motivation between primary education level group and middle level education group.

Table 17. Difference of Sexual Esteem, Sexual Consciousness and Sexual Motivation in Husbands with Different Education Levels

Groups	Sexual esteem		Sexual consciousness		Sexual motivation	
	Mean rank	Z	Mean rank	Z	Mean rank	Z
①	82.29	-3.927**	83.64	-3.208**	84.75	-2.589*
③	121.20		115.24		110.36	
②	49.14	-2.948**	51.81	-1.613	53.24	-.884
③	68.50		62.35		59.05	
①	106.99	-1.291	105.12	-1.903	105.09	-1.906
②	118.64		122.21		122.28	

Note: 1. ① refers to primary level education; ② refers to middle level education; ③ refers to high level education.

2.* means $p < .05$; ** means $p < .01$.

(2) Difference of sexual motivation in husbands with different economic level

The results of Mann-Whitney U-test for pairwise comparison showed husbands with low class of economic level had lower median value of sexual motivation than medium class group ($Z = -2.130$, $p = .033$) and high class group ($Z = -2.303$, $p = .021$) respectively. It is noted that husbands who had higher economic level had higher sexual motivation on average.

(3) Difference of sexual esteem, sexual motivation and sexual satisfaction in husbands from couples with different type of infertility diagnosis

A summary of Mann-Whitney U-test further (Table 18) reveals husbands from infertile couples with male factor infertility had statistically significant lower median value of sexual esteem and sexual motivation, compared with husbands from couples with other three types of infertility (couple with female factor infertility, couple with combined factors infertility, and couple with unexplained factor infertility) respectively. It is interesting that husbands did not have significant difference in sexual esteem and sexual motivation within these three groups. There was no significant difference in sexual satisfaction between husbands from couples with male factor infertility and from couples with female factor infertility, as well as no significant difference was found between husbands from couples with common factors infertility and couples with unexplained factor infertility. However, husbands either in couples with male factor infertility or in couples with female

factor infertility, they had the lowest sexual satisfaction, compared with husbands from couples with combined factors infertility and from couples with unexplained factor infertility.

Table 18. Difference of Sexual Esteem, Sexual Motivation and Sexual Satisfaction in Husbands from Couples with Different Infertility Diagnosis

Groups	Sexual esteem		Sexual motivation		Sexual satisfaction	
	Mean rank	Z	Mean rank	Z	Mean rank	Z
①	65.56	-1.621*	62.63	-2.317*	69.47	-.940
②	72.39		79.80		62.51	
①	58.79	-1.784*	56.39	-2.341*	56.86	-2.038*
③	69.04		75.07		73.11	
①	85.40	-2.881**	88.57	-2.093*	76.24	-5.158**
④	108.48		105.34		117.55	
②	31.46	-.261	30.42	-.330	26.92	-2.317*
③	30.24		31.96		37.74	
②	64.25	-.699	72.14	-.774	42.25	-4.811**
④	69.47		66.38		78.09	
③	52.37	-1.252	66.98	-.998	52.70	-1.203
④	62.43		58.96		62.35	

Note: 1. ① refers to male factor infertility primary; ② refers to female factor infertility; ③ refers to combined factors infertility; ④ refers to unexplained factors infertility.
2. * means $p < .05$; ** means $p < .01$.

(4) Difference of sexual consciousness and sexual satisfaction in husbands from couples with different infertility duration

For sexual satisfaction, Mann-Whitney U-test (Table 19) shows there was significant difference when husbands from infertile couples with 1–3 years' infertility duration were compared with husbands with 4–6 years' and 7 years or over infertility duration respectively. It could be concluded that husbands from infertile couples with 1–3 years' infertility duration had the highest median value in sexual satisfaction. For sexual consciousness, no significant difference was found in relation to infertility duration.

Table 19. Difference of Sexual Consciousness and Sexual Satisfaction in Husbands with Different Infertility Duration

Groups	Sexual consciousness		Sexual satisfaction	
	Mean rank	Z	Mean rank	Z
① 1 – 3 years	112.63	-.272	118.83	-2.953**
② 4 – 6 years	109.82		88.36	
① 1 – 3 years	102.22	-.163	108.46	-3.419**
③ 7 years or over	104.08		69.24	
② 4 – 6 years	40.20	-.390	42.69	-.827
③ 7 years or over	42.29		38.27	

Note: * means $p < .05$; ** means $p < .01$.

4.3.2.3 Results of analysis on various aspects of sexuality in wives from infertile couples

Table 20 presents results of a Kruskal-Wallis test examination of the association between various aspects of wives' sexuality and their biosocial demographics. The results indicate wives' age and economic level had no significant effect on any aspect of their sexuality. However, wives' sexual esteem was found to be related to length of marriage, different type of infertility diagnosis and infertility duration variables. Sexual consciousness was related to education level. Sexual motivation was related to infertility duration, and sexual satisfaction was related to different types of infertility diagnosis.

Table 20. Test on Wives' Sexuality in Relation to Biosocial Demographics

Variables	Sexual esteem	Sexual conscious	Sexual motivation	Sexual satisfaction
	χ^2	χ^2	χ^2	χ^2
Age group	2.621	3.291	2.528	2.041
Education level	2.159	8.252*	4.980	.519
Economic level	.335	2.309	1.805	5.785
Length of marriage	6.430*	.738	5.090	2.511
Type of infertility diagnosis	10.090*	2.490	1.291	12.777**
Infertility duration	10.236**	.134	6.226*	5.136

Note: * means $p < .05$; ** means $p < .01$.

For all the overall significant differences displayed in Table 20, further analysis of significant differences were carried out by Mann-Whitney U-test to locate the different pairs for each dimension of wives' sexuality with respect to corresponding biosocial demographics. The results are below.

(1) Difference of sexual consciousness in wives with different education level

Table 20 indicates that the difference of mean rank in sexual consciousness ($\chi^2=8.252$, $df=2$, $p=.016$) across education levels. The results of Mann-Whitney U-test for pairwise comparison indicated wives with primary level education had significant lower median value of sexual consciousness, compared with wives with middle level education ($Z=-2.171$, $p=.030$) and wives with high level education ($Z=-2.364$, $p=.018$) separately. Though there were no statistical significant differences found between wives with middle level education and wives with high level education in sexual consciousness ($p > .05$), the results of three pairwise comparison indicated the trend that wives had increasing median value of relationship concern, with the increasing of education level.

(2) Difference of sexual esteem in wives from different length of marriage

Table 20 indicates that the difference of mean rank in sexual esteem ($\chi^2=6.430$, $df=3$, $p=.040$) across length of marriage. Furthermore, the results of Mann-Whitney U-test for pairwise comparison indicated wives with longest length of marriage (7 years or more) had significant lower median value of sexual esteem ($Z=-2.555$, $p=.011$), compared with wives with shortest length of marriage (1-3 years). There were no statistical significant differences found between wives with 1-2 years' length of marriage and 3-4 years' length of marriage, as well as between wives with 3-4 years' length of marriage and 7 years' or more length of marriage.

(3) Difference of sexual esteem and satisfaction in wives from different type of infertility diagnosis

Table 20 indicates a difference of mean rank in sexual esteem ($\chi^2=10.090$, $df=3$, $p=.018$) and sexual satisfaction ($\chi^2=12.777$, $df=3$, $p=.005$) across different types of infertility diagnosis. Furthermore, a summary of Mann-Whitney U-test in Table 21 further reveals wives from infertile couples with female factor infertility had lower median value of sexual esteem and sexual satisfaction, compared with wives from couples with other three types of infertility (couple with male factor infertility, couple with combined factors infertility, and couple with unexplained factor infertility) respectively. No significant difference was found in other three pairwise groups.

Table 21. Difference of Sexual Esteem and Sexual Satisfaction in Wives from Couples with Different Infertility Diagnosis

Groups	Sexual esteem		Sexual satisfaction	
	Mean rank	Z	Mean rank	Z
①	73.76	-2.980**	73.31	-2.763**
②	51.70		52.82	
①	60.17	-.108	59.64	-.236
③	59.30		61.52	
①	98.54	-.382	93.42	-.889
④	95.48		100.54	
②	26.99	-2.283*	26.74	-2.423*
③	37.63		38.04	
②	53.30	-2.746**	49.18	-3.513**
④	73.76		75.37	
③	61.07	-.087	57.15	-.516
④	60.37		61.29	

Note: 1. ① refers to male factor infertility primary; ② refers to female factor infertility; ③ refers to combined factors infertility; ④ refers to unexplained factors infertility.
2. * means $p<.05$; ** means $p<.01$.

(4) Difference of sexual esteem and sexual motivation in wives from different infertility duration

Table 20 shows results of Kruskal-Wallis procedures, which indicated the difference of mean rank in sexual esteem ($\chi^2=10.236$, $df=2$, $p=.006$) and sexual satisfaction ($\chi^2=6.226$, $df=2$, $p=.044$) across different infertility duration variables. Mann-Whitney U-test further (Table 22) reveals that wives with 1–3 years' infertility duration had higher median value in sexual esteem and sexual motivation than wives with 7 years or over of infertility duration. No significant difference was found in other two pairwise groups ($p>.05$). However, the results provide the trend that longer infertility duration, lower median value in sexual esteem and sexual motivation.

Table 22. Difference of Sexual Esteem and Sexual Motivation in Wives Different Infertility Duration

Groups	Sexual esteem		Sexual motivation	
	Mean rank	Z	Mean rank	Z
① 1 – 3 years	115.35	-1.447	114.83	-1.221
② 4 – 6 years	100.42		102.22	
① 1 – 3 years	107.81	-3.048**	106.58	-2.337*
③ 7 years or over	72.89		79.76	
② 4 – 6 years	44.49	-1.712	43.65	-1.293
③ 7 years or over	35.37		36.73	

Note: * means $p<.05$; ** means $p<.01$.

4.3.2.4 Comparison of sexuality between husbands and wives from infertile couples

In order to further understand differences in sexual variables between the husband and wife, the study utilized the paired samples t-test, using the same process described in Section 4.3.1.4, the normality of value differences in sexuality variables was checked. The results (Table 23) reveal significant differences in various aspects of sexuality between husbands and wives. Thus, the non-parametric version of paired samples t-test, Wilcoxon signed rank test was employed to check the difference in sexual esteem, sexual consciousness and sexual motivation between husbands and wives.

Table 23. Test on Normal Distribution for the Differences between Husbands and Wives in Sexuality

Variable difference	Skewness	Kurtosis	K-S	p
Sexual esteem	-.186	-.444	.080	.000
Sexual consciousness	-.273	.049	.060	.027
Sexual motivation	-.146	.004	.091	.000
Sexual satisfaction	.192	-.031	.071	.004

The results in Table 24 revealed significant differences were found between husbands and wives ($p < .05$) for each sexuality variable, husbands had a higher mean rank than wives in all sexuality variables. However, considering of median value of each dimension of sexuality, both husbands and wives were found in the middle level.

Table 24. Difference between Husbands and Wives in Sexuality

Variables	Ranks	N	Mean Rank	Sum of Ranks	Z	Asymp. Sig. (2-tailed)
Sexual esteem	Negative	144	129.92	18708.50	-3.817	.000
	Positive	97	107.76	10452.50		
	Ties	13				
	Total	254				
Sexual consciousness	Negative	137	119.98	16437.00	-2.996	.003
	Positive	94	110.20	10359.00		
	Ties	23				
	Total	254				
Sexual motivation	Negative	152	121.37	18448.00	-4.122	.000
	Positive	85	114.76	9755.00		
	Ties	17				
	Total	254				
Sexual satisfaction	Negative	128	117.75	15072.50	-2.420	.016
	Positive	97	106.73	10352.50		
	Ties	29				
	Total	254				

4.3.3 Research Question 3: what is the relationship between biosocial demographics and marital well-being in infertile couples?

4.3.3.1 Test of normality and homogeneity of variance

In this study, the Dyadic Adjustment Scale (DAS) and the Kansas Marital Satisfaction scale (KMSS) were combined to assess marital well-being in infertile couples. As a comprehensive approach, the combined two instruments are more helpful for the discussion of marital well-being. Prior to data analysis, both Kolmogorov-Smirnov's and Levene's tests were performed to check the normality and homogeneity of variance across biosocial demographics. These procedures were also used in the study of Research Question One (Section 4.3.1) and Research Question Two (Section 4.3.2).

Appendices 5 and 6 reveal husbands' dyadic consensus was not normally distributed across the type of infertility diagnosis; dyadic cohesion was also not normally distributed across the following variables: economic level, type of infertility diagnosis and infertility duration. Thus, the assumption of one-way

ANOVA was violated. Furthermore, the total DAS was found not to adhere to the assumptions of one-way ANOVA across education levels, economic levels, categories of marriage duration, types of infertility diagnosis and categories of infertility duration, due to non-normally distributed or heterogeneity of variance. In contrast, the assumptions for one-way ANOVA were met for other marital well-being variables across different categories of biosocial demographics. The dyadic consensus of wives met the assumptions of ANOVA in the categories of infertility duration, as well as dyadic cohesion in different economic levels; dyadic satisfaction in different education levels, categories of marriage duration and types of infertility diagnosis. The assumptions for one-way ANOVA were violated for other marital well-being variables across different categories of biosocial demographics.

4.3.3.2 Results of analysis on husbands' marital well-being (marital adjustment and marital satisfaction) in relation to biosocial demographics

Table 25 presents the results of ANOVA and Kruskal-Wallis tests for examining differences in marital adjustment (dyadic consensus, dyadic cohesion, dyadic satisfaction, affectional expression, and DAS total) and marital satisfaction in relation to age group, education level, economic level, marriage duration, type of infertility diagnosis and infertility duration in husbands.

Both marital adjustment (each dimension of dyadic adjustment and DAS total) and marital satisfaction in husbands were not related to their economic level and infertility duration, however, significant effect was found for dimensions of dyadic adjustment, DAS total, and marital satisfaction in relation to certain biosocial demographics. Full details were reported in Table 25.

Table 25. Test on Husbands' Marital Well-being in Relation to Biosocial Demographics

Variables	Dyadic consensus	Dyadic cohesion	Dyadic satisfaction	Affectional expression	DAS total	Marital satisfaction
	F/ χ^2	F/ χ^2	χ^2	χ^2	F/ χ^2	χ^2
Age group	2.614 ‡	.419 ‡	17.755 ***	3.891 †	4.437 ‡**	1.086 †
Education level	1.611 ‡	2.544 ‡	1.293 †	1.492 †	2.516 †	12.558 ***
Economic level	.653 ‡	5.972 †	4.146 †	5.569 †	4.350 †	3.574 †
Length of marriage	3.700 ‡*	.721 ‡	9.011 ‡*	2.219 †	10.837 ***	4.025 †
Type of infertility diagnosis	34.588***	23.408***	93.327 ***	2.049 †	76.595 ***	7.917**
Infertility duration	.547 ‡	1.062 †	3.470 †	.578 †	2.189 †	4.323 †

Note: 1. “†” refers to χ^2 value in Kruskal–Wallis test; “‡” refers to F value in ANOVA.

2. * means $p < .05$; ** means $p < .01$.

Again, for all significant differences found (Table 25), further analysis was performed to gain a deep understanding of how marital well-being varies across different categories of biosocial demographics variables. The results are presented below.

(1) Difference of dyadic satisfaction and DAS total in husbands with different age group

Table 25 indicates significant effects for husbands’ dyadic satisfaction in relation to their age ($\chi^2=17.755$, $df=3$, $p=.000$). Furthermore, Mann-Whitney U test was used for pairwise comparison of age groups, the results show a significance between group aged 36 years or over and group aged 20 – 25 years ($Z=-4.148$, $p=.000$); between group aged 36 years or over and group aged 26 – 30 years ($Z=-3.932$, $p=.000$); also between group aged 36 years or over and group aged 31 – 35 years ($Z=-3.227$, $p=.001$). Specifically, husbands from oldest age group (aged 36 years or over) had lowest median value of dyadic satisfaction.

ANOVA (Table 26) indicates there was a significant association of husbands’ age group with their DAS total ($F=4.437$, $df=3$, $p=.005$). Further, the results of Post-hoc comparisons using the Fisher LSD test (Table 26) indicated husbands aged 36 years or more had the lowest mean score of DAS total, with a significant mean difference compared with the other age groups. Husbands aged 20-25 years had the highest mean score (DAS total), but the mean difference was not statistically significant ($p>.05$) compared with husbands aged 26-30 years and 31-35 years respectively.

Table 26. Difference of DAS Total in Husbands with Different Age Group

Groups	N	DAS total (M±SD)	F	p
		①>④>,②>④,③>④		
① 20 – 25 years	40	99.13±14.64	4.437	.005
② 26 – 30 years	103	97.76±21.04		
③ 31 – 35 years	78	98.22±20.76		
④ 36 years or over	33	84.91±16.86		

(2) Difference of marital satisfaction in husbands with different education level

Regarding husbands’ marital satisfaction, significant difference across different education levels ($\chi^2=12.558$, $df=2$, $p=.002$) was concluded by Kruskal–Wallis test in Table 25. For the pairwise comparison of husbands’ marital satisfaction, the results of Mann-Whitney U test demonstrated a significance between primary level education group and high level education group ($Z=-3.428$,

p=.001), also between primary level education group and middle level education group ($Z=2.365$, $p=.018$). Specifically, husbands with high level education had the highest median value of marital satisfaction.

(3) Difference of dyadic consensus, dyadic satisfaction and DAS total in husbands with different length of marriage

Table 27 concludes there was significant effect of marriage duration on the change in husbands' dyadic consensus ($F=3.700$, $df=2$, $p=.026$). By performing Post-hoc comparisons using the Fisher LSD test, the results in Table 27 further indicated that husbands with 1-3 years marriage duration had the highest mean score of dyadic consensus, and husbands with 4-6 years marriage duration had the lowest score of dyadic consensus. There was a significant difference in the mean scores between these two groups ($p<0.05$), but no significant difference in the mean score of dyadic consensus was found between husbands' marriage duration with 4-6 years and 7 years or more.

Table 27. Difference of Dyadic Consensus in Husbands with Different Length of marriage

Groups	N	Dyadic consensus (M±SD)	χ^2	p
		①>②, ①>③		
① 1– 3 years	111	42.64±9.33	3.700	.026
② 4 –6 years	80	39.01±10.66		
③ 7 years or more	63	39.75±9.18		

The results from Table 28 show that husbands with 1–3 years' length of marriage had higher median value of DAS total, compared with 4 – 6 years' length of marriage ($Z=-2.322$, $p=.020$) and 7 years or more length of marriage ($Z=-3.008$, $p=.003$). Also, the median value of dyadic satisfaction in husbands with 1–3 years' length of marriage was significantly higher than husbands with 7 years or more length of marriage ($Z=-2.898$, $p=.004$).

Table 28. Difference of Dyadic Satisfaction and DAS Total in Husbands with Different Length of Marriage

Groups	Dyadic satisfaction		DAS total	
	Mean rank	Z	Mean rank	Z
① 1 – 3 years	101.67	-1.672	103.88	-2.322*
② 4 – 6 years	88.13		85.06	
① 1 – 3 years	95.82	-2.898**	96.15	-3.008**
③ 7 years or over	72.83		72.25	
② 4 – 6 years	76.39	-1.429	75.11	-1.013
③ 7 years or over	66.43		68.05	

Note: * means $p<.05$; ** means $p<.01$.

(4) Difference of dyadic consensus, dyadic cohesion, dyadic satisfaction, DAS total and marital satisfaction in husbands from couples with different type of infertility diagnosis

A summary of Mann-Whitney U-test further (Table 29) reveals husbands from infertile couples with female factor infertility had lower median value of dyadic consensus, dyadic cohesion, dyadic satisfaction and DAS total, compared with husbands from couples with other three types of infertility (couple with male factor infertility, couple with combined factors infertility, and couple with unexplained factor infertility) respectively. Also, the results showed husbands from couples with the combined factors infertility had significant lower median value of dyadic consensus and DAS total, compared with husbands from couples with male factor infertility and husbands from couples with unexplained factors infertility respectively.

Furthermore, the results of Mann-Whitney U-test demonstrate only husbands from couples with female factor infertility had statistically significantly lower median value of marital satisfaction than husbands from couples with unexplained factor infertility ($Z=-2.50$, $p=.012$).

Table 29. Difference of Dyadic Consensus, Dyadic Cohesion, Dyadic Satisfaction, DAS Total and Marital Satisfaction in Husbands from Couples with Different Infertility Diagnosis

Groups	Dyadic consensus		Dyadic cohesion		Dyadic satisfaction		DAS total		Marital satisfaction	
	Mean Rank	Z	Mean Rank	Z	Mean Rank	Z	Mean Rank	Z	Mean Rank	Z
①	77.18	-4.59**	76.80	-4.42**	85.99	-8.77**	83.51	-7.59**	69.82	-1.11
②	43.05		44.01		20.79		27.05		61.63	
①	63.08	-1.99*	60.85	-.55	62.80	-1.81	63.45	-2.23*	60.73	-.48
③	47.15		56.46		48.30		45.59		56.93	
①	95.18	-.45	99.27	-.56	102.47	-1.36	98.90	-.47	89.70	-1.81
④	98.80		94.76		91.58		95.12		104.23	
②	27.96	-1.72*	25.05	-3.38**	20.32	-6.08**	21.34	-5.46**	30.33	.70
③	36.02		40.83		48.65		46.96		32.11	
②	36.87	-5.79**	44.79	-4.33**	21.09	-8.73**	24.78	-8.04**	54.61	2.50*
④	80.20		77.09		86.38		84.93		73.25	
③	44.17	-2.51*	60.20	-.05	54.20	-.97	45.02	-2.38*	49.76	-1.65
④	64.37		60.57		61.99		64.17		63.05	

Note: 1. ① refers to male factor infertility primary; ② refers to female factor infertility; ③ refers to combined factors infertility; ④ refers to unexplained factors infertility.
2. * means $p<.05$; ** means $p<.01$.

4.3.3.3 Results of analysis on wives' marital well-being (marital adjustment and marital satisfaction) in relation to biosocial demographics

The results of ANOVA and Kruskal-Wallis testing (Table 30) indicate an association between wives' marital adjustment and various biosocial demographics. Specific association was found between dyadic consensus and types of infertility, dyadic cohesion and education level, dyadic satisfaction and age group, marriage duration and infertility duration, affectional expression and education level, DAS total and education level, and marriage duration and infertility duration. Wives' marital satisfaction was related to education level, economic level, type of infertility and infertility duration.

Table 30. Test on Wives' Marital Well-being in Relation to Biosocial Demographics

Variables	Dyadic consensus	Dyadic cohesion	Dyadic satisfaction	Affectional expression	DAS total	Marital satisfaction
	F/ χ^2	F/ χ^2	F/ χ^2	χ^2	χ^2	χ^2
Age group	.270 †	.749 †	10.189 †*	.224 †	1.195 †	3.964 †
Education level	4.648 †	7.457 †*	.356 ‡	7.398 †*	6.119 †*	10.514 †**
Economic level	2.494 †	1.884 ‡	.096 †	.509 †	2.049 †	8.409 †*
Length of marriage	2.572 †	3.218 †	9.605 †**	.797 †	8.862 †*	5.602 †
Type of infertility diagnosis	8.242 †*	2.182 †	1.852 ‡	3.307 †	7.102 †	22.663 †**
Infertility duration	.755 ‡	.920 †	19.205 †**	4.855 †	6.385 †*	9.345 †**

Note: 1. “†” refers to χ^2 value in Kruskal–Wallis test; “‡” refers to F value in ANOVA.

2. * p<.05; ** p<.01.

(1) Difference of dyadic satisfaction in wives with different age group

The results of Kruskal–Wallis Test in Table 30 indicate the difference of dyadic satisfaction was statistically significant across different age groups ($\chi^2=10.189$, $df=3$, $p=.017$). Furthermore, the results of Mann-Whitney U-test indicate that wives from youngest age group (aged 20-25 years) had significant higher median value of dyadic satisfaction, compared with the group aged 31-35 years ($Z=-2.864$, $p=.004$) and the group aged 36 years or over ($Z=-2.443$, $p=.015$).

(2) Difference of dyadic cohesion, affectional expression, DAS total and marital satisfaction in wives with different education level

The results of Kruskal–Wallis test in Table 30 indicate there were significant differences of dyadic cohesion ($\chi^2=7.457$, $df=2$, $p=.024$), affectional expression ($\chi^2=7.398$, $df=2$, $p=.025$), DAS total ($\chi^2=6.119$, $df=2$, $p=.047$) and marital

satisfaction ($\chi^2=10.514$, $df=2$, $p=.005$) across education levels. Furthermore, a summary of the results of Mann-Whitney U tests in Table 31 for pairwise comparisons indicate wives with high level education had higher median value of dyadic cohesion, compared with primary education level group ($Z=-2.657$, $p=.008$) and middle education level group ($Z=-2.469$, $p=.014$) respectively. Wives with primary education level had lower median value of DAS ($Z=-2.282$, $p=.023$) total and marital satisfaction.

It is noted that wives with primary level education had lowest median value of affectional expression, DAS total and marital satisfaction, compared those with middle level education groups and high level education groups.

Table 31. Difference of Dyadic Cohesion, Affectional Expression, DAS Total and Marital Satisfaction between Different Education Level

Groups	Dyadic cohesion		Affectional expression		DAS total		Marital satisfaction	
	Mean rank	Z	Mean rank	Z	Mean rank	Z	Mean rank	Z
①	113.51	-.158	106.66	-2.381*	106.88	-2.282*	107.06	-2.233*
②	114.96		128.30		127.88		127.52	
①	84.67	-2.657**	86.08	-2.506*	83.63	-2.249*	84.49	-2.773**
③	113.06		105.20		112.15		114.06	
②	48.19	-2.469*	51.80	-.406	52.08	-.241	50.25	-1.291
③	64.80		54.50		53.70		58.91	

Note: 1. ① refers to primary level education; ② refers to middle level education; ③ refers to high level education.

2. * means $p < 0.05$; ** means $p < 0.01$.

(3) Difference of marital satisfaction in wives with different economic level

Significant effect was obtained for wives' marital satisfaction in relation to economic level ($\chi^2=8.409$, $df=2$, $p=.015$), which was showed in Table 30. A summary of the results of Mann-Whitney U tests for pairwise comparisons indicates that wives with high economic class had higher median value of marital satisfaction, compared with low economic class group ($Z=-2.839$, $p=.005$) and medium class group ($Z=-2.140$, $p=.032$). The results demonstrated a trend that wives' economic level was positively related their marital satisfaction.

(4) Difference of dyadic satisfaction and DAS total in wives with length of marriage

Post-hoc testing in Table 32 reveals there was no significant difference ($p > .05$) in dyadic satisfaction between wives with 4–6 years' length of marriage and 7 years or over length of marriage. However, significant differences ($p < .05$) were found,

when wives with 1- 3 years' length of marriage were compared with those who married for 4–6 years' and 7 years or over in their marriage, respectively. The results provided that lower dyadic satisfaction relating to longer length of marriage.

Table 32. Difference of Dyadic Satisfaction in Wives with Different Length of Marriage

Groups	N	Dyadic satisfaction (M±SD)	F	p
		①>②,①>③		
① 1 – 3 years	111	37.04±5.10	9.605	.000
② 4 – 6 years	80	35.09±5.58		
③ 7 years or over	63	33.40±5.56		

(5) Difference of dyadic consensus and marital satisfaction in wives from couples with different type of infertility diagnosis

The results of Kruskal–Wallis test (Table 30) indicate there were significant difference in mean rank of dyadic consensus ($\chi^2=8.242$, $df=3$, $p=.041$) and marital satisfaction ($\chi^2=22.663$, $df=3$, $p=.000$) across different types of infertility diagnosis. Furthermore, Table 33 demonstrates that wives from couples with female factor infertility had statistically significant lower median value of marital satisfaction, compared with other three types of infertility (couple with male factor infertility, couple with combined factors infertility, and couple with unexplained factor infertility) respectively. In addition, it was found that wives from couples with male factor infertility had higher median value of dyadic consensus than wives from couples with female factor infertility and couple with unexplained factors infertility.

Table 33. Difference of Dyadic Consensus and Marital Satisfaction in Wives from Couples with Different Infertility Diagnosis

Groups	Dyadic consensus		Marital satisfaction	
	Mean Rank	Z	Mean Rank	Z
①	71.80	-2.040*	76.53	-4.299**
②	56.63		44.70	
①	59.50	-.323	60.21	-.135
③	62.09		59.13	
①	105.97	-2.221*	96.86	-.035
④	88.12		97.14	
②	28.00	-1.698	26.04	-2.821**
③	35.96		39.20	
②	65.43	-.477	43.75	-4.535**
④	69.01		77.50	
③	71.78	-1.732	59.74	-.117
④	57.82		60.68	

Note: 1. ① refers to male factor infertility primary; ② refers to female factor infertility; ③ refers to combined factors infertility; ④ refers to unexplained factors infertility.

2. * means $p<.05$; ** means $p<.01$.

(6) Difference of dyadic satisfaction, DAS total and marital satisfaction in wives from couples with different infertility duration

The results of Kruskal–Wallis test (Table 30) indicates there were significant difference in mean rank of dyadic satisfaction ($\chi^2=19.205$, $df=2$, $p=.000$), DAS total ($\chi^2=6.385$, $df=2$, $p=.041$), and marital satisfaction ($\chi^2=9.345$, $df=2$, $p=.009$) across different infertility duration. Furthermore, the results from Table 34 showed that wives with highest infertility duration (7 years or over) had significant lower median value of dyadic satisfaction, DAS total and marital satisfaction, comparing with 1-3 years group and 4-6 years group separately. This result indicated longer the duration of infertility might have negative effect on the marital well-being.

Table 34. Difference of Dyadic Satisfaction, DAS Total and Marital Satisfaction in Wives with Different Infertility Duration

Groups	Dyadic satisfaction		DAS total		Marital satisfaction	
	Mean rank	Z	Mean rank	Z	Mean rank	Z
①1 – 3 years	116.20	-1.811	112.95	-.410	113.20	-.519
②4 – 6 years	97.47		108.71		107.85	
①1 – 3 years	109.89	-4.230**	106.87	-2.500*	107.83	-3.063**
③7 years or over	61.27		78.10		72.76	
②4 – 6 years	46.05	-2.460*	45.00	-2.144*	45.53	-2.213*
③7 years or over	32.85		33.53		33.69	

4.3.3.4 Comparison of marital well-being between husbands and wives from infertile couples

In order to examine the discrepancy between husbands’ and wives’ marital well-being a paired samples t-test was employed. As explained in Section 4.3.1.4, the normality of value differences between husbands and wives in marital adjustment (each dimension of dyadic adjustment and DAS total) and marital satisfaction was assessed first. Table 35 reports the results of Kolmogorov-Smirnov/Lilliefors testing, which showed statistically significant difference for dyadic cohesion, dyadic satisfaction, affectional expression, DAS total and marital satisfaction ($p<.01$). For dyadic consensus, however, there was no significance ($p>.05$). As normality cannot be assumed for the differences of dyadic cohesion, dyadic satisfaction, affectional expression, DAS total and marital satisfaction, the Wilcoxon signed rank test was employed to investigate the differences between husbands and wives. The differences on dyadic consensus had a normal distribution, consequently, a paired samples t-test compared differences

between husbands and wives.

Table 35. Test on Normal Distribution for the Differences between Husbands and Wives in Marital Well-being

Variable difference	Skewness	Kurtosis	K-S	p
Dyadic consensus	.055	-.120	.053	.078
Dyadic cohesion	.205	.863	.088	.000
Dyadic satisfaction	-1.201	1.561	.158	.000
Affectional expression	.017	.422	.107	.000
DAS total	-.348	.820	.085	.000
Marital satisfaction	-.177	.105	.058	.037

Table 36. Difference between Husbands and Wives in Dyadic Consensus

Variable	Husbands	Wives	Paired differences		t	p	
	(Mean ±SD)	(Mean ±SD)	Mean	SD			
Dyadic consensus	40.78±9.84	41.23±10.00	-.45	12.00	.75	-.596	.552

Table 37. Difference between Husbands and Wives in Dyadic Cohesion, Dyadic Satisfaction, Affectional Expression, DAS Total and Marital Satisfaction

Variables	Ranks	N	Mean rank	Sum of ranks	Z	Asymp. Sig. (2-tailed)
Dyadic cohesion	Negative Ranks	97	108.16	10492.00	-2.476	.013
	Positive Ranks	130	118.35	15386.00		
	Ties	27				
	Total	254				
Dyadic satisfaction	Negative Ranks	110	103.02	11332.50	-2.134	.033
	Positive Ranks	122	128.65	15695.50		
	Ties	22				
	Total	254				
Affectional expression	Negative Ranks	122	102.60	12517.50	-1.129	.259
	Positive Ranks	92	113.99	10487.50		
	Ties	40				
	Total	254				
DAS total	Negative Ranks	113	116.35	13148.00	-2.123	.034
	Positive Ranks	136	132.18	17977.00		
	Ties	51				
	Total	254				
Marital satisfaction	Negative Ranks	72	100.62	7244.50	-6.281	.000
	Positive Ranks	162	125.00	20250.50		
	Ties	20				
	Total	254				

Table 36 and Table 37 conclude that there were statistically significant differences between the spouses' dyadic cohesion ($p < .05$), dyadic satisfaction

($p < .05$), DAS total ($p < .05$) and marital satisfaction ($p < .001$), but that there was no difference in dyadic consensus and affectional expression ($p > .05$). However, husbands had lower level of marital adjustment (median value=99) and marital satisfaction (median value=11), as well as wives had lower level of marital adjustment (median value=102) and marital satisfaction (median value=13).

4.3.4 Research Question 4: are there any correlations between infertility stress, sexuality and marital well-being in infertile couples?

In order to explore the relationship between infertility, sexuality and marital well-being in infertile couples, correlation analyses were conducted. The procedure firstly checked whether husbands' and wives' perceived infertility stress and dissimilarity in infertility stress of the husband/wife dyad were correlated with sexuality variables. Subsequently, the associations between husbands' and wives' perceived infertility stress, dissimilarity in infertility stress of the husband/wife dyad, sexuality and marital well-being were analyzed utilizing the Actor Partner Interdependence Model (APIM). The dissimilarity in infertility stress of the husband/wife dyad was calculated by subtracting the wife's specific infertility stress score from the husband's specific infertility stress score (both scores were measured by the FPI). Prior to correlation analysis, any difference in the score between husband and wife was converted to an absolute difference score because the interest was in the size of the discrepancy not the direction of the discrepancy. On this point, higher scores for the dissimilarity in specific infertility stress reflected greater discrepancy in the levels of infertility within the dyad.

As study variables were not normally distributed for both husbands and wives, Spearman correlation coefficients were calculated to test the correlations. The results are presented through the answering of Question 4.1 and Question 4.2 as follows.

4.3.4.1 Question 4–1: are there any correlations between husbands' perceived infertility stress, wives' perceived infertility stress, dissimilarity in infertility stress of husband–wife dyad, husbands' sexuality, and husbands' marital well-being?

Table 38 shows the correlations between dimensions of the following variables: husbands' sexuality and infertility stress, wives' infertility stress, and dissimilarity in infertility stress of the husband - wife dyad.

Husbands' sexual variables were found to be significantly related to almost all

indicators of their perceived infertility stress. More specifically, husbands' sexual esteem was significantly correlated with their social concern ($r = -.247, p < .01$), sexual concern ($r = -.164, p < .01$) and relationship concern ($r = -.153, p < .05$). Sexual consciousness was found to be related to relationship concern ($r = -.214, p < .01$). Sexual motivation had significant correlations with social concern ($r = -.147, p < .05$), sexual concern ($r = -.146, p < .05$), relationship concern ($r = -.252, p < .01$) and rejection of childfree lifestyle ($r = -.148, p < .05$).

No significant correlation was found between the need for parenthood and any indicator of husbands' sexual variables. In addition, husbands' sexual variables were found to be significantly related to three indicators of their wives' perceived infertility stress. Specifically, husbands' sexual esteem was significantly correlated to their wives' relationship concern ($r = -.140, p < .05$). Husbands' sexual consciousness was correlated with their wives' social concern ($r = -.186, p < .01$) and relationship concern ($r = -.200, p < .05$). Husbands' sexual motivation was correlated with their wives' sexual concern ($r = -.123, p < .05$) and relationship concern ($r = -.180, p < .01$); and husbands' sexual satisfaction was correlated with their wives' sexual concern ($r = -.130, p < .05$) and relationship concern ($r = -.145, p < .05$).

Table 38. Correlation between Husbands' Infertility Stress, Wives' Infertility Stress, Dissimilarity in Infertility Stress and Husbands' Sexuality

	Sexual esteem	Sexual consciousness	Sexual motivation	Sexual satisfaction
Husbands' infertility stress				
Social concern	-.247**	-.027	-.147*	-.111
Sexual concern	-.164**	-.112	-.146*	-.138*
Relationship concern	-.153*	-.214**	-.252**	-.146*
Rejection of childfree lifestyle	-.077	-.015	-.148*	-.180**
Need for parenthood	-.013	-.006	-.052	-.078
Wives' infertility stress				
Social concern	-.076	-.186**	-.058	-.082
Sexual concern	-.049	-.037	-.123*	-.130*
Relationship concern	-.140*	-.200**	-.180**	-.145*
Rejection of childfree lifestyle	-.058	-.080	-.043	-.016
Need for parenthood	-.017	-.075	-.015	-.018
Dissimilarity in infertility stress				
Social concern	.111	-.084	.016	-.074
Sexual concern	.047	.119	.051	-.034
Relationship concern	.089	-.122	.045	.014
Rejection of childfree lifestyle	.019	-.027	.005	.005
Need for parenthood	-.099	-.006	-.088	.063

Note: * means correlation is significant at the .05 level (two-tailed); ** means correlation is significant at the .01 level (two-tailed).

All the correlations are negative, indicating husbands and their wives tend to have more infertility stress, with decreasing of husbands' sexuality level. However, no significant correlations were found between each dimension of husbands' sexuality and dissimilarity in infertility stress between husbands and wives.

The results in Table 39 show significant associations between husbands' marital well-being (marital adjustment and marital satisfaction) and their perceived specific infertility stress except for rejection of childfree lifestyle and the need for parenthood.

Table 39. Correlation between Husbands' Infertility Stress and Wives' Infertility Stress, Dissimilarity in Infertility Stress, Husbands' Sexuality and Husbands' Marital Well-being

	Husbands' marital adjustment	Husbands' marital satisfaction
Husbands' infertility stress		
Social concern	-.337**	-.247**
Sexual concern	-.272**	-.218**
Relationship concern	-.286**	-.200**
Rejection of childfree lifestyle	-.038	-.094
Need for parenthood	-.068	-.057
Wives' infertility stress		
Social concern	-.075	-.131*
Sexual concern	-.151*	-.060
Relationship concern	-.114	-.136*
Rejection of childfree lifestyle	-.228*	-.101
Need for parenthood	-.087	-.004
Dissimilarity in infertility stress		
Social concern	.033	.058
Sexual concern	.055	.066
Relationship concern	-.078	.064
Rejection of childfree lifestyle	.021	-.105
Need for parenthood	-.018	-.034
Husbands' sexuality		
Sexual esteem	.260**	.408**
Sexual consciousness	.092	.216**
Sexual motivation	.078	.206**
Sexual satisfaction	.242**	.319**

Note: * means correlation is significant at the .05 level (two-tailed); ** means correlation is significant at the .01 level (two-tailed).

Additionally, husbands' marital adjustment was negatively associated with their own social concern ($r = -.337, p < .01$), sexual concern ($r = -.272, p < .01$) and relationship concern ($r = -.286, p < .01$), respectively. Husbands' marital adjustment was significantly related to their wives' perceived sexual concern ($r = -.151, p < .05$)

and rejection of childfree lifestyle ($r = -.228, p < .05$). Husbands' marital adjustment and their own sexuality are positively associated; that is, husbands' marital adjustment is significantly correlated with their own sexual esteem ($r = .260, p < .01$) and sexual satisfaction ($r = .242, p < .01$). However no associations were found between husbands' marital adjustment and their own sexual consciousness or sexual motivation. Furthermore, husbands' marital satisfaction was significantly negatively correlated with their own perceived infertility stress of social concern ($r = -.247, p < .01$), sexual concern ($r = -.218, p < .01$) and relationship concern ($r = -.200, p < .05$). Husbands' marital satisfaction was also significantly negatively related to their wives' perceived infertility related stress in social concern ($r = -.131, p < .05$) and social concern ($r = -.136, p < .05$). Moreover, husbands' marital satisfaction was found to have significant positive correlation with each dimension of their own sexuality; that is, sexual esteem ($r = .408, p < .01$), sexual consciousness ($r = .216, p < .01$), sexual motivation ($r = .206, p < .01$), and sexual satisfaction ($r = .319, p < .01$). Specifically, no significant effect was found between husbands' marital well-being (marital adjustment and marital satisfaction) and dissimilarity in infertility stress between husbands and wives.

4.3.4.2 Question 4–2: are there any correlations between husbands' infertility stress, wives' infertility stress, dissimilarity in infertility stress of husband–wife dyad, wives' sexuality, and wives' marital well-being?

Table 40 presents the results for correlations between various dimensions of wives' sexuality and husbands' infertility stress, wives' infertility stress and dissimilarity in infertility stress of the husband - wife dyad.

Wives' sexual esteem was significantly negatively correlated with husbands' perceived infertility stress of sexual concern ($r = -.142, p < .05$) and their own perceived infertility stress of social concern ($r = -.125, p < .05$). Wives' sexual consciousness was significantly negatively related to their husbands' perceived infertility stress of social concern ($r = -.123, p < .05$) and their own perceived infertility stress of relationship concern ($r = -.144, p < .05$). Wives' sexual motivation was significantly negatively related to husbands' perceived infertility stress of sexual concern ($r = -.175, p < .05$) and their own perceived infertility stress of social concern ($r = -.130, p < .05$). Wives' sexual satisfaction was significantly negatively correlated to husbands' perceived infertility stress of sexual concern ($r = -.140, p < .05$) and relationship concern ($r = -.145, p < .05$), and also negatively correlated

with their own perceived infertility stress of social concern ($r = -.130, p < .05$) and relationship concern ($r = -.135, p < .05$). No significant correlation was found between wives' sexuality and dissimilarity in infertility stress between husbands and wives.

Table 40. Correlation between Husbands' Infertility Stress, Wives' Infertility Stress, Dissimilarity in Infertility Stress and Wives' Sexuality

	Sexual esteem	Sexual consciousness	Sexual motivation	Sexual satisfaction
Husbands' infertility stress				
Social concern	-.105	-.123*	-.096	-.089
Sexual concern	-.142*	-.048	-.175**	-.140*
Relationship concern	-.058	-.041	-.099	-.145*
Rejection of childfree lifestyle	-.074	-.025	-.024	.007
Need for parenthood	-.078	-.062	-.052	-.038
Wives' infertility stress				
Social concern	-.125*	-.065	-.130*	-.130*
Sexual concern	-.106	-.086	-.109	-.110
Relationship concern	-.066	-.144*	-.049	-.135*
Rejection of childfree lifestyle	-.079	-.020	-.036	-.031
Need for parenthood	-.003	-.110	-.010	-.092
Dissimilarity in infertility stress				
Social concern	-.037	.063	.025	-.015
Sexual concern	.054	.064	-.105	-.047
Relationship concern	-.119	.092	-.039	-.042
Rejection of childfree lifestyle	.020	-.054	-.014	.009
Need for parenthood	.091	.113	.004	-.051

Note: * means correlation is significant at the .05 level (two-tailed); ** means correlation is significant at the .01 level (two-tailed).

The results in Table 41 indicate wives' marital adjustment was related to husbands' perceived infertility stress of social concern ($r = -.248, p < .01$), sexual concern ($r = -.217, p < .01$), relationship concern ($r = -.213, p < .01$) and the need for parenthood ($r = -.161, p < .05$). Additionally, wives' marital adjustment was associated to their own perceived infertility stress of social concern ($r = -.213, p < .01$), sexual concern ($r = -.277, p < .01$), relationship concern ($r = -.306, p < .01$) and the need for parenthood ($r = -.173, p < .01$). Also, wives' marital adjustment was significantly positively correlated with all their own sexuality indicators, except sexual consciousness, namely: sexual esteem ($r = .167, p < .05$), sexual motivation ($r = .195, p < .01$) and sexual satisfaction ($r = .214, p < .01$). Furthermore, wives' marital satisfaction was significantly negatively correlated with husbands'

perceived infertility stress of social concern ($r = -.130, p < .05$), sexual concern ($r = -.155, p < .05$) and relationship concern ($r = -.164, p < .01$).

Additionally, wives' marital satisfaction was significantly negatively related to their own perceived infertility stress of social concern ($r = -.183, p < .01$), sexual concern ($r = -.193, p < .01$), relationship concern ($r = -.161, p < .05$) and the need for parenthood ($r = -.193, p < .01$). Wives' marital satisfaction was found to have significant positive correlation with each dimension of their own sexuality, namely: sexual esteem ($r = .279, p < .01$), sexual consciousness ($r = .185, p < .01$), sexual motivation ($r = .180, p < .01$), and sexual satisfaction ($r = .251, p < .01$). These results indicated wives who had higher values in their own sexuality tended to be more satisfied with their marriages. No significant effect of dissimilarity in infertility stress between husbands and wives was found on wives' marital well-being (marital adjustment and marital satisfaction).

Table 41. Correlation between Husbands' Infertility Stress, Wives' Infertility Stress, Dissimilarity in Infertility Stress, Wives' Sexuality and Wives' Marital Well-being

	Wives' marital adjustment	Wives' marital satisfaction
Husbands' infertility stress		
Social concern	-.248**	-.130*
Sexual concern	-.217**	-.155*
Relationship concern	-.213**	-.164**
Rejection of childfree lifestyle	-.116	-.113
Need for parenthood	-.161*	-.075
Wives' infertility stress		
Social concern	-.213**	-.183**
Sexual concern	-.277**	-.193**
Relationship concern	-.306**	-.161*
Rejection of childfree lifestyle	-.016	-.058
Need for parenthood	-.173**	-.193**
Dissimilarity in infertility stress		
Social concern	-.018	.006
Sexual concern	-.074	.067
Relationship concern	-.044	-.122
Rejection of childfree lifestyle	.022	-.057
Need for parenthood	.081	-.003
Wives' sexuality		
Sexual esteem	.167**	.279**
Sexual consciousness	.100	.185**
Sexual motivation	.195**	.180**
Sexual satisfaction	.214**	.251**

Note: * means correlation is significant at the .05 level (two-tailed); ** means correlation is significant at the .01 level (two-tailed).

4.3.5 Question 5: what is the nature of the relationship between biosocial demographics, infertility stress, sexuality and marital well-being in infertile couples?

Multiple regression analysis was conducted to find predictors that influenced husbands' and wives' marital well-being (marital adjustment and marital satisfaction). All significant variables obtained from univariate analyses mentioned in previous sections were included in the multiple regression analysis to identify their contributions in predicting the outcome variables, namely, marital well-being. Modeling results were presented through answering the following three questions.

4.3.5.1 Question 5–1: are there any effects from biosocial demographics, infertility stress and sexuality on husbands' marital well-being?

In both Section 4.3.3.2 and Section 4.3.4.1 of this chapter, the results indicated husbands' marital adjustment (scored by DAS total) was correlated with:

- Biosocial demographics (husbands' age group, marriage duration and type of infertility diagnosis for couple).
- Husbands' perceived infertility stress (social concern, sexual concern and relationship concern).
- Wives' perceived infertility stress (sexual concern and rejection of childfree lifestyle).
- Husbands' sexuality (sexual esteem and sexual satisfaction).

For husbands' marital satisfaction, it was found to be correlated with:

- Biosocial demographics (husbands' education level, type of infertility diagnosis for couple)
- Husbands' perceived infertility stress (social concern, sexual concern and relationship concern)
- Wives' perceived infertility stress (social concern and relationship concern)
- Husbands' sexuality (sexual esteem, sexual consciousness, sexual motivation and sexual satisfaction).

In order to explore the predictors of biosocial demographics using multiple regression analysis, effect coding was used to transfer categorical variables (biosocial demographics) into dummy variables. The procedure is useful in testing the effect of each group compared with the entire set of groups, rather than with a

reference group (Alkharusi 2012). By this method, membership in a given group or category is assigned a value of 1 when applicable, a value of -1 when the base category applies, or a value of zero. Effect coding for biosocial demographics variable related to husbands’ marital well-being are follows.

Husband age: Calculated by subtracting participants’ date of birth from the date of participating in the survey. It is measured and coded as follows: 1=20-25 years; 2=26-30 years; 3=31-35 years; 4=36 years or more. Effect coding variables for age are shown below (31-35 years is the “base group”).

Age	Age1	Age2	Age4
20-25 Years	1	0	0
26-30 Years	0	1	0
31-35Years	-1	-1	-1
36 Yeas or over	0	0	1

Husband education level: Coded in three categories: 1 for primary level with 6-9 years’ education experience, including primary school or junior high school; 2 for middle level with 10-12 years’ education experience, including senior high school or vocational college; and 3 for high level with more than 12 years’ education experience, including university. Effect coding variables for education level are shown below (Middle education level is the “base group”).

Education level	Edu1	Edu 3
Primary education level	1	0
Middle education level	-1	-1
High education level	0	1

Length of marriage: Measured in years from the date of marriage to the date of the survey. Further, this continuous variable was coded as 3 categories in data analysis, which was 1 for 1-3 years, 2 for 4-6 years, and 3 for 7 years or more. Effect coding variables for marriage duration are shown below (4-6 years is the “base group”).

Length of marriage	Mardur 1	Mardur3
1 – 3 years	1	0
4 – 6 years	-1	-1
7 years or over.	0	1

Type of infertility diagnosis: Codes used were 1 for male factor infertility, 2

for female factor infertility, 3 for combined factor infertility, and 4 for unexplained factors infertility. Effect coding variables for marriage duration are shown below (combined factor infertility is the “base group”).

Type of infertility diagnosis	Infertype 1	Infertype 2	Infertype 4
Infertility with male factor,	1	0	0
Infertility with female factor,	0	1	0
Infertility with combined factors	-1	-1	-1
Infertility with unexplained factors	0	0	1

Considering the appropriateness of a multiple regression analysis employed in the study, assumptions of regression, including multicollinearity, normality, linearity and homoscedasticity were assessed (Munro 2005). These assumptions refer to various aspects of the distribution of scores and the nature of the underlying relationship between variables (Julie 2010).

4.3.5.1.1 Evaluation of assumptions for multiple regression analysis on marital well-being in husbands

4.3.5.1.1.1 Multicollinearity

To test for multicollinearity, Pearson’s coefficient for measuring the intercorrelations of variables was used. All are continuous variables related to husbands’ marital adjustment and marital satisfaction. Multicollinearity generally occurs when intercorrelations among independent variables are greater than or equal to 0.85. The variables are considered redundant and should be combined or eliminated (Kline 2005). The results of correlation coefficients in Table 42 and Table 43 do not show any signs of multicollinearity as all of the values are much lower than 0.85.

Table 42. Intercorrelations of Variables Related to Husbands’ Marital Adjustment

Variables	1	2	3	4	5	6	7
1.Husbands’ social concern	1						
2.Husbands’ sexual concern	.238**	1					
3.Husbands’ relationship concern	.328**	.286**	1				
4.Wives’ sexual concern	.267**	.027	.187**	1			
5.Wives’ rejection of childfree life style	.103	.028	.139*	.150*	1		
6.Husbands’ sexual esteem	-.250**	-.169**	-.173**	-.046	-.058	1	
7.Husbands’ sexual satisfaction	-.102	-.167**	-.171**	-.117	-.057	.290**	1

Note: * means correlation is significant at the .05 level (two-tailed);

** means correlation is significant at the .01 level (two-tailed).

Table 43. Intercorrelations of Variables Related to Husbands' Marital Satisfaction

Variables	1	2	3	4	5	6	7	8	9
1. Husbands' social concern	1								
2. Husbands' sexual concern	.238**	1							
3. Husbands' relationship concern	.328**	.286**	1						
4. Wives' social concern	.202**	.070	.191**	1					
5. Wives' relationship concern	.193**	.029	.292**	.324**	1				
6. Husbands' sexual esteem	-.250**	-.169**	-.173**	-.057	-.109	1			
7. Husbands' sexual consciousness	-.039	-.142*	-.245**	-.175**	-.207**	.268**	1		
8. Husbands' sexual motivation	-.104	-.147*	-.244**	-.074	-.169**	.247**	.198**	1	
9. Husbands' sexual satisfaction	-.102	-.167**	-.171**	-.119	-.163**	.290**	.255**	.206**	1

Note: * means correlation is significant at the .05 level (two-tailed); ** means correlation is significant at the .01 level (two-tailed).

Furthermore, since a variable could be co-linear with a combination of other variables, for the assumption of multicollinearity, the study also checked the level of tolerance which gives the strength of the linear relationships among the independent variables, including the variance inflation factor (VIF) which is an index of how much variance of an estimated coefficient has been increased by multicollinearity. Multicollinearity diagnostics (Table 44 and Table 45) indicate the variables in this present study did not have tolerances less than 0.2 and VIF scores were not higher than 10 (Tufféry 2011), which provided further evidence that no collinearity occurred between these variables in the regression analysis on marital adjustment and marital satisfaction in husbands from infertile couples.

In order to find the predicted difference between the “base group” and the grand mean of all groups in the model for husbands' marital adjustment and marital satisfaction, the two models were re-run with a different set of effect coding. The results indicated that the predicting ability of the “base group” had no significant difference from the entire set of groups in the model for marital adjustment and marital satisfaction respectively.

Table 44. Marital Adjustment's Multiple Regression Model with Tolerance Measures

Model	Unstandardised coefficients		Standardised coefficients	t	Sig.	Collinearity statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	114.082	6.580		17.337	.000		
Age1	.622	1.994	.021	.312	.755	.362	2.759
Age2	.934	1.366	.039	.684	.495	.486	2.058
Age4	-2.566	1.981	-.082	-1.295	.197	.400	2.498
Mardur1	2.060	1.299	.089	1.586	.114	.512	1.952
Mardur3	-.557	1.479	-.021	-.377	.706	.522	1.916
Infertype1	11.605	1.412	.362	8.218	.000	.828	1.208
Infertype2	-21.383	1.856	-.522	-11.521	.000	.781	1.280
Infertype4	6.918	1.412	.216	4.901	.000	.825	1.212
Husbands' sexual esteem	.945	.228	.184	4.151	.000	.815	1.228
Husbands' sexual concern	-.538	.126	-.181	-4.254	.000	.884	1.131
Wives' rejection of childfree lifestyle	-.475	.108	-.182	-4.380	.000	.924	1.082
Husbands' social concern	-.459	.115	-.173	-3.998	.000	.857	1.167
Husbands' sexual satisfaction	.649	.248	.120	2.614	.010	.760	1.317

Note: 1. Age 1=Husband's age from 20 – 25 years; Age 2=Husband's age from 26–30 years; Age 4=Husband's age with 36 years or over.

2. Mardur 1= Length of marriage with 1– 3 years; Mardur 3= Length of marriage with 7 years or over.

3. Infertype 1 = Infertility with male factor; Infertype 2 = Infertility with female factor; Infertype 4 = Infertility with combined factors.

Table 45. Marital Satisfaction's Multiple Regression Model with Tolerance Measures

Model	Unstandardised coefficients		Standardised coefficients	t	Sig.	Collinearity statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	9.328	.865		10.786	.000		
Edu 1	-.518	.194	-.189	-2.674	.008	.593	1.685
Edu 3	.527	.275	.137	1.914	.057	.584	1.712
Infertype 1	.379	.226	.097	1.680	.094	.901	1.110
Infertype 2	-.317	.302	-.063	-1.049	.295	.822	1.217
Infertype 4	.286	.233	.073	1.231	.219	.845	1.184
Husbands' sexual esteem	.178	.038	.284	4.660	.000	.804	1.243
Husbands' sexual satisfaction	.140	.041	.212	3.454	.001	.790	1.265
Husbands' social concern	-.042	.019	-.129	-2.251	.025	.914	1.094

Note: 1. Edu 1=Husband's primary education level; Edu 3=Husband's high education level.

2. Infertype 1 = Infertility with male factor; Infertype 2 = Infertility with female factor; Infertype 4 = Infertility with combined factors infertility.

4.3.5.1.1.2 Normality, linearity and homoscedasticity

Testing for normality, linearity and homoscedasticity of dependent variables (marital adjustment and marital satisfaction) in the regression analysis was conducted through the scatterplot of the standardized residuals. Residuals are the differences between the obtained and the predicted dependent variable scores. If the scatterplot residuals show that the assumptions of analysis are deemed to have been met, then further screening of variables and cases is unnecessary (Tabachnick and Fidell 2007b). The results are presented in following two figures.

Figure 2 Normality, Linearity and Homoscedasticity (Residual Plots) for Husbands' Marital Adjustment (Dependent Variable)

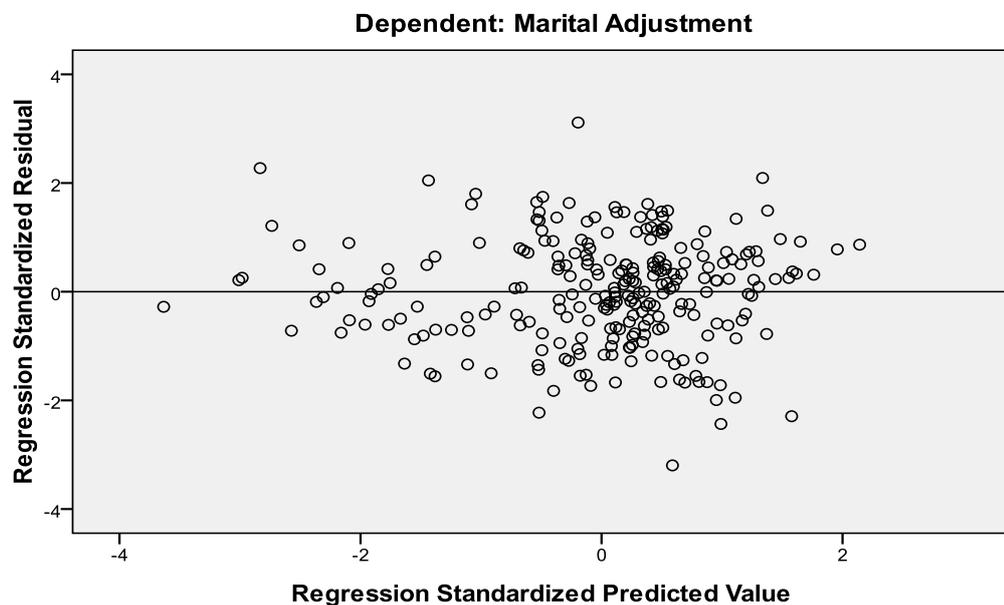
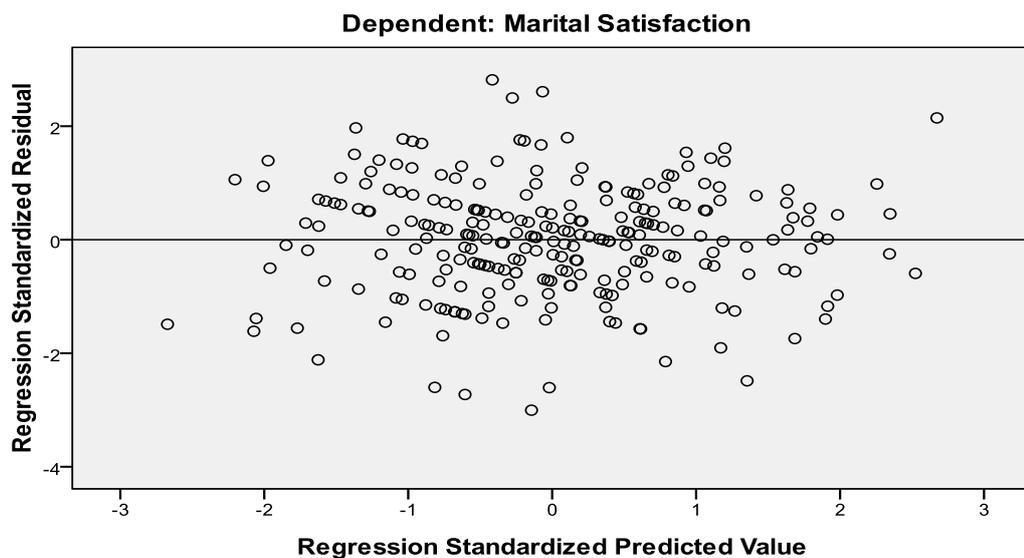


Figure 3 Normality, Linearity and Homoscedasticity (Residual Plots) for Husbands' Marital Satisfaction (Dependent Variable)



Both Figure 2 and Figure 3 show that data is located near the horizontal line

along the zero point, with a rectangular pattern, and without distinct pattern of the residuals, such as curvilinear or residuals being higher on one side than the other. Thus, the condition of assumptions was met in multiple regression analysis, and the significant predictor variables in explaining husbands' marital well-being and goodness fit of the model can be identified through linear multiple regression.

4.3.5.1.2 Examining predictors of influencing husbands' marital well-being

Table 44 and Table 45 tabled the results of multiple regression analysis for husbands' marital adjustment and marital satisfaction, respectively. The regression model for husbands' marital adjustment indicated 59.4% of the variance in marital adjustment was explained by the independent variables (Adjusted $R^2=0.594$, $F=29.501$, $p<.001$) and the model is overall statistically significant. However, the regression model for husbands' marital satisfaction predicted only 24.6% of the variance (Adjusted $R^2=0.246$, $F=11.336$, $p<.001$). This low value indicated that husbands' marital satisfaction is also influenced by other variables than those considered here; the model is statistically significant though.

After controlling for infertility type and education level, two models in Table 46 were attained, which listed significant predictors with their beta weights, t values and p values. The mean marital adjustment of husbands from couples with female factor infertility is 0.536 units smaller than the grand mean of all couples, but for couples with male factor infertility and unexplained factors infertility, the mean of husbands' marital adjustment is greater by 0.381 units and 0.226 units, respectively, than the grand mean of all couples, controlling for other independent variables. Additionally, husband's primary education level was not significant in the model. Furthermore, the results in Table 46 demonstrated that husbands' sexual esteem ($t=4.090$, $p<.001$) and sexual satisfaction ($t=2.952$, $p<.01$) significantly positively predicted husbands' changes in marital adjustment; also husbands' sexual esteem ($t=5.002$, $p<.01$) and sexual satisfaction ($t=3.927$, $p<.01$) significantly positively predicted husbands' changes in marital satisfaction, but husbands' perceived infertility stress of sexual concern ($t=-4.456$, $p<.01$) and social concern ($t=-4.232$, $p<.01$) as well as wives' perceived infertility stress of rejection of childfree lifestyle ($t=-4.183$, $p<.01$) significantly negatively predicted husbands' marital adjustment. Also, husbands' perceived infertility stress of social concern ($t=-2.610$, $p<.05$) significantly negatively predicted husbands' marital satisfaction. It is worth to

mention that husbands' sexual esteem had the highest absolute value of beta weights comparing with other continuous predicating variables in marital adjustment and marital satisfaction model, which indicated sexual esteem is important predicting element in husbands' marital well-being. The results indicated both husbands' marital adjustment and marital satisfaction can be predicated by their sexual esteem, sexual satisfaction and social concern stress related to infertility.

Table 46. Multiple Regression Prediction of Marital Well-Being in Husbands

Marital well-being	Predictors	Beta	t	p
Marital adjustment	Infertype 1	.381	8.847	.000
	Infertype 2	-.536	-12.085	.000
	Infertype 4	.226	5.155	.000
	Husbands' social concern	-.182	-4.232	.000
	Husbands' sexual esteem	.179	4.090	.000
	Husbands' sexual concern	-.189	-4.456	.000
	Wives' rejection of childfree life style	-.171	-4.183	.000
	Husbands' sexual satisfaction	.134	2.952	.003
Marital satisfaction	Edu 1	-.100	-1.801	.073
	Husbands' sexual esteem	.297	5.002	.000
	Husbands' sexual satisfaction	.226	3.927	.000
	Husbands' social concern	-.149	-2.610	.010

Note: 1. Infertype 1= Infertility with male factor; Infertype 2 = Infertility with female factor; Infertype 4 =Infertility with unexplained factors.
2. Edu 1=Husband's primary education level.

4.3.5.2 Question 5-2: are there any effects from biosocial demographics, infertility stress and sexuality on wives' marital well-being?

In both Section 4.3.3.3 and Section 4.3.4.2 of this chapter, the results indicated wives' marital adjustment were correlated with biosocial demographics (wife's education, length of marriage, infertility duration), husbands' perceived infertility stress (social concern, sexual concern, relationship concern, and need for parenthood), wives' perceived infertility stress (social concern, sexual concern, relationship concern, and need for parenthood), and wives' sexuality (sexual esteem, sexual motivation and sexual satisfaction). Wives' marital satisfaction were found to be correlated with biosocial demographics (wife's education level, economic level, type of infertility diagnosis, infertility duration), husbands' perceived infertility stress (social concern, sexual concern and relationship concern), wives' perceived

infertility stress (social concern, sexual concern, relationship concern and need for parenthood), and wives' sexuality (sexual esteem, sexual consciousness, sexual motivation and sexual satisfaction). Since biosocial demographics are categorical variables, and cannot be entered directly into a regression model and be meaningfully explained, thus these biosocial demographic variables with significant effect on marital adjustment and marital satisfaction were coded through the same procedure of effect coding as mentioned in Section 4.3.5.1 of this chapter. The effect coding is presented below.

Wife's education level: The education level of the participants was coded in three categories, 1 for primary level with 6 – 9 years' education experience, including primary school or junior high school; 2 for middle level with 10 – 12 years' education experience, including senior high school or vocational college; and 3 for high level with more than 12 years' education experience, including university or above. Effect coding variable for education level is created below (High education level as "base group").

Education level	Edu f1	Edu f2
Primary education level	1	0
Middle education level	0	1
High education level	-1	-1

Economic level: The economic level was defined as the estimated household monthly income. It was coded as 1 for low class with less than or equal to 1,999 RMB, 2 for medium class with 2,000RMB – 2,999RMB, and 3 for high class with 3,000 RMB or over. Effect coding variable for economic level is created below (3,000 RMB or over as "base group").

Economic level	Eco1	Eco2
Less than or equal to 1,999 RMB	1	0
2,000RMB – 2,999RMB,	0	1
3,000 RMB or over	-1	-1

Length of marriage: Measured in years from the date of marriage to the date of the survey. This continuous variable was coded 1 for 1-3 years, 2 for 4-6 years, and 3 for 7 years or more. Effect coding variables for marriage duration are shown below (7 years or more is the "base group").

Length of marriage	Mardur 1	Mardur2
1 – 3 years	1	0
4 – 6 years	0	1
7 years or over.	-1	-1

Type of infertility diagnosis: Codes were 1 for male factor infertility, 2 for female factor infertility, 3 for combined factor infertility, and 4 for unexplained factors infertility. Effect coding variables for marriage duration are shown below (combined factor infertility is the “base group”).

Type of infertility diagnosis	Infertype 1	Infertype 2	Infertype 4
Infertility with male factor,	1	0	0
Infertility with female factor,	0	1	0
Infertility with combined factors	-1	-1	-1
Infertility with unexplained factors	0	0	1

Infertility duration: The length of infertility experience was estimated in years from the time of couple trying to get pregnant until the time of fertility treatment. This continuous variable was coded as three categories in data analysis: 1 for 1-3 years, 2 for 4-6 years, and 3 for 7 years or more. Effect coding variables for infertility duration are shown below (7 years or more is the “base group”).

Infertility duration	Inferdur 1	Inferdur 2
1 – 3 years	1	0
4 – 6 years	0	1
7 years or over.	-1	-1

4.3.5.2.1 Evaluation of assumptions for multiple regression analysis on wives’ marital well-being

Prior to the actual regression analysis of the data, the assumptions for a multiple regression model should be checked. The methods explained in Section 4.3.5.1 were used to test multicollinearity, normality, linearity and homoscedasticity.

4.3.5.2.1.1 Multicollinearity

Prior to commencing the multiple regression analysis, the assumptions for a multiple regression model should be checked. The methods explained in Section 4.3.5.1 were used to test multicollinearity, normality, linearity and homoscedasticity for variables related to wives’ marital well-being.

Table 47. Intercorrelations of Continuous Variables Related to Wives' Marital Adjustment

Variables	1	2	3	4	5	6	7	8	9	10	11
1.Husbands' social concern	1										
2.Husbands' sexual concern	.24**	1									
3.Husbands' relationship concern	.33**	.29**	1								
4.Husbands' need for parenthood	.18**	.15*	.19**	1							
5.Wives' social concern	.20**	.07	.19**	.03	1						
6.Wives' sexual concern	.27**	.03	.19**	.07	.37**	1					
7.Wives' relationship concern	.19**	.03	.29**	.13*	.33**	.27**	1				
8.Wives' need for parenthood	.12*	.03	.17**	.14*	.43**	.45**	.21**	1			
9. Wives' sexual esteem	-.12	-.17**	-.07	-.06	-.17**	-.09	-.02	.001	1		
10. Wives' sexual motivation	-.11	-.17**	-.10	.06	-.16*	-.08	.003	-.002	.37**	1	
11. Wives' sexual satisfaction	-.10	-.16*	-.16**	-.02	-.14*	-.13*	-.15*	-.08	.22**	.30**	1

Note: * means correlation is significant at the .05 level (two-tailed). ** means correlation is significant at the .01 level (two-tailed).

Table 48. Intercorrelations of Continuous Variables Related to Wives' Marital Satisfaction

Variables	1	2	3	4	5	6	7	8	9	10	11
1.Husbands' social concern	1										
2.Husbands' sexual concern	.24**	1									
3.Husbands' relationship concern	.33**	.29**	1								
4.Wives' social concern	.20**	.07	.19**	1							
5.Wives' sexual concern	.27**	.03	.19**	.37**	1						
6.Wives' relationship concern	.19**	.03	.29**	.32**	.27**	1					
7.Wives' need for parenthood	.12*	.03	.17**	.43**	.45**	.22**	1				
8.Wives' sexual esteem	-.12	-.17*	-.07	-.17**	-.09	-.02	.001	1			
9.Wives' sexual consciousness	-.14*	-.04	.001	-.09	-.07	-.10	.11	.36**	1		
10.Wives' sexual motivation	-.11	-.17*	-.10	-.16*	-.08	.002	-.003	.37**	.42**	1	
11.Wives' sexual satisfaction	-.10	-.16*	-.16**	-.14*	-.13*	-.15*	-.08	.22**	.21**	.30**	1

Note: * means correlation is significant at the .05 level (two-tailed). ** means correlation is significant at the .01 level (two-tailed).

Multicollinearity generally occurs when intercorrelations among independent variables are greater than or equal to 0.85. The variables are considered redundant and should be combined or eliminated (Kline 2005). The results of correlation coefficients in Table 47 and Table 48 do not show any signs of multicollinearity as all of the values are much lower than 0.85.

Furthermore, Table 49 and Table 50 show the results of testing tolerance level and variance inflation factor (VIF) yielded further evidence that collinearity is not a problem. These regression models found no tolerance value less than 0.2, and all VIF values were less than 10.

Table 49. Wives' Marital adjustment: Multiple Regression Model with Tolerance Measures

Model	Unstandardised Coefficients		Standardised Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	137.986	6.848		20.151	.000		
Edu f1	-.138	1.408	-.006	-.098	.922	.924	1.083
Edu f2	.954	1.536	.035	.621	.535	.968	1.034
Inferdur 1	-1.318	1.843	-.056	-.715	.475	.508	1.970
Inferdur 2	3.804	1.892	.129	2.011	.045	.747	1.338
Mardur 1	4.035	1.620	.195	2.490	.013	.497	2.014
Mardur 2	-2.428	1.541	-.109	-1.575	.117	.638	1.568
Wives' perceived sexual concern	-.654	.154	-.248	-4.246	.000	.900	1.111
Wives' perceived relationship concern	-.672	.163	-.241	-4.134	.000	.901	1.110
Wives' sexual motivation	.623	.229	.157	2.722	.007	.920	1.087
Husbands' perceived Sexual concern	-.350	.143	-.141	-2.453	.015	.920	1.087

Note: 1. Edu f1=Wife's primary education level; Edu f2 =Wife's middle education level.

2.Inferdur 1=Infertility duration with 1-3 years; Inferdur 2 = Infertility duration with 4-6 years.

3.Mardur 1= Length of marriage with 1– 3 years; Mardur 2=Length of marriage with 4-6 years.

Table 50. Wives' Marital Satisfaction: Multiple Regression Model with Tolerance Measures

Model	Unstandardised Coefficients		Standardised Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	12.634	1.048		12.054	.000		
Edu f1	-.417	.303	-.089	-1.377	.170	.722	1.39
Edu f2	-.087	.291	-.017	-.298	.766	.974	1.03
Eco 1	-.637	.269	-.164	-2.364	.019	.626	1.60
Eco 2	.193	.291	.041	.665	.507	.790	1.27
Infertype 1	.733	.298	.143	2.460	.015	.892	1.12
Infertype 2	-2.086	.404	-.319	-5.162	.000	.791	1.26
Infertype 4	.696	.298	.136	2.334	.020	.888	1.13
Inferdur 1	.175	.268	.039	.654	.514	.868	1.15
Inferdur 2	.391	.321	.069	1.217	.225	.938	1.07
Wives' sexual consciousness	.161	.047	.201	3.436	.001	.883	1.13
Wives' need for parenthood	-.054	.020	-.158	-2.763	.006	.920	1.09
Wives' sexual satisfaction	.120	.054	.131	2.221	.027	.873	1.15

Note: 1. Edu f1=Wife's primary education level; Edu f2=Wife's middle education level.
 2. Eco 1= Low economic class; Eco 2= Medium economic class.
 3. Infertype 1= Infertility with male factor; Infertype 2= Infertility with female factor; Infertype 4= Infertility with unexplained factors.
 4. Inferdur 1 = Infertility duration with 1-3 years; Inferdur 2 = Infertility duration with 4-6 years.

In order to explore the predicted difference between the “base group” and the grand mean of all groups, a different set of effect coding was employed in the above model. After re-running the model for wives' marital adjustment and marital satisfaction respectively, the results showed that the predicting ability of the “base group” had no significant difference from the entire set of groups in the models.

4.3.5.2.1.2 Normality, linearity and homoscedasticity

Test for normality, linearity and homoscedasticity of dependent variables (wife's marital adjustment and marital satisfaction) in the regression analysis were conducted through the scatterplots of the standardized residuals. Both Figure 4 and Figure 5 reveal a rectangular pattern of data distribution along the horizontal zero line, without curvilinear or residuals being higher on one side than the other. No violations of assumption of normality, linearity and homoscedasticity were observed. Thus, multiple linear regression is appropriate to predict the effect of independent variables on wives' marital well-being.

Figure 4 Normality, Linearity and Homoscedasticity (Residual Plots) for Wives' Marital Adjustment (Dependent Variable)

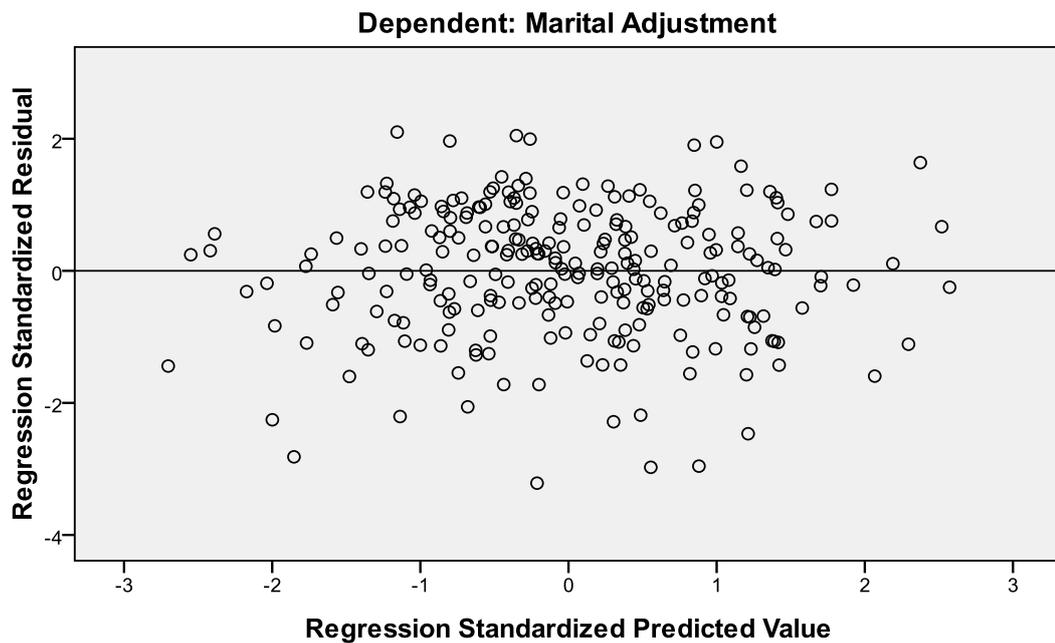
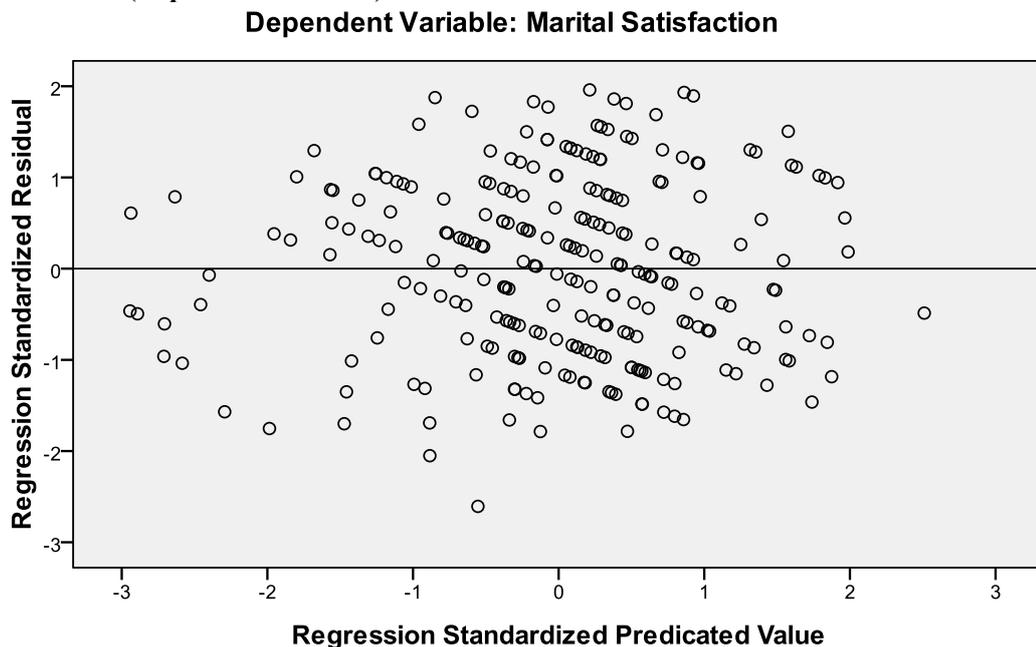


Figure 5 Normality, Linearity and Homoscedasticity (Residual Plots) for Wives' Marital Satisfaction (Dependent Variable)



4.3.5.2.2 Examining predictors of influencing wives' marital well-being

As a result of the above diagnostic checks, these two models met all the assumptions of the linear regression model, and can be used to explain wives' marital adjustment and marital satisfaction. Table 48 and Table 49 have shown the results of multiple regression analysis on wives' marital adjustment and marital

satisfaction, respectively. The regression model for wives' marital adjustment indicated 22.6% of the variance in marital adjustment can be explained by the independent variables (Adjusted $R^2=0.226$, $F=8.377$, $p<.001$). Also, the regression model for wives' marital satisfaction predicted 23.6% of the variance (Adjusted $R^2=0.236$, $F=7.501$, $p<.001$). Both models are statistically significant however the low adjusted R^2 indicated that there are other variables rather than those considered which have impact on wives' marital well-being.

After controlling for other independent variables such as infertility duration, education level, length of marriage and infertility type, significant predictors in two models are listed in Table 51, with their beta weights, t values and associate P values. Hold other predictors unchanged, the mean marital adjustment of wives with 1-3 years' length of marriage is estimated by 0.120 units higher than the grand mean of all groups. Additionally, the mean marital satisfaction of wives from low economic class is 0.157 units less than the grand mean of all groups. For wives from couples with female factor infertility, their marital satisfaction's mean value is 0.325 units smaller than the grand mean of all groups. But, wives from couples with male factor infertility or unexplained factor infertility have significant higher mean marital satisfaction than the grand mean of all groups.

Table 51. Multiple Regression Prediction of Marital Well-Being in Wives

Marital well-being	Predictors	Beta	t	p
Marital adjustment	Mardur 1	.120	2.109	.036
	Wives' perceived sexual concern	-.239	-4.148	.000
	Wives' perceived relationship concern	-.250	-4.334	.000
	Wives' sexual motivation	.155	2.719	.007
	Husbands' perceived sexual concern	-.139	-2.473	.014
Marital satisfaction	Eco 1	-.157	-2.775	.006
	Infertype 1	.144	2.458	.015
	Infertype 2	-.325	-5.312	.000
	Infertype 4	.146	2.520	.012
	Wives' sexual consciousness	.222	3.839	.000
	Wives' need for parenthood	-.184	-3.242	.001
	Wives' sexual satisfaction	.148	2.525	.012

Note: 1. Mardur 1= Length of marriage with 1–3 years.

2. Eco 1= Low economic class.

3. Infertype 1= Infertility with male factor; Infertype 2= Infertility with female factor; Infertype 4= Infertility with unexplained factors.

Furthermore, the results in Table 51 demonstrated that wives' perceived infertility stress of sexual concern ($t=-4.148$, $p<.01$) and relationship concern ($t=-4.334$, $p<.01$) as well as husband's perceived sexual concern ($t=-2.473$, $p<.05$)

significantly negatively predicted wives' changes in marital adjustment; and wives' perceived infertility stress of the need for parenthood ($t=-3.242$, $p<.01$) also significantly negatively predicted their marital satisfaction's changes. However, wives' sexual motivation ($t=2.719$, $p<.01$) was found to have significantly positive predication for their marital adjustment, further, wives' sexual consciousness ($t=3.839$, $p<.01$) and sexual satisfaction ($t=2.525$, $p<.05$) also significantly positively predicted their marital satisfaction.

Chapter 5: Results of Qualitative Study

This chapter presents the qualitative results of the present study. Interviewees' demographic characteristics are described, and the themes for three qualitative research questions are analyzed respectively.

5.1 Introduction

Participants for the interview that provided the qualitative data were recruited during the implementation of the quantitative survey. Of 30 infertile couples recruited by purposive sampling, two couples withdrew. One couple informed the researcher that they did not have time due to moving house; the second couple did not give a reason. Of the remaining 28 infertile couples, individual interviews were conducted with each partner, resulting in 56 interviews. Twenty infertile couples were interviewed immediately after they completed their questionnaire survey (that is, on the same day) and the remaining participants were interviewed when they returned to the hospital for their follow up medical appointments. Husbands and wives were interviewed by the researcher separately. The interview was brought to a close when no new themes emerged.

Prior to the interview, the researcher explained the purpose of the study to the participants, and asked them to sign a consent form to indicate their willingness to participate. The researcher explained the reason for using a digital audio-recorder for recording all interviews. Some participants were confused about this and some declined to be recorded with most giving no reason for their decision. The researcher took notes during the interviews and promptly verified the narrative contents from the recordings that were possible, and expanded upon information after each interview. Only one or two in-depth interviews were conducted in one day.

The responses to individual questions from husbands and wives were analyzed separately. As themes emerged from the analysis, representative quotations were selected and included in the present chapter to demonstrate the emerging themes. The present researcher transcribed participant narratives in the Chinese language and presented them in English in this chapter with as little editing as possible in order to mirror the words as originally spoken in Chinese. Light editing of the English translation was undertaken by the researcher, however, to aid

comprehension for English-language readers. All efforts were made to retain the original intent of the participants' responses as formulated in the Chinese language, and to retain the quality and descriptiveness of the content within the context and the purpose of this present study.

5.2 Biosocial Demographic Characteristics of Interviewees

Table 52 describes each couple by the following demographic information: age group, educational level, marital duration, economic level, infertility duration and type of infertility diagnosis. To protect anonymity, each interviewee was labeled by the same code as that one used in their questionnaire, further, letter “H” and letter “W” were used for husband and wife separately. All the participants were from different type of infertility diagnosis, and represented couples with various types of infertility.

Of the 56 participants (28 infertile couples), the mean age of males was 34.25 years (SD=5.22), and ranged from 24 to 45 years. The mean age of females was 30.71(SD=4.81) years, and ranged from 21 to 38 years. Additionally, in 28 infertile couples, almost two-thirds of males (n=18, 64.3%) were in primary education level, 5 (17.9%) males with middle education level, and 5 (17.9%) males with high education level. For the females, 17 (60.7%) females were in primary education level, 6 (21.4%) females with middle education level, and 5 (17.9%) females with high education level. Regarding length of marriage of these infertile couples, the average duration was 5.57 years (SD=1.93), ranged from 1 to 9 years. Additionally, of the 28 infertile couples, 12 (42.9%) couples reported having low class economic level, 8 couples (28.6%) with medium class economic level, and 8 couples (28.6%) with high class economic level. Among these participants, there were 9 couples (32.1%) with male factor infertility, 10 couples (35.7%) with female factor infertility, 4 couples (14.3%) with the combined factors infertility, and 5 couples (17.9%) with unexplained factors infertility. The average duration of their experiencing infertility was 3.39 years (SD=1.45), ranged from 1 to 7 years.

Table 52. Biosocial Demographics of the Sample in Qualitative Interview

Couple code	H-Age	W-Age	H-Edu	W-Edu	Mardur	Ecolevel	Infertype	Inferdur
187#	38	30	primary	primary	8	low	combined factors	5
155#	43	38	primary	primary	6	low	female factor	4
43#	44	38	primary	middle	9	medium	unexplained factors	6
27#	45	37	high	high	3	high	female factor	2
201#	35	30	primary	primary	7	low	male factor	4
129#	34	32	primary	middle	7	medium	female factor	3
104#	34	30	primary	primary	8	low	male factor	7
29#	33	30	primary	primary	8	low	combined factors	3
11#	34	30	primary	primary	3	low	unexplained factors	3
171#	29	27	primary	primary	7	low	female factor	3
158#	40	37	primary	primary	6	low	female factor	4
92#	38	30	high	middle	6	medium	combined factors	4
69#	39	37	high	high	6	high	male factor	5
169#	35	31	middle	middle	5	high	combined factors	3
67#	34	30	middle	middle	4	medium	male factor	2
40#	33	28	primary	middle	5	high	unexplained factors	3
3#	32	27	middle	primary	6	low	male factor	4
30#	34	31	high	high	4	high	male factor	2
229#	30	26	primary	primary	5	low	female factor	4
57#	30	36	primary	primary	6	high	female factor	3
14#	27	25	primary	primary	5	medium	male factor	2
149#	37	25	middle	primary	3	high	male factor	1
114#	35	37	primary	primary	6	low	female factor	3
77#	34	36	high	high	7	high	unexplained factors	5
76#	35	32	middle	high	8	medium	male factor	5
28#	28	26	primary	primary	4	medium	unexplained factors	2
202#	25	23	primary	primary	3	medium	female factor	2
90#	24	21	primary	primary	1	low	female factor	1

Note: 1. H-Age=Years of Husband age; W-Age=Years of Wife age;
2. H-Edu=Husband education level; W-Edu=Wife education level.
3. Mardur=Length of marriage.
4. Eco=Economic class.
5. Infertype =Type of infertility diagnosis.
6. Inferdur=Infertility duration.

5.3 Qualitative Research Question One: what is the experience on infertility of each partner/spouse of the infertile couple?

Husbands and wives were interviewed by following questions 1-4 in the interview outline (Appendix 12). Three dominant themes emerged from the narratives of both husbands and wives. Those themes primarily reflected their perception of infertility.

5.3.1 Frustration in carrying on the family lineage

During the interviews, all participants expected to have a child, and fulfill their obligations to their in - laws.

[Couple 104#: 104H]: For me, I am the only son without siblings. My parents are eager to have a grandchild, and always hasten me to have a child especially my father who holds strong ideas of carrying on ancestral line (Chuan Zong Jie Dai. 传宗接代). He always shows our family's pedigree with name on the list to me, and hopes his grandchild's name will go on the list. My mother frequently prays to Kwanyin (Guan Yin. 观音)⁴. In rural setting this idea is very ubiquitous. I also have strong expectation of having child.

[Couple 67#: 67H]: I have a feeling of immorality for not continuing our familial bloodline, I feel ashamed to my parents. And I hope that my problem (low sperm count) can be solved.

[Couple 229#: 229W]: I am diagnosed with infertility, and have already begun the treatment. Though my parents-in-law are kind to me, I feel pressure from their anticipation, especially from my mother-in-law as she always gives some hints that she expects to have a grandchild. My husband loves me very much, but I am not happy being childless. I sincerely expect I can be successful in conceiving following the treatment.

[Couple 202#: 202W]: My husband's sister-in-law is infertile, my parents-in-law expect me and my husband to give them a grandchild, and I don't know what to say.

From the above responses, it can be concluded participants faced considerable pressure

⁴ A fertility goddess who grants children; Chinese folk belief.

from their parents and in-law. In other cases, both husbands and wives stated that they were also experiencing the uncertainty of an insecure future.

[Couple 92#: 92W]: My husband and I believe that rearing children can rely on them when we are in old age (Yang Er, Fang Lao Wu Yi Kao. 养儿, 防老无依靠). We often imagine we will not be alone and will be accompanied by our child. This expectation is very strong when we see some empty-nesters' life in actual life. We do not know how to deal with our feeling of a sense of incomplete family. I cannot imagine my life getting old, without our own child. I feel very frustrated.

[Couple 3#: 3H]: Though raising children for old age is a Chinese traditional thinking, children give their parents support in their old age. I and my wife live together with my parents, we care for them when they suffer from disease, and also provide some help for decreasing their hard work in farmland. I am afraid for my life in old age without the support of my child.

5.3.2 Emotion stress

A strong emerging theme was of emotional stress. Four out of five females reported feelings of depression, anxiety and jealousy because they could not fulfill their obligations and responsibilities in the combined roles of mother, wife and daughter in law.

[Couple 57#: 57W]: I expect to have my own child, I envy those having children. I feel more grief when I pass the kindergarten on my way back from work and I see lovely children with their mothers. I always ask myself why I cannot be a mother? Why did infertility happen to me? If it were not for my infertility, I would be a good wife, good daughter and good daughter-in-law.

[Couple 27#: 27W]: Last month, one of my colleagues gave birth in hospital. Despite the fact that we have a good relationship, I did not call her to congratulate her. I am not comfortable while considering my current conditions; I feel my family life is empty without child. It is so hard watching mothers with their babies, I can't help feeling inferior to other fertile women, I cannot feel myself as a whole woman.

Husbands also expressed being anxious and distressed by the cause of male factor infertility. Unlike their wives, however, husbands did not express feeling of jealousy toward

their friends. Most of them stated: "If it happens, it happens. If it does not, then so be it."(Shun Qi Zi Ran. 顺其自然).

Some husbands appear to have been affected by their wives' reactions to the infertility, not by infertility itself. They frequently responded to their wives' reaction as reported below:

[Couple 43#: 43H]: I am annoyed at my wife's emotion, she is frequently irritable. I think my wife gave too much emphasis on her responsibility to be motherhood. She always complains why the reason for infertility cannot be found, even though we repeated related medical test in other hospitals, and doctors gave us the same result: unexplained infertility. I frequently feel more frustrated by her response on infertility than infertility itself.

[Couple 129#: 129H]: My wife is very regretful for taking contraceptive drug for several years, which results in her infertility due to endometriosis caused by the drug. I feel, my wife's infertility cannot be totally ascribed to herself, because both of us agreed to defer the date of childbirth by contraception. I always conciliate my wife, and give more support to help her overcome the distress, but she still blames herself and feels guilt for this, sometimes I am very tired of her emotion's fluctuation, and feel more extra disturbance from her reaction on infertility.

All participants reported they were suspicious and anxious when they themselves were diagnosed with an infertility factor.

[Couple 114#: 114W]: I am so surprised for this, why me? It is not real. It is unfair.

[Couple 14#: 14H]: It is not possible, I do not believe this. I am healthy.

[Couple 171#: 171W]: How could this happen to me? I cannot accept this. My heart is broken.

5.3.3 Decreasing social connection

Wives' interpersonal relationships with extended family members and friends changed due to perceived pressure to have children.

[Couple 187#: 187W]: My parents-in-law and husband's relatives frequently ask me when you will have a child. I feel very embarrassed and extremely unhappy by this expectation. I do not think they give real sympathy and concern to me. From their

talking, I experienced lack of understanding of what infertility means to me. I dislike going to family gatherings specifically in some traditional festivals: Chinese Luna New Year (Chun Jie. 春节) and Moon Festival (Zhong Qiu Jie. 中秋节). I hope to avoid these acquaintances so that I do not have to answer their questions. I do not want to present myself in that situation, as I frequently feel gloomy when I face lovely children with their parents. I am eager to have this kind of family love, but I cannot.

[Couple 129#: 129W]: I feel my friends circle is becoming small. I do not contact my friends for long time, not actively attend dinner party with them or my family relatives anymore. I also dislike engaging in other social gathering, as they always talk about their children, and I feel I don't belong to their circle.

[Couple 11#: 11W]: In the past, I used to like to go shopping together with my close friend. Now I try to avoid her, because I cannot accept her saying: "at your age, it is not easy to conceive, and also has a risk to bear a baby". Especially, I feel my friends cannot share my distress with me.

For the wives, the decreased social connection may further enhance their feeling of isolation, helplessness and inabilities which, in turn, can become obstacles to receiving support from parents or in-laws, relatives or friends. Similarly, their husbands' social connections might be affected.

[Couple 171#: 171H]: My wife frequently asks me to communicate with her. She expects me to accompany her, and I feel I should stay with her as much as possible, specifically in weekends and holidays. As a result, I am not able to attend friends' gathering. I feel my lifestyle too is changing.

As reported in the interviews below, some husbands experienced changes in their social connection caused by infertility.

[Couple 201#: 201H]: My schoolmate's son is already 8 years old. When I go to his family, his lovely son calls me uncle. At that time, I am so frustrated that I do not have my own child. I am afraid to attend some social gatherings together with friends or other relatives, most of them always ask questions about why you do not have any children yet. I feel a stigma when they talk male's ability to impregnate a woman.

[Couple 149#: 149H]: For me, I am unable to accept my infertile diagnosis; at the same time I do not want my friends to know this. Most of my friends feel my bad temper. I am not as easy-going as I used to be. I feel disconnected, and I try to avoid their gathering. Sometimes I do not want to see anybody, I just want to work and let myself be busy. I feel I can save my face this way.

5.4 Qualitative Research Question Two: what is the understanding of sexuality in the context of infertility held by each partner/spouse in infertile couples?

All participants were interviewed about their understanding of sexuality in the context of infertility. Each partner/spouse was interviewed by the following questions in the interview outline (Appendix 12): the first half of Question 6, Question 7 and Question 8. Three dominant themes emerged from the ways, husbands and wives described the effect of infertility on their sexuality: self-identity, communication about sex and sexual life.

5.4.1 Self-identity

Fertility has a substantial connection with sexuality. It is generally regarded as one of the primary expressions of sexuality. Participants experienced considerable psychosocial stress specifically associated with self-image. For example:

[Couple 14#: 14H]: My sense self is very bad. I can have sex with my wife, no problem, but I feel a sense of inability and inferiority, not a real man. I am a husband, but cannot be a father. However, I will put more money and try to find effective treatment for infertility, and attain manhood.

[Couple 27#: 27W]: My close friend frequently tells me that a real woman should experience a process from conceiving to giving birth in her lifetime. I also agree with this. Now I am infertile, and unable to have that sense. I cannot be a mother, and I deeply feel less of a normal woman. However, I do not want to adopt a child, I only want to have my own child. I feel I don't have anything in common with other women. I always ask myself: how can I be a real woman?

Additionally, some participants expressed perceptions of their self-identity due to infertility. For example:

[Couple 169#: 169W]: I expect to be a mother, and like other fertile women have an

experience of bearing a child, but I have felt worthless due to my fertility problem. However, I am always feeling confused and annoyed: the medical tests indicate my husband is also defective in fertility, but people around me (family relatives, friends, neighbors etc.) always turn their eyes to me. If being a man or a woman lies on the reproductive ability, why are there more discourses on being female or womanhood, but not on male or manhood?

[Couple 76#: 76H]: I feel a dud. I do believe I have a certain sexual impairment, but all the tests indicate I do not have any kind of sexual dysfunction. However, I cannot give up a sense of emasculation. I almost lose a sense of self-confidence on my sexual ability.

5.4.2 Communication on sex

Some participants seldom discussed sexual matters and communication with each other was limited specifically in terms of marital sexual life. Couples explained that there was no need of spoken communication.

[Couple 40#: 40H]: I never tell my wife when to have sex with her, almost no verbal communication. I feel she can understand my intention specifically when I touch and hug her. We already know each other because sex is so simple; also we are married for 6 years.

[Couple 40#: 40W]: I do not speak my willingness of having sex with my husband. We have a tacit agreement of having sex 2-3 times per week in these years. Sometimes I take the initiative, but most of the time my husband does.

Additionally, some couples reported there was little verbal communication about sex because they lived together with their family members such as parents-in-law and siblings and lacked privacy.

[Couple 28#:28H]: I live with my parents, my sister is also in our family, and she is not married yet. We live in separate rooms, but in the same house, and not soundproof. I am afraid my parents can hear our intimate talking. Additionally, we do not talk about sex openly; after all, my family members are very conservative.

[Couple 28#: 28W]: I really feel it is not comfortable because my parents-in-law live in a next room. I cannot speak loudly, and tend not to about sexual things.

The themes indicated gender differences were associated with sexual demand. Husbands reported they initiated sex, while their wives seldom expressed their demand for sex and did not talk directly to their husbands about their sexual desire.

[Couple 202#: 202H]: I am really surprised my wife never talk about her thought in sexual demand, I feel she agrees with my requirement when I express my demand for having sex with her, but sometimes I am not clear what she thinks. I am not satisfied with this status due to without relax and free mood in sex.

[Couple 202#: 202W]: I feel I never make my husband feel disappointed. I think a wife should give her husband a comfortable feeling. Although sometimes I am tired and do not want to do it, I still pretend I desire it.

Interviewees who had a clear diagnosis of the cause of infertility shared a lack of sexual communication and decreased sexual desire.

[Couple 76#:76H]: I feel my sexual desire decreasing, and not active in love-making. I seldom express my sexual needs to my wife, and do not ask my wife's sexual expectation about her feelings. Sometimes facing my wife's initiation of sex, I pretend I'm too tired to do it. Other times, I just do it perfunctorily.

[Couple 229#: 229W]: My husband always initiates sex, but I'm not in the mood for it. Since being diagnosed as infertile, I feel a disruption with almost zero sex drive. In these two years, I have tried to find all methods for conceiving, nothing happened. It feels as if my sexual desire has shut down.

Some couples reacted differently to the diagnosis of unexplained infertility and to how they communicated about sexual matters. A husband said:

[Couple 43#: 43H]: My sperm is normal, no physical disease is found to be related to my infertile condition. I do not feel any pressure about my sexual ability. I can initiate the discussion around my sexual need with my wife. On the other hand she does not express her thoughts and feeling to me.

During the interview with the husband's wife, held separately according to the research procedure, the wife volunteered the following information:

[Couple 43#: 43W]: I have no interest in sex, sometimes I feel disgusted by my husband's sexual need. There has been a big change since I've known about my infertility, now all my attention focuses as to why they can't find the cause. I find it hard to accept this uncertainty, not knowing for certain what has caused my condition. While in the past, I really enjoyed having sex with my husband; now, I am not the person I was. Having sex has become a chore for me, with hardly any communication around it.

5.4.3 Sexual life

An emerging theme confirmed a widespread impact on sexual drive as a result of a diagnosis of unexplained infertility.

[Couple 149#: 149H]: My infertility has had a negative effect on my sexual life. I am not active in making love with my wife, and do not have strong desire or passion for it. Sometimes I intentionally decrease the frequency of sexual intercourse using physical fatigue as an excuse, because I feel over-sex is not good for body. Additionally, I feel considerable stress in my life: I have to work to earn money, and withstand the pressure from my parents' expectation for grandchild as well as their asking why we don't have children. All in all, I hardly pay attention as to how and when I have sex with my wife.

[Couple 57#: 57W]: I truly blame myself because I couldn't give a child to my husband, I am also distressed by my infertility. I feel the only thing I can do is to try to please him, but I don't seem to be initiative while love making. My husband always expresses his demand for sex and initiates it directly, after which he goes to sleep. I feel my sexual arousal is very slow while having sex, I hardly ever feel any sexual pleasure, so I look forward to its finishing as soon as possible. It upsets me so much.

It was clear from some responses that the participants' sexual life focused mainly on sexual intercourse for the purpose of conception.

[Couple 187#: 187W]: For me, conceiving is the exclusive aim of having sex with my husband. I frequently decide when to have sex with my husband according to my

cycle and doctor's suggestions. When my husband wants to have sex with me, I ask him to keep sperm and release it in possible day of conceiving. My husband is not happy for this, but I do not want to change this.

[Couple 149#: 149H]: When I have sex with my wife, we only think of having a baby. Having sex is our obligation for conceiving a child. Sex is not for enjoyment. Some time when I would like to have sex, we don't do it because it is not the right time. Other times even if I am too tired from work we do it because my wife says it is the better day for conceiving. Actually, I dislike this planned activity for sexual intercourse, it is so boring. I almost feel like I have become a machine.

A few wives expected their husbands to give them physical cuddling, caressing or kissing other than sexual intercourse, and also had a greater expectation of intimacy in their marital sexual life.

[Couple 40#: 40W]: I am really disgusted with my sexual life, because my husband only focuses on penetration during sex, no touching, no kissing, no word communication. Sometimes I feel I am in an empty status after sex.

[Couple 3#: 3W]: Generally, we have sex on average 2-3 times per week, this is ok for me. But I feel I am gradually losing desire for it, because my husband always considers his sexual demand's fulfillment during sex, and neglects my needs. Sometimes I do not have orgasm, but I do not mind this, I only expect my husband can give me caressing, kissing or sweet words.

5.5 Qualitative Research Question Three: how does infertility stress and sexuality affect the marital relationship in each partner/spouse of infertile couples?

In order to get a profile of how infertile couples perceived the effect of infertility stress and sexuality on the marital relationship, all participants were asked Question 5 and the second half of Question 6 (Appendix 12). Three themes emerged: adjustment to infertility, sexual satisfaction and commitment to marriage.

5.5.1 Adjustment to infertility

The transcripts of interviews revealed that the dissimilarity of adjustment to infertility might impact the marital relationship.

[Couple 171#: 171W]: I am frequently uncertain about the treatment result. When I talk with my husband about my failure to conceive, he seems uninterested and does not communicate. Moreover, he seldom provides care or support while I am in grief. He only says: “It does not matter” and “Do not consider this”, and that’s the end of the communication. I feel my husband does not know my feelings well. Additionally, I don’t know what his thoughts are, because he always avoids talking about the fertility problem with me. I really feel this is not good communication, and sometimes I quarrel with him so that our marital relation is feeling the tension.

[Couple 27#: 27H]: My wife often asks me to be concerned about her, but I actually already contribute more to this family and her infertility treatment. Before coming to this hospital, we used folk remedies and now it costs more money for the medical assistance in another hospital, still nothing happened. Even though there is no insurance cover for it, I never give up my efforts to try and find a treatment. I feel my wife has over- reacted about her body not working, she keeps asking me what to do if we don’t conceive. I am very upset by this, so I don’t respond to her.

Such responses clearly indicated a change in the marital relationship. One out of six infertile couples acknowledged this negative interaction might eventually lead to divorce.

[Couple 129#: 129H] I am really not satisfied with my marriage because I cannot accept a “no child marriage”, my marriage is a failure due to my wife’s fertility problem, and my family is incomplete. To me, remaining childless might lead to a divorce.

[Couple 158#: 158W] I feel everything around me has changed because of infertility; specifically I begin to worry about my relationship with my husband. Prior to my infertility diagnosis, my husband was an optimistic and talkative man; also he used to share housework with me. But now, he seldom speaks with me due to my infertile condition, sometimes I initiate talking with him, he impatiently replies with just a few words. If this situation continues without any changes, I am afraid our marital relation will no longer be sustainable, and may be destroyed one day.

In contrast to those fears, other participants did not consider infertility to be an impediment to marriage. They did not report having conflicts while discussing infertility ,

problems and they did not blame each other while sharing their concerns, frustrations and feelings around their experience in infertility each other.

[Couple 90#: 90W]: Regarding infertility, I can share my thoughts and concerns to my husband, he understands me. We care and support each other. I am pleased that my husband respects my decision and accompanies me to find effective medical treatment. I feel we understand each other, and keep a harmonious relationship.

[Couple 30#: 30H] I think infertility brings me and my wife closer together, and strengthen our marital relationship. I can openly express the stress accompanied by the diagnosis of infertility; also my wife never expresses her anxiety or stress to me. Apart from regular communication in our daily life, we also exchange thoughts on future life if we cannot fulfill our wish for a child due to failure treatment. Additionally, thanks to my wife's help, I have stopped smoking completely. This is not only helpful for the quality of my semen, but also helpful for my general physical health.

5.5.2 Sexual satisfaction

Sexual satisfaction in marriage was a strong theme, mentioned by eight out of ten participants. Some stated that a satisfying sexual experience alleviated the tension caused by infertility stress. In their responses the interviewees also mentioned that sexual satisfaction had a positive effect on their marital relationship.

[Couple 69#: 69W] My husband always talks to me kindly and humorously before he wants to have sex with me. He is very understanding about my physical condition, and he respects my thoughts about sexual activities, involving time, place, behavior pattern and frequency of sex. I am really satisfied with our marital sexual life, it happens in a sweet atmosphere. Furthermore, I feel sexual satisfaction may increase the emotion of connection between us. During our sexual love making, I have an extra-opportunity to express my feeling about infertility; he also shares his thoughts with me.

[Couple 77#: 77H] I have intimate experience with my wife when we have sex together, involving cuddling, kissing and free sex talk. We have a positive and good relationship along with sexual pleasure. I feel sexual satisfaction helps us to relax,

and we share the emotional depth and closeness with each other. Though infertility brings some negative influence on my feeling, it does not bring turmoil to my life.

Another strong theme to emerge from the infertile couples a routine or planned sexual life was a negative influence on their relationship. Participants did not appreciate sexual intercourse being planned for procreation rather than sexual pleasure and satisfaction.

[Couple 43#: 43W] My marital sexual life has changed from “willing to do it” to “having to do it”. Now this activity is just for conceiving. I am fed up with it, mainly because I experience a lack of orgasm and mutual intimacy. Sometimes I really do not want to have sex with my husband and eventually refuse his demand. This, however, causes considerable tension between us.

[Couple 14#: 14H] My wife dislikes changing sexual positions and sexual behavior patterns in our sexual activities, but I want to try these because I hope our sexual life might become more romantic and fun. From the beginning of our marriage up to now, we almost always engage in lovemaking using one sexual behavior pattern, on the same bed and at the planned time. I am not satisfied with this, but my wife thinks that having a child is our priority. I disagree with her; sex should also be fun and enjoyable. I fear that our incongruence on this matter will destroy our marriage life.

5.5.3 Commitment to marriage

A clear theme to emerge was that many felt (nearly 1 in every two respondents, or 42%) their marital relationship was not destroyed by infertility. Those people said their commitment to marriage played a crucial role in their marital relationship.

[Couple 29#: 29H] I feel it is fate (Yuan Fen. 缘分) that brought my wife and me together. Marriage provides an exclusive opportunity for us to care and love each other. We keep our promise to what we said to each other on our first married day: “To have mutual affinity and have a harmonious union forever.” (Xin Xin Xiang Yin, Bai Nian Hao He. 心心相印, 百年好合). No matter what happens, we are going to be together for the rest of our lives. So, though we do not have child now, this does not influence our relationship. I think infertility is just one thing that happened in our life, this can help us realize what is really important to our marital life.

[Couple 77#: 77W] I think our relationship as a couple, is very strong. We have a family which is the place for putting two hearts together, and where I can have a secure relationship. For me, it is important to stay with my husband, I do not intend to leave him to find another relationship even though we do not currently have child. “A day together as husband and wife means endless devotion the rest of your life.”(Yi Ri Fu Qi, Bai Ri En. 一日夫妻，百日恩), I believe this and I love my husband and our family.

However, an equally strong theme emerged from the wives of infertile couples who expressed feeling uncertain or insecure in their marriage relationship. Half of the wives (55%) reported feeling this way, despite being committed to the marriage.

[Couple 155#: 155W] I am very satisfied with my marital relationship; both of us have a strong desire to remain permanently with each other. However, I do not think my husband loves me as much as he did before we discovered the infertility problem. Since then, he frequently says to me “a child is the crucial for a family”, “a child is a tie between husband and wife”, “being childless is not beneficial t to the marriage”. Furthermore, now, my husband seldom expresses his empathy and seldom supports me. I perceive as if my husband seems has forgotten about his promise that: “No matter what happened, we live together, and love each other forever.”

CHAPTER 6: DISCUSSION, RECOMMENDATIONS AND SUMMARY

The purpose of this chapter is to discuss the findings of the relationships among the variables of biosocial demographics, infertility stress, sexuality and marital well-being (marital adjustment and marital satisfaction). Predicting factors that influence infertile couples' marital well-being are identified. This chapter will also present the strengths and limitations of the study, and recommend future research and practical intervention. Finally, the conclusion of the study is provided.

6.1 Key Findings and Discussion for Quantitative Study

The present study was designed to increase knowledge of infertility stress, sexuality and marital well-being in infertile Chinese couples, specifically, the aim of the study is to identify what factors can be predictors for influencing the marital well-being among infertile couples. As very few studies of infertility have been conducted in the Chinese socio-cultural context, the findings from this study should facilitate understanding of marital well-being in infertile couples. It should also provide guidance for the effective management of infertility through supportive interventions. The study found individual differences in biosocial demographics having a different effect on infertile couples' experience of infertility stress, sexuality and marital well-being.

6.1.1 The effect of biosocial demographic factors on infertility stress, sexuality and marital well-being in infertile couples

6.1.1.1 Biosocial demographic factors' effect on infertility stress

With respect to the effect of age on infertility stress, only women showed differences for their perceived stress regarding the need for parenthood variable. Women's age was positively related to infertility-related stress, with a significant difference between the oldest age group (36 years or more) and the youngest age group (20-25 years). The present study suggested that women aged 36 years or more reported the highest level of the need for parenthood. It is recommended that health and welfare professionals become cognisant of the increased stress on older infertile women and include this factor in their treatment plans.

There was a positive correlation between higher levels of education and lower levels of

stress in both men and women in this study. It was found that men with lower levels of education experienced greater levels of infertility stress such as sexual concern, relationship concern, rejected a childless lifestyle, also with higher levels of global stress. Likewise, women with lower levels of education had higher levels of infertility stress in sexual concern and global stress variables. In addition, the study found that family economic level had a significant negative impact on men's level of infertility stress. This was very particularly the case in regard to relationship concern and rejection of childless lifestyle. There was a similar effect on the rejection of childless lifestyle experienced by women. These findings indicated that socioeconomic status (as indexed by income and educational attainment) had a negative effect on perceived specific infertility stress. This might be due to the additional stress that a low level of SES means fewer resources (Boivin J., Sanders K., and Schmidt L. 2006). A higher economic level and good educational background may provide infertile women with the means to minimize the impact of stigmatization and stress (Donkor and Sandall 2007). Higher levels of education and SES might provide more sophisticated coping strategies for coping with infertility (Schmidt, Christensen, and Holstein 2005).

It is of note that this study found that men perceived various infertility stress was more likely to be impacted by SES compared with wives. However, the reason for gender differences in the association between infertility stress and SES is unclear. Future studies should explore this further. Moreover, it is worth highlighting that higher economic level had a significant positive impact on the need for parenthood experienced by men. This might be related to the strong expectation of men to have children as a life-fulfillment. For those with a higher level of SES, there might be an eagerness to enhance their social identity which is bonded with the traditional value of childbearing to continue family lineage in Chinese culture (Lee and Chu 2001). These comments are speculative, thus further research on infertile couples' motivation for parenthood in Chinese culture should be undertaken.

Length of marriage had a positive significant association with relationship concern stress experienced by men as well as the need for parenthood experienced by women. The finding indicates that the longer length of the marriage, the greater levels of stress experienced by both men and women. In previous studies, length of marriage was also demonstrated to have a positive correlation with depression and the strength of psychological symptoms (Thara, Ramachandran, and Hassan 1986; Ozkan and Baysal 2006).

The present study revealed that husbands from couples with male factor infertility had

the highest level of sexual concern and global stress, and husbands from couples with unexplained factor infertility had the lowest global stress score. Wives from couples with female factor infertility had the highest level of relationship concern. It is noted that infertile couples with an identified causative factor for their infertility had more stress than those with unexplained infertility factors, a result that was similar to previous research (Domar A. D. et al. 1992).

Furthermore, the present study found that rejection of a childless lifestyle and global stress experienced by men, as well as the need for parenthood experienced by women, were related to the longevity of the infertility period. Men who had experienced infertility for a period (1-3 years) reported the lowest levels of stress regarding their rejection of childless lifestyle and global stress. However, wives with the longest infertility duration (7 years or over) reported the lowest level of stress regarding their need for parenthood, a possible explanation for this finding is that high resilience was associated with low scores on this aspect in the women (Herrmann D. et al. 2011).

The study found no significant difference between spouses in most aspects of infertility stress, this might be related to infertility as shared stress within infertile couples. However, the results indicated wives experienced a higher level of social concern stress than husbands, and husbands experienced a higher level of sexual concern than wives. For this, it might be associated with the effect of social culture value on spouses and partners.

6.1.1.2 Biosocial demographic factors' effect on sexuality

The age of infertile couples was not associated with their psychological tendency in sexual esteem, sexual consciousness, sexual motivation and sexual satisfaction variables.

For men, the level of education was significantly related to their sexual esteem, sexual consciousness and sexual motivation. Women's education level was associated with their sexual consciousness. Specifically, of the three levels of education, men with high education level had the highest level of sexual esteem. Additionally, men with a high education level had higher level of sexual consciousness and sexual motivation than those in primary education level. Women with primary education level had the lowest level of sexual consciousness. Furthermore, economic level had a significant positive effect on sexual motivation for men, but no significant effect of economic level on each dimension of sexuality in women was found. In light of these results, it is found that SES has a positive effect on infertile couples'

sexuality. This finding is consistent with a positive tendency found in previous research on a relationship between SES and sexuality. For example, a higher SES is positively related to safer sex behavior (Agha 2001), lower SES can indicate earlier onset of sexual activity (Cooksey, Rindfuss, and Guilkey 1996), and higher SES can result in higher sexual satisfaction (Barrientos and Páez 2006). However, almost no studies exist on the relationship between SES and the sexuality of infertile couples, the present study provides some insight into the relationship between SES and sexuality in the context of infertility.

No significant difference was found between length of marriage and each dimension of men's sexuality, whereas women's sexual esteem was negatively related to length of marriage. This result could be explained by the confounding effect from infertility stress.

Evidently, infertility diagnosis had a significant effect on sexual esteem, sexual motivation and sexual satisfaction experienced by husbands. Husbands with male factor infertility had the lowest level of sexual esteem and sexual motivation. The lowest sexual satisfaction was experienced by husbands from couples with male factor infertility or with female factor infertility, compared with husbands from couples with combined factors infertility and unexplained factor infertility. Wives from couples with female factor infertility had the lowest level in sexual esteem and sexual satisfaction. The findings demonstrate that infertile couples with an identified causative factor for their infertility had changes in their sexuality, a finding which supports previous studies (Gurkan, Raynor, and Hellstrom 2009; Muller, Schilling, and Haidl 1999).

Infertility duration was found to have a negative effect on wives' sexual esteem and sexual motivation; women with the shortest duration of infertility experience (1–3 years) had a higher level of sexual esteem and sexual motivation than wives with the longest duration (7 years or over). This result is consistent with a previous study which indicated sexual relationships are negatively affected by the increasing duration of infertility treatment (Ozkan and Baysal 2006).

As for the congruence between husbands and wives in sexuality, the findings suggested that there were significant differences between spouses. Though husbands had higher levels in each dimension of sexuality than their wives, both of their psychological tendency in sexuality are in middle level. This indicates infertile couples' sexuality might have some correlation with their perceived infertility stress besides biosocial factors.

6.1.1.3 Biosocial demographic factors' effect on marital well-being

Age was found to have a negative effect on husbands' total level of marital adjustment and its dimension of dyadic satisfaction as well as wives' dyadic satisfaction.

Education level had a significantly positive effect on husbands' marital satisfaction. Wives with a high education level had the highest level of dyadic cohesion, whilst wives with a primary education level had the lowest level of affectional expression and DAS total marital satisfaction. Economic level, however, was only positively related to wives' marital satisfaction. This finding indicated one factor of SES (education or economic) level is positively related to infertile couples' marital well-being, this result is consistent with other research that found marriage satisfaction tended to increase with higher levels of education (Vaijyanthimala k., Bharati Kumari k., and Bharati 2004).

Length of marriage had a significantly negative effect on husbands' dyadic consensus and DAS total. Husbands with the shortest length of marriage (1-3 years) had a higher level of dyadic satisfaction than those from the longest length of marriage group (7 years or over). Wives with the shortest length of marriage had the highest level of DAS total and dyadic satisfaction.

Husbands from couples with female factor infertility had the lowest level of dyadic consensus, dyadic cohesion, dyadic satisfaction and DAS total, compared with husbands from couples with non-female factor infertility. As for marital satisfaction, the only significant difference was found between husbands from couples with female factor infertility and those from couples with unexplained factor infertility. Wives from couples with female factor infertility had the lowest level of dyadic consensus and marital satisfaction. Also, wives from couples with unexplained factor infertility had a lower level of dyadic consensus than wives from couples with male factor infertility.

Duration of infertility was only found to have had a significantly negative effect on the marital well-being of wives.

There were statistically significant differences between the spouses' dyadic cohesion, dyadic satisfaction, DAS total and marital satisfaction, but no difference in dyadic consensus and affectional expression.

6.1.2 Correlations between infertility stress, sexuality and marital well-being in infertile couples

6.1.2.1 Correlation between sexuality and infertility stress

Husbands' sexual esteem was significantly negatively correlated with their perceived infertility stress related to social concern, sexual concern, relationship concern, and their wives' perceived relationship concern. Husbands' sexual consciousness was significantly negatively correlated with their perceived relationship concern, their wives' perceived social concern and relationship. Husbands' sexual motivation had significant negative correlations with their perceived social concern, sexual concern, relationship concern, rejection of childfree lifestyle, and their wives' perceived sexual concern and relationship concern. Additionally, husbands' sexual satisfaction was negatively correlated with their perceived sexual concern, relationship concern, rejection of childfree lifestyle, and their wives' perceived sexual concern and relationship concern.

The sexual esteem of wives was significantly negatively correlated with their perceived social concern and husbands' perceived sexual concern. Wives' sexual consciousness was significantly negatively correlated to their perceived relationship concern and their husbands' perceived social concern. Wives' sexual motivation was significantly negatively related to their perceived social concern and husbands' perceived sexual concern. Sexual satisfaction was significantly negatively correlated to their perceived social concern and relationship concern, and their husbands' perceived sexual concern and relationship concern.

These results indicated infertility as stressor may have effect on men's and women's psychological tendency in sexuality. Previous studies presented the psychological sequence of infertility experienced by infertile individuals can generate negative effect on their sexual expression such as sexual esteem, sexual satisfaction, sexual intimacy and sexual communication (Lee and Sun 2000; Peterson, Newton, and Feingold 2007; Lee, Sun, and Chao 2001; Ohl et al. 2009). In this study, the results demonstrated infertility had negative effect on other aspects of sexuality such as sexual conscious and sexual motivation, this provided further evidence about the relationship between sexuality and infertility. Furthermore, based on family system perspective, both partners may share the experience of infertility, thus the study found one partner's sexuality was also correlated with the other's response on infertility.

6.1.2.2 Marital well-being in correlation with sexuality and infertility stress

The marital adjustment of husbands was negatively associated with their perceived infertility stress in social concern, sexual concern, relationship concern, and their wives' perceived sexual concern and rejection of childfree lifestyle. On the other hand, husbands' marital adjustment was positively correlated with their sexual esteem and sexual satisfaction. Furthermore, husbands' marital satisfaction was negatively correlated with their perceived infertility stress of social concern, sexual concern and relationship concern, and their wives' perceived social concern and relationship concern, but positively related to sexual esteem, sexual consciousness, sexual motivation and sexual satisfaction.

The marital adjustment of wives was negatively related to husbands' perceived infertility stress of social concern, sexual concern, relationship concern and the need for parenthood. Also it was negatively related to their own perceived social concern, sexual concern, relationship concern and the need for parenthood. Additionally, wives' marital adjustment was significantly positively correlated with their sexual esteem, sexual motivation and sexual satisfaction. Wives' marital satisfaction was negatively correlated with husbands' perceived infertility stress of social concern, sexual concern and relationship concern; and negatively related to their own perceived infertility stress of social concern, sexual concern, relationship concern and the need for parenthood. Additionally, wives' marital satisfaction was found to have a significant positive correlation with their sexual esteem, sexual consciousness, sexual motivation and sexual satisfaction, indicating wives who had higher a value of their own sexuality tended to be more satisfied with their marriages.

These findings presented infertility stress had negative relationship with marital well-being, specifically one partner's marital well-being was also found to have negative association with the other's experienced infertility stress. This could be related to increasing of emotion distress by infertility, which had negative effect on marital well-being (Waldinger et al. 2004). Furthermore, the study indicated sexuality had positive relationship with both husbands' and wives' marital well-being, this can be explained that sexuality is crucial for intimacy, couple relationship and communication.

6.1.3 Predictors of marital well-being of infertile couples by biosocial demographics, infertility stress and sexuality

In conformity with bio-psycho-social systems perspective and family systems theory, the variables having significant relationship with marital well-being were analyzed in regression model. The findings demonstrated that bio-socio-demographic characteristics and sexuality-related variables explained only 24.6% of the variance in marital satisfaction of husbands. For wives, the variables studied explained less than 25% of variance in marital adjustment and marital satisfaction. Those low adjusted R^2 indicated that there might have other variables associated with husbands' and wives' marital well being, which might be fatigue, work-related stress or pressure or interference from in-laws. However, from the aforementioned regression findings, it can be found that infertility diagnosis, infertility stress and psychological tendency in sexuality can be as predictors for husbands' and wives' marital well-being.

The study has demonstrated that infertility diagnosis, specific infertility stress and different aspect of sexuality might be as predictors of husbands' marital adjustment. Compared with the grand mean of all groups, husbands from couples with female factor infertility was a predictor for negative marital adjustment whereas couples with male factor infertility or unexplained factor infertility were a positive predictor of marital adjustment for husbands. Additionally, husbands' sexual esteem and sexual satisfaction were predictors of positive marital adjustment and marital satisfaction. However, the study found husbands' perceived infertility stress such as social concern, sexual concern and wives' perceived rejection of childfree life style, might be negative predictors for husbands' marital adjustment. As well as, social concern related to infertility stress perceived by husbands was a negative predictor for husbands' marital satisfaction.

Predictors of a negative marital adjustment for wives in infertile couples included wives' perceived infertility stress of sexual concern, relationship concern and husbands perceived infertility stress of sexual concern. However, predictors of a positive marital adjustment for wives were the shortest length of marriage and wives' sexual motivation. Moreover, a low economic level and wives' perceived infertility stress of need for parenthood were predictors of negative marital satisfaction among wives, but wives' sexual consciousness and sexual satisfaction were positive predictors of marital satisfaction. Infertility diagnosis was another predictor of wives' marital satisfaction. Compared with the grand mean of all groups, wives with female factor infertility was a predictor for negative marital satisfaction whereas couples with male factor infertility or unexplained factor infertility were a positive predictor of marital

satisfaction for wives.

Therefore, these results provide the evidence for the intervention with the holistic perspective to improve marital well-being in infertile couples.

6.2. Discussion: Qualitative Part of Study

The findings of the qualitative approach in this study provide valuable understanding of Chinese couples in their lived experience of infertility. This includes their feeling about infertility, their understanding of sexuality and how their marital relationship was impacted. Following is an analysis and discussion of these findings.

6.2.1 Perceived infertility impacted by traditional values on childbearing

The findings demonstrate that all of the infertile couples in this study expressed their desire to have a child, and adhered to the belief that having children is necessary for an integrated family. More evidently, the value of childbearing for the continuation of the family line (CCFL) was deeply rooted in their life. Additionally, the expectation of childbearing for old-age security and to minimize the risk of destitution was strongly emphasized, specifically with low socioeconomic group. Furthermore, the study found that CCFL was highlighted in the family system, the extended family members directly or indirectly demonstrated their attitudes towards childbearing, and wished the participants to fulfill their duty for the family. Clearly, the participants were confronted with traditional cultural values on childbearing compounding their distress about infertility. Compared with the findings of similar studies of Western societies (Callan 1984; Nahar 2010; Fahami et al. 2010; Alexander et al. 1992), CCFL is a unique feature demonstrated by the participants in this study.

The study also demonstrated two other themes, namely emotional stress and decreasing social connection. These responses were also found in other studies (Yagmur and Oltuluoglu 2012; Martins et al. 2011; Larsen et al. 2010). However, in Chinese society, there are some specific features.

The results of this study indicate both infertile men and infertile women demonstrated the common emotion of stress in the face of failing in childbearing, involving anxiety, distress, anger, grief and feelings of worthlessness. It could be explained that both of them had the same stressful encounter, and also might be related to their similar failure in realizing the expectation of having a child grounded on CCFL. However, there was a clear discrepancy in the extent of the emotional stresses between infertile men and infertile women. The results

indicated that infertile women showed a greater level of emotional stress than infertile men. Only one study showed that men's stress levels were similar to those of a comparative female cohort (Nachtigall, Becker, and Wozny 1992).

Infertile women expressed guilt, self-blame, depression and jealousy towards pregnant people, whereas men with or without factor for infertility did not state these. Gender difference, societal and culture perspectives could provide meaningful explanations for the variation in findings. In Chinese society, the social roles of women and men are still endowed with traditional social expectations based on patriarchal culture norms (Sheng 2011). Under this stance, Chinese women are commonly expected to be responsible for her husband, children and mother-in-law. They are in a subordinate position in the family as well as in the wider society. In contrast, men's role is to be the breadwinner for the family and hold a dominant position in both public and family fields. Specifically, women are undoubtedly viewed as child bearers and to have the important role for continuing the family line. (Loke, Yu, and Hayter 2012). Additionally, in Chinese culture there are higher values on gestating offspring as filial duty to one's parents and ancestors (Qiu 2002). In such situations, women from infertile couples were exclusively regarded as the main contributor to a childless status. They are more likely to be blamed by family members and outsiders, this is the case even when the infertility is not due to female factor. Thus gender difference in the experience of infertility is likely to be related to traditional values.

The theme of decreasing social connection was found in this study. The participants reported they experienced pressure in the family interaction and in social communication, because people always raised the topic, and explicitly or implicitly expressed traditional values. As for these, infertile couples deemed the concern expressed by others as sympathy not as empathy. Women specifically, frequently felt painful, stigmatization and discrimination from the discourse of others. Significantly, infertile couples were unwilling to communicate with others or openly discuss the topics of infertility, children and pregnancy. Furthermore, some of infertile couples avoided social involvement and interaction, because they could not accept the derisive words and joking from friends at social gatherings. Couples want to avoid adding to their feelings of anxiety, humiliation and inferiority. This finding is similar to other studies which indicate infertile couples feel socially alienated and isolated from their friends with children (Imeson and McMurray 1996; Anderson K. M. et al. 2003).

In summary, infertility is not just a physical, medical problem, with the high value placed

on fertility and parenthood in Chinese society impacts on the emotional health of infertile couples.

6.2.2 The impact of infertility and cultural values on sexuality

The participants in this study expressed their negative perception of sexual identity, demonstrated changes in sexual communication and in sexual life. From the results, it is evident that infertility was the crucial influencing factor for these changes. Additionally, the sexuality of infertile couples was also influenced by the culture.

Both infertile men and infertile women reported infertility threatened their sexual identity, however the study indicated the different result, comparing with one study's finding that infertility had a stronger negative impact on a woman's sense of sexual identity than on a man's (Andrews F. M., Abbey A., and Halman L. J. 1991). In Chinese culture, a man can never be sure about his masculinity until he is a father (Lee and Chu 2001). Thus, it can be understandable that infertile men extremely perceived themselves as the emasculated in the study. Additionally, even though the participants in this study do not have any sexual dysfunction, they still expressed more concern about their ability to be a biological father. This could be explained that the link between fertility and potency is strongly highlighted in Chinese culture, specifically men's identity and masculinity are highly considered to be equated with sexual performance (Susan Brownell and Wasserstrom 2002). However, it is noted that in infertile couples where men were not infertile did not get their sense of identity from their sexual performance. Likewise, motherhood is considered a major role of women and a respected female identity (Loke, Yu, and Hayter 2012). Infertile women in this study reported a negative sense of sexual identity such as feeling of unfeminine and defective due to a failure to conceive. Further, women from all of infertile couples reported their feeling of loss of identity due to failure to attain motherhood, which was central to their sexual identity. The changes in their perception of sexual identity might be explained by the fact that motherhood is not just a pattern passing from one generation to another. In Chinese society family relations and social life places great emphasis on fertility (Lee, Sun, and Chao 2001), and childbirth is seen as women's business (Kartchner and Callister 2003).

Regarding sexual communication between infertile couples, the study found it was fairly limited. This could be explained by the fact that sex is still somewhat of a taboo topic, even though there are rapid changes in sexual mores in current Chinese society (Xiao, Mehrotra,

and Zimmerman 2011). However, this study demonstrated that infertile couples evidently held traditional values and beliefs on sex. Specifically they perceived that the purpose of sex was for reproduction, not for pleasure and romance. They viewed fertility as their predominant concern in a sexual relationship, with little interest in communicating about desire and feeling, or discussion their personal views related to sexuality. The results also indicated that both men and women considered sexual matters as more sensitive and private than other topics. In reality, infertile couples lived in a limited space that they shared with their family members. Clearly the infertile couples in this sort of family environment do not have reasonable opportunity for private communication, and are concerned about invasion of privacy. The results indicated that infertile couples perceived the paucity of privacy as the evident barrier for their sexual communication. Apart from these factors, it was evident that there was a discrepancy in sexual communication between husbands and wives. The results showed most husbands were more likely than their wives to initiate sexual expression. It is reasonable to expect some attitudinal differences in sexual matters between men and women in a Chinese social context. These are associated with culture factors that tend to enhance the role of the husband as the dominator while women are expected to play a more passive role including that related to their sexual communication. Obviously, infertility has a negative effect on sexual communication in both infertile men and infertile women, this finding is similar to other studies (Nene, Coyaji, and Apte 2005; Lee and Chu 2001; Allison 2011), which might be related to emotion stress caused by the diagnosis. It is noted that in couples with unexplained infertility factor, men did not report any problems in sexual communication, while women almost lost their interest in sexual matters. This difference might be explained by the notion that the men maintained a positive sense of sexual identity due to their perceived normal sexual function. Conversely, women experienced emotion stress associated with the inability to conceive thereby reducing their self-concept and further inhibiting their sexual communication.

In general, from these findings, it is reasonable to deduce that infertile couples' communication on sex is influenced by a variety of factors. These include the dominant value placed on the concept of sexuality, attitudes toward sex and sexuality, social norms on sexual identity, living space with limited privacy and an imbalance of gender power.

This study has demonstrated that a majority of the couples were dissatisfied with their sexual lives, which was related to their perceived experience of infertility, this finding is

similar to other studies (Valsangkar et al. 2011; Drosdzol and Skrzypulec 2009; Ramezanzadeh et al. 2006; Elsenbruch et al. 2003). Additionally, the sense of sexual identity and sexual communication in marital life also conflated with a decrease in sexual desire and pleasure. Moreover, some infertile couples complained that their planning sexual intercourse around ovulation, disrupted their sense of pleasure because the focus was on reproduction. The lack of spontaneous sex and sex for fun with intimacy, combined with the expectation of having a child, these infertile couples suffered psychological pressure.

What makes this study different is the Chinese cultural context. A commitment to Taoist health values in Chinese culture had an effect on infertile men's sexual behavior. This is demonstrated by the findings that 38% of the infertile men cohort followed Taoist principles of intentionally decreasing the frequency in marital sexual activity. While Taoist values were not commonly used by infertile men, this finding implies that attitudes and behavior is relevant to their social-culture context.

Regarding infertile women it is clear that they rarely negotiated with their husbands either in the expression of desire for sex or in the initiation of sexual activity. Additionally, they seldom talked to their husbands about their sexual feelings. These prominent features were associated with culture values, this can be explained from the following discourse. China is a country with a history of more than 3000 years of sexual suppression (Zeng J.P. 2004), there is no doubt that sexual conservativeness is still regarded as part of Chinese cultural values. Further, under the influence of Confucian concepts that are rooted in Chinese culture, women should submit and sacrifice to men (Tang, Wong, and Lee 2001). As a result, the women in the study were not active in their marital sexual life, and had a passive role within the conjugal relationship. It is noted that some women in the study perceived sexual intimacy as an important part of their relationship, and expected their husbands to intuitively understand their needs. It is evident that gender differences in attitude toward to sexuality impacts on relationships and that more attention should be given to these aspects when providing health services for infertile couples.

6.2.3 Marital relationship related to infertility adjustment, sexual satisfaction and commitment to the marriage

A number of studies have demonstrated that a diagnosis of infertility is an undoubted stress that has a physical and psychological impact that affects marital relationships (Ellison

and Hall 2003; Stanton et al. 2002). However, the marital relationship of infertile couples has not been widely discussed. Specifically, within the context of canvassing the views of both partners, simultaneously, the dynamics by which infertility affects relationships are not well understood. In this study, the results revealed infertile couples' marital relationship was related to their adjustment, sexual satisfaction and commitment to the marriage.

In general, the results indicated that infertile women experienced more strain on a relationship than men, which was related to their stress from infertility diagnosis and uncertain treatment. Furthermore, it was found that some women perceived their marital relationship was associated with their husbands' lack of empathy and understanding. Conversely, some men considered their stress resulted from the response of their wife which then resulted in having a negative effect on marital relationship. These findings imply that more attention should be given to the different pattern of adjustment to infertility. In the face of infertility, men were found to be emotionally restrained, while women significantly expressed great negative emotion reaction. It is proposed that this is due to the different societal expectations of stereotypical gender roles. A discrepancy of adjustment to infertility between men and women might increase the tension within a relationship and result in marital discord. In addition, in the study a small proportion of couples reported they did not experience any frustration of marital relationship, on the contrary, maintained stable and harmonious couple relationship. This might be related to the compatible adjustment to infertility besides understanding, communication and support each other. It was found that men and women experienced sexuality differently which embodied different needs, expectations and feelings in marital sexual life. Furthermore, it is clear that the impact of infertility generated problems regarding sexual relations, most being related to emotional stress. Specifically, over half of the participants reported that sexual satisfaction had decreased due to the need to plan coitus to meet the duty of conception, thus divorcing pleasure from sexual activity. In the study, the result also revealed the majority of participants believe the enjoyable and mutually satisfying sexual relationship is beneficial to their marital relationship. Further, this study found that sexual satisfaction was helpful for lowering infertility stress. This assumption is supported by other studies which indicate that dissatisfaction with sexual relationships can contribute to instigating and/or worsening marital relationship (Stanik and Bryant 2012; Wielinski et al. 2010; Yasan and Gurgun 2009). However, it is noted that over half participants in this study seemed not to initiatively take

measures to improve their sexual lives, this might be explained that they have few knowledge about the difference between sex and sexuality, or don't want to disclose their privacy related to marital sexual life.

In the study, it was also found that commitment to marriage as an institution can have an effect on some infertile couples' marital relationship, likewise, the decline in commitment can weaken marital bonds. This can be understandable that in Chinese culture, there is a strong emphasis on the obligation and duties of marriage, the value of the family as a unit, and life-long commitment to marriage. There is no more information of influencing marriage commitment from infertile couples in this study, however, the attitude toward marriage, infertile couples' perceived commitment to marriage and influencing factors should be give more consideration when discussing the association between infertility, sexuality and marital relation.

6.3 Limitations and Strengths

Some limitations in the current study should be noted.

Firstly, the study sample was purposively recruited at a specialized infertility center; the results, therefore, may differ from a community based sample of infertile couples who do not seek medical assistance. Thus, the findings of the present study may only represent the participants from Hei Longjiang Province, China, and may not be representative of other locations with different culture values, and are not intended to be representative of all infertile couples. For the purpose of this study, it was not feasible for the proposed study to use random selection due to the costs and extensive resources needed to sample infertile couples from the general population. A further study should be considered and possibly conducted in other locations.

Secondly, the present study is a cross-sectional design study; self-reported data or survey data might not provide enough evidence to evaluate and predict change over time in infertility stress, sexuality and marital well-being in a clinical sample. Future studies are needed to examine whether there is a changing pattern of marital well-being across a follow-up study, specifically considering different stage of infertility treatment and different treatment results.

Thirdly, most interviewees in the qualitative study were preparing for IVF treatment, with only a few infertile couples being in the second treatment cycle. Little information was gathered about the infertility stress and psychosexual tendencies in infertile couples

undergoing treatment, and their effect of that treatment on couple relationship.

Fourthly, based on the findings of this study, biosocial demographics were found to have various effects on infertility stress, sexuality and marital well-being, so future study should be conducted for further evidence of their impact on infertile couples' well-being.

Despite the limitations mentioned above, the study had the following strengths.

Firstly, all the questionnaires used had satisfactory reliability and validity. In particular, two instruments (the FPI and the MSQ) were validated in the Chinese language for the first time as a result of this study, which make it possible to utilize the results of this study in cross-cultural research on infertility and sexuality. In addition, they may provide more feasibility in related research based on standard instruments.

Secondly, the sample of 254 couples in the quantitative part of this study ensured a statistical power of 90% and the response rate was a satisfactory 95%. Also, all items in the questionnaires were answered by these participants. Additionally, in qualitative study, only two couples missed the interview, and other interviewees had good cooperation with the researcher in whole interview. These ensured the qualitative data's saturation.

Thirdly, the assumptions of different statistical analyses conducted on quantitative data were strictly checked, which ensured the validity of conclusions.

Finally, a mixed-method design of quantitative and qualitative analysis on infertility, sexuality and marital well-being provided a meaningful application from research methodology to practical intervention.

In conclusion, the strengths of the study ensured rigorous findings.

6.4 Recommendations

Based on the findings of the present study, the following recommendations are provided as a matter of necessity to increase the well-being of infertile couples. The recommendations are for researchers and medical professionals working with individuals or couples experiencing infertility, and also for health and social development policy planners.

6.4.1 Recommendations for research

The research findings demonstrated perceived infertility stress was at a high level, and that sexuality is impacted by infertility stress. Both husbands and wives had low levels of marital well-being. Although the study researched infertile couples sampled from an IVF clinic in the city of Harbin, Hei Longjiang Province, little is known about infertile couples'

well-being and related influencing factors elsewhere in the province, nor elsewhere in China. There is a large difference between the culture and socioeconomic development of urban and rural areas, which might affect the infertility experience of individuals and couples in different ways. It is necessary and urgent to conduct related research on all aspects of infertility through quantitative, qualitative or mixed methods designs to obtain more deeper and broader insights on all aspects of infertility. It can be argued that more socio-cultural and economic influences associated with infertility should be investigated in future studies.

Although the results of the present study indicate discrepancy between husbands and wives for sexuality and marital well-being, no significant difference was found in their perceived infertility stress. The univariate analysis demonstrated this could possibly be related to the different effects of biosocial demographics. It is to be remembered that the present research is limited to the association between infertility, sexuality and marital well-being. Future research should investigate the correlation of spousal congruency and isolate predictors for incongruencies. This would lead to a better understanding of relationship problems and provide a guide to management.

The qualitative analysis found that sexual communication and commitment to the marriage had a strong influence on infertile couples' marital relationship, but neither this study nor previous studies have approached this area with quantitative research. Additional research should focus on sexual communication and commitment to the marriage, and the effectiveness of both in the context of infertility. Moreover, a future cross-cultural study would be beneficial.

Finally, a follow-up study should be designed and conducted to explore the long-term infertility and the impact on psychosexual functions and of those effects on the marital relationship. Follow-up studies can also provide useful evidence for psycho-social intervention for infertility, including support, education, and research.

6.4.2 Recommendations for practice

Some recommendations for practice are possible as a result of this study. It was found that biosocial demographics (age, education, income, length of marriage, infertility diagnosis and infertility experience duration) of infertile couples were related to perceived infertility stress, psychological tendency in sexuality, and marital well-being. In the context of Chinese Confucian culture, the value of childbearing for lineage and in stereotypical gender roles was

deeply rooted in infertile couples, generating problems in communication, marital adjustment and well-being in sexual and marital relationships.

Medical professionals, social workers, psychologists or health promotion experts should take into account the effect of cultural and social backgrounds on couples and give more consideration to bio-social-culture issues when providing medical care or designing interventions for infertile couples. Medical professionals who work in infertility clinics may be able to identify individuals who are more likely to experience more stress or difficulties in couple relationship if these factors are investigated through routine procedures.

Both husbands and wives in the present study experienced high stress-related infertility. Husbands, specifically, showed evidence of higher levels of sexual concern than wives. Wives experienced higher levels of social concern than husbands. Husbands had higher levels in various aspects of sexuality than wives, but all were in the middle level. Husbands had a lower level of marital adjustment and marital satisfaction compared with their wives, but both of them were in lower level of marital adjustment and marital satisfaction. More importantly, these changes were proved to be inter-related with infertility stress and sexuality. While interviewing infertile couples at the IVF clinic, the present researcher found almost all infertile couples expressed their expectation of counseling for psychological distress in addition to information and education regarding infertility. One that was conversant with the pathophysiology of infertility, and an understanding of the psychological and social impact causing personal distress. However, the IVF clinic accessed for this study did not have any consultants for counseling. Further, medical professionals mainly delivered medical tests and associated treatment, and had no insufficient time to provide opportunities for infertile couples to share their psychological distress or other stresses related to infertility, and discuss the psychological aspects of their situation. Such issues have a detrimental effect on their well-being and also have a negative effect on the outcome of infertility treatment (Morreale et al. 2011; Matthiesen et al. 2011; Louis et al. 2011; Gollenberg et al. 2010). It is crucial that medical professionals facilitate the ability of infertile couples to deal with these difficulties early. It is recommended, then, that IVF clinics should provide specialist counselors and counseling services for infertile couples for the duration of their infertility treatment.

6.4.3 Recommendations for public education and advocacy

Public advocacy and education are important in order to address and eliminate gender

bias, to clarify the nature of infertility and to destigmatize infertility. The study found a common experience for infertile couples was a decline in social connection because of stigmatization and a lack of support from family and society. Wives endured more stress for social concern than husbands, and husbands experienced more sexual concern than wives. Both concerns are closely related to traditional and stereotypical gender roles. It also indicates a strong prejudice against infertile couples due to a lack of knowledge about infertility combined with little empathy for infertile couples.

It is recommended that cross-sectional collaboration should be formed between health institutes, women's federal unions, infertility researchers, psychologists, social workers, feminists and others with the aim of delivering public advocacy and education that will address and eliminate gender bias, to clarify the nature of infertility and to destigmatize infertility.

It is clear that expensive treatment resulted in further stress and detriment to the marital relationship of infertile couples from a low social economic status. The present researcher feels compelled to reveal feeling deeply touched by the grief and sense of loss expressed by infertile couples involved in the present study. Medical insurance to cover the cost of treatment for infertile couples is recommended. This measure will both benefit infertile couples, and eliminate inappropriate use of costly procedures for infertility treatment. This should be a key objective of public advocacy.

6.5 Summary

This study is one of only a few studies to examine marital quality in a non-Western setting. As such, it contributes to the literature on marital quality by extending the commonly found association between infertility, sexuality and marital quality.

Though biosocial demographics have been widely discussed in health research, they are seldom given attention in the field of infertility, specifically no empirical studies were implemented. This study proved there is great variability in perceived infertility stress, psychological tendency in sexuality and adjustment to marital relationship, depending on age, education, economic level, length of marriage, infertility diagnosis and infertility duration, therefore it is extremely important to understand these biosocial demographics of infertile couples. Furthermore, these findings will be useful for formulating and implementing tailored

interventions in effective management of infertility, and promote infertile couples' marital well-being.

The quantitative part of this study identified the correlation between infertility stress, sexuality, marital adjustment and marital satisfaction in infertile Chinese couples. The results indicated both members' perceived infertility stress are negatively correlated with each partner's/spouse's sexuality, as well as are negatively correlated with each partner's/spouse's marital adjustment and marital satisfaction. However, both members' sexuality are found to have positive correlation with their marital adjustment and marital satisfaction. These results also emerged in qualitative part of this study.

Overall, in this study, a range of biosocial demographics, infertility stress and sexuality variables may influence the marital well-being in infertile couples. The results of multiple regression demonstrated that husbands from couples with female factor infertility was a predictor for their negative marital adjustment, compared with the grand mean of all groups; and husbands' perceived infertility stress of social concern and sexual concern were negative predictors for marital adjustment, as well as wives' perceived rejection of childfree life style. Additionally, husbands' perceived social concern was a negative predictor for their marital satisfaction. However, husbands' sexual esteem and sexual satisfaction were predictors of their positive marital adjustment and marital satisfaction. For wives' marital adjustment, the results indicated wives' perceived infertility stress of sexual concern, relationship concern and husbands' perceived infertility stress of sexual concern were negative contributors. In contrast, compared with the grand mean of all groups, the shortest length of marriage was positive predictor for wives' marital adjustment, as well as wives' sexual motivation. Additionally, compared with the grand mean of all groups, low economic level and female factor for infertility were negative predictors for wives' marital satisfaction as well as wife's perceived the need for parenthood. However, compared with the grand mean of all groups, male factor infertility and unexplained factor infertility were predictors for positive marital satisfaction, as well as wives' sexual consciousness and sexual satisfaction with positive contribution.

Furthermore, social culture, traditional value of childbearing, stereotypical gender roles, sexual communication, sexual satisfaction, and commitment to marriage are found to have effect on infertile couples' perceived infertility stress and understating of sexuality.

Infertile couples' experience on infertility were found to be correlated with: (1) frustration in carrying on the family lineage; (2) Emotion stress; (3) decreasing social

connection. Additionally, their understandings on sexuality were associated with: (1) self identity; (2) communication on sex; (3) sexual life. Furthermore, the effect of infertility stress and sexuality on marital well-being were discovered to be related to adjustment to infertility, sexual satisfaction and commitment to marriage.

All of these above findings provide the evidence that intervention with the holistic perspective is necessary to improve marital well-being in infertile couples. Four papers from the research have been published in peer review journals. Further publications are anticipated. It is the intention of the author to disseminate the significant findings through a range of professional continuing education activities. The intention is to combine research findings with practice. The results of this study have particular implications both for evidence-based medical practice and infertile couples' marital well-being. Thus, these research outcomes will be formulated into practice guidelines for medical and mental health practitioners. Additionally, public health campaigns will also be employed.

REFERENCES

- Abbey, Antonia, Frank M. Andrews, and L. Jill Halman. 1995. "Provision and Receipt of Social Support and Disregard: What Is Their Impact on the Marital Life Quality of Infertile and Fertile Couples?" *Journal of Personality & Social Psychology* 68 (3): 455-469.
- Abbey, Antonia, Frank M. Andrews, and Halman L. Jill. 1992. "Infertility and Subjective Well-Being: The Mediating Roles of Self-Esteem, Internal Control, and Interpersonal Conflict." *Journal of Marriage and the Family* 54 (2): 408-408.
- Adler, R. H. 2009. "Engel's Biopsychosocial Model Is Still Relevant Today." *Journal of psychosomatic research* 67 (6): 607-11.
- Agha, S. 2001. "Patterns of Use of the Female Condom after One Year of Mass Marketing." *AIDS Educ Prev* 13 (1): 55-64.
- Aldous, Joan, and Rodney F. Ganey. 1999. "Family Life and the Pursuit of Happiness: The Influence of Gender and Race." *Journal of Family Issues* 20 (2): 155-180.
- Alexander, B. B., R. L. Rubinstein, M. Goodman, and M. Luborsky. 1992. "A Path Not Taken: A Cultural Analysis of Regrets and Childlessness in the Lives of Older Women." *Gerontologist* 32 (5): 618-26.
- Alkharusi, Hussain. 2012. "Categorical Variables in Regression Analysis: A Comparison of Dummy and Effect Coding." *International Journal of Education* 4 (2): 202-210.
- Allison, J. 2011. "Conceiving Silence: Infertility as Discursive Contradiction in Ireland." *Med Anthropol Q* 25 (1): 1-21.
- Alvarez, A. S., M. Pagani, and P. Meucci. 2012. "The Clinical Application of the Biopsychosocial Model in Mental Health: A Research Critique." *American journal of physical medicine & rehabilitation / Association of Academic Physiatrists* 91 (13 Suppl 1): S173-80.
- Amato, Paul R., and Stacy J. Rogers. 1997. "A Longitudinal Study of Marital Problems and Subsequent Divorce." *Journal of Marriage and the Family* 59 (3): 612-624.
- Amir, Marianne, Netta Horesh, and Tami Lin-Stein. 1999. "Infertility and Adjustment in Women: The Effects of Attachment Style and Social Support." *Journal of Clinical Psychology in Medical Settings* 6 (4): 463-479.
- Anderson, B. J., and F. M. Wolf. 1986. "Chronic Physical Illness and Sexual Behavior: Psychological Issues." *Journal of Consulting and Clinical Psychology* 54 (2): 168-175.
- Anderson K. M., Sharpe M., Rattray A., and Irvine D. S. 2003. "Distress and Concerns in Couples Referred to a Specialist Infertility Clinic." *Journal of psychosomatic research* 54 (4): 353-5.
- Anderson, Stephen A., Candyce S. Russell, and Walter R. Schumm. 1983. "Perceived Marital Quality and Family Life-Cycle Categories: A Further Analysis." *Journal of Marriage & the Family* 45 (1): 127-139.
- Andrews F. M., Abbey A., and Halman L. J. 1991. "Stress from Infertility, Marriage Factors, and Subjective Well-Being of Wives and Husbands." *Journal of Health and Social Behavior* 32 (3): 238-253.
- Arnetz, B. B. 1996. "Causes of Change in the Health of Populations: A Biopsychosocial Viewpoint." *Social Science & Medicine* 43 (5): 605-8.
- Artinian, N. T. "Selecting a Model to Guide Family Assessment." *DCCN - Dimensions of Critical Care Nursing* 13 (1): 4-12; quiz 13.
- Atwood, Joan D., and Steven Dobkin. 1992. "Storm Clouds Are Coming: Ways to Help Couples Reconstruct the Crisis of Infertility." *Contemporary Family Therapy: An International Journal* 14 (5): 385-403.
- Audu, B. M. 2002. "Sexual Dysfunction among Infertile Nigerian Women." *J Obstet Gynaecol* 22 (6): 655-7.
- Awonuga, A. O., and A. Nabi. 1997. "In Vitro Fertilization with Low-Dose Clomiphene Citrate Stimulation in Women Who Respond Poorly to Superovulation." *Journal of assisted reproduction and genetics* 14 (9): 503-7.
- Baillie, Aubrey, and Sarah Corrie. 1996. "The Construction of Clients' Experience of Psychotherapy through Narrative, Practical Action and the Multiple Streams of Consciousness." *Human Relations* 49 (3): 295-311.
- Barrientos, Jaime E., and Dario Páez. 2006. "Psychosocial Variables of Sexual Satisfaction in Chile." *J Sex Marital Ther* 32 (5): 351-368.
- Beaton, D. E., C. Bombardier, F. Guillemin, and M. B. Ferraz. 2000. "Guidelines for the Process of Cross-Cultural Adaptation of Self-Report Measures." *Spine* 25 (24): 3186-91.

- Becker, Gay, and Robert D. Nachtigall. 1992. "Eager for Medicalisation: The Social Production of Infertility as a Disease." *Sociology of health & illness* 14 (4): 456-471.
- Berg, Barbara J., and John F. Wilson. 1991. "Psychological Functioning across Stages of Treatment for Infertility." *Journal of Behavioral Medicine* 14 (1): 11-26.
- Berg, Bruce. 2007. "Qualitative Research Methods for the Social Sciences (6th Ed)." 3. Boston: Pearson Education.
- Bergstrom, S. 1992. "Reproductive Failure as a Health Priority in the Third World: A Review." *East African Medical Journal* 69 (4): 174-80.
- Bertaux, Daniel. 1981. "From the Life-History Approach to the Transformation of Sociological Practice." In *Biography and Society: The Life History Approach in the Social Sciences*, ed. Daniel Bertaux, 29-45. London: Sage.
- Blenner, Janet L. 1992. "Stress and Mediators: Patients' Perceptions of Infertility Treatment." *Nursing Research* 41 (2): 92-97.
- Boivin J., Sanders K., and Schmidt L. 2006. "Age and Social Position Moderate the Effect of Stress on Fertility. Evolution and Human Behavior " 27 (5): 345-356.
- Boivin, J., L. Bunting, J. A. Collins, and K. G. Nygren. 2007. "International Estimates of Infertility Prevalence and Treatment-Seeking: Potential Need and Demand for Infertility Medical Care." *Human Reproduction* 22 (6): 1506-12.
- Boivin, J., L. C. Scanlan, and S. M. Walker. 1999. "Why Are Infertile Patients Not Using Psychosocial Counselling?" *Human Reproduction* 14 (5): 1384-1391.
- Boivin, J., and J. E. Takefman. 1995. "Stress Level across Stages of in Vitro Fertilization in Subsequently Pregnant and Nonpregnant Women." *Fertility and Sterility* 64 (4): 802-10.
- Bradbury, Thomas N., Frank D. Fincham, and Steven R. Beach. 2000. "Research on the Nature and Determinants of Marital Satisfaction: A Decade in Review." *Journal of Marriage & the Family* 62 (4): 964-980.
- Bringhent, F., F. Martinelli, R. Ardeni, and G. B. La Sala. 1997. "Psychological Adjustment of Infertile Women Entering Ivf Treatment: Differentiating Aspects and Influencing Factors." *Acta Obstetrica et Gynecologica Scandinavica* 76 (5): 431-7.
- Cai, Q. F., F. Wan, R. Huang, and H. W. Zhang. 2011. "Factors Predicting the Cumulative Outcome of Ivf/Icsi Treatment: A Multivariable Analysis of 2450 Patients." *Human Reproduction* 26 (9): 2532-40.
- Calahan, Charles A. 1997. "Internal Consistency, Reliability, and Concurrent Validity of the Kansas Marital Satisfaction Scale and the Quality Marriage Index." *Psychological Reports* 80 (1): 49-50.
- Callan, V. J. 1984. "Voluntary Childlessness: Early Articulator and Postponing Couples." *J Biosoc Sci* 16 (4): 501-9.
- Callan, Victor J., and John F. Hennessey. 1989. "Strategies for Coping with Infertility." *British Journal of Medical Psychology* 62 (4): 343-354.
- Carey, Michael P., Ilana P. Spector, Larry J. Lantinga, and Dennis J. Krauss. 1993. "Reliability of the Dyadic Adjustment Scale." *Psychological Assessment* 5 (2): 238-240.
- Cassell, C., and G. Symon. 1994. "Qualitative Research in Work Contexts." In *Qualitative Methods in Organizational Research*, eds C. Cassell and G. Symon, 1-13. Thousand Oaks, CA: Sage Publications.
- Cassileth, B. R., and D. A. Drossman. 1993. "Psychosocial Factors in Gastrointestinal Illness." *Psychotherapy and psychosomatics* 59 (3-4): 131-43.
- Chachamovich, J., E. Chachamovich, M. P. Fleck, F. P. Cordova, D. Knauth, and E. Passos. 2009. "Congruence of Quality of Life among Infertile Men and Women: Findings from a Couple-Based Study." *Human Reproduction* 24 (9): 2151-2157.
- Chang, S. N., and P. F. Mu. 2008. "Infertile Couples' Experience of Family Stress While Women Are Hospitalized for Ovarian Hyperstimulation Syndrome During Infertility Treatment." *Journal of clinical nursing* 17 (4): 531-8.
- Che, Y., and J. Cleland. 2002. "Infertility in Shanghai: Prevalence, Treatment Seeking and Impact." *Journal of obstetrics and gynaecology : the journal of the Institute of Obstetrics and Gynaecology* 22 (6): 643-8.
- Cheatle, M. D., and R. M. Gallagher. 2006. "Chronic Pain and Comorbid Mood and Substance Use Disorders: A Biopsychosocial Treatment Approach." *Current psychiatry reports* 8 (5): 371-6.
- Cheung, Maria. 1997. "Social Construction Theory and the Satir Model: Toward a Synthesis." *American Journal of Family Therapy* 25 (4): 331-343.
- Chin-chun Yi, and Wen-yin Chien. 2006. "Does Conjugal Disparity Affect Marital Relations? A Comparative Study

- of Taiwan, Shanghai and Hong Kong." *Current Sociology* 54 (2): 229-254.
- Chou, K. L., and I. Chi. 2004. "Childlessness and Psychological Well-Being in Chinese Older Adults." *International journal of geriatric psychiatry* 19 (5): 449-57.
- Conrad, Peter, and Kristin K. Barker. 2010. "The Social Construction of Illness: Key Insights and Policy Implications." *Journal of Health and Social Behavior* 51 (1, Suppl): S67-S79.
- Cook, William L., and David A. Kenny. 2005. "The Actor-Partner Interdependence Model: A Model of Bidirectional Effects in Developmental Studies." *International Journal of Behavioral Development* 29 (2): 101-109.
- Cooksey, E. C., R. R. Rindfuss, and D. K. Guilkey. 1996. "The Initiation of Adolescent Sexual and Contraceptive Behavior During Changing Times." *J Health Soc Behav* 37 (1): 59-74.
- Cousineau, T. M., and A. D. Domar. 2007. "Psychological Impact of Infertility." *Best practice & research. Clinical obstetrics & gynaecology* 21 (2): 293-308.
- Covington, S. N., P. J. Hillard, E. W. Sterling, and L. M. Nelson. 2011. "A Family Systems Approach to Primary Ovarian Insufficiency." *Journal of pediatric and adolescent gynecology* 24 (3): 137-41.
- Craib, Ian. 1997. "Social Constructionism as a Social Psychosis." *Sociology* 31 (1): 1-15.
- Crane, D. Russell, C. Middleton Kenneth, and A. Bean Roy. 2000. "Establishing Criterion Scores for the Kansas Marital Satisfaction Scale and the Revised Dyadic Adjustment Scale." *The American Journal of Family Therapy* 28 (1): 53-60.
- Crawford, Duane W., Renate M. Houts, Ted L. Huston, and Laura J. George. 2002. "Compatiability, Leisure, and Satisfaction in Marital Relationships." *Journal of Marriage and Family* 64 (2): 433-449.
- Creswell, J. W. 1998. "Qualitative Inquiry and Research Design Choosing among Five Traditions." 64. Thousand Oaks, CA: Sage Publications.
- Creswell, J. W., V. L. Plano Clark, M. L. Gutmann, and W. E. Hanson. 2003. "Advanced Mixed Methods Research Designs." In *Handbook of Mixed Methods in Social & Behavioral Research* eds A. Tashakkori and C. Teddlie, 212. Thousand Oaks: Sage.
- Creswell, John W. 2003. "Research Design: Qualitative, Quantitative, and Mixed Methods Approaches." 18. Thousand Oaks, CA: SAGE Publications.
- Creswell, John W. 2009. "Research Design: Qualitative, Quantitative, and Mixed Methods Approaches." 215-216. Thousand Oaks, CA: Sage Publications.
- Cwikel, J., Y. Gidron, and E. Sheiner. 2004. "Psychological Interactions with Infertility among Women." *European Journal of Obstetrics & Gynecology and Reproductive Biology* 117 (2): 126-131.
- Da Costa, D., M. Zimmer, and M. A. Fitzcharles. 2011. "Biopsychosocial Determinants of Physical and Mental Fatigue in Patients with Spondyloarthritis." *Rheumatology international* 31 (4): 473-80.
- Daar A., and Merali Z. 2002. "Infertility and Social Suffering: The Case of Art in Developing Countries." In *Current Practices and Controversies in Assisted Reproduction*, ed. RowePJ VayenaE, GriffinPD, 15-21. Geneva: World Health Organization.
- Daniluk, Judith C. 2001. "Reconstructing Their Lives: A Longitudinal, Qualitative Analysis of the Transition to Biological Childlessness for Infertile Couples." *Journal of Counseling & Development* 79 (4): 439-449.
- de Mouzon, J., P. Lancaster, K. G. Nygren, E. Sullivan, F. Zegers-Hochschild, R. Mansour, O. Ishihara, and D. Adamson. 2009. "World Collaborative Report on Assisted Reproductive Technology, 2002." *Human Reproduction* 24 (9): 2310-20.
- Deka P.K., and Sarma S. 2010. "Psychological Aspects of Infertility." *Br J Med Prac* 3 (3): a336.
- Demyttenaere, K., P. Nijs, G. Evers-Kiebooms, and P. R. Koninckx. 1992. "Coping and the Ineffectiveness of Coping Influence the Outcome of in Vitro Fertilization through Stress Responses." *Psychoneuroendocrinology* 17 (6): 655-65.
- Dicicco-Bloom, B., and B. F. Crabtree. 2006. "The Qualitative Research Interview." *Med Educ* 40 (4): 314-21.
- Domar A. D., Broome A., Zuttermeister P. C., Seibel M., and Friedman R. 1992. "The Prevalence and Predictability of Depression in Infertile Women." *Fertility and Sterility* 58 (6): 1158-63.
- Domar, A. D., P. C. Zuttermeister, and R. Friedman. 1993. "The Psychological Impact of Infertility: A Comparison with Patients with Other Medical Conditions." *Journal of psychosomatic obstetrics and gynaecology* 14 Suppl: 45-52.
- Donkor, E. S., and J. Sandall. 2007. "The Impact of Perceived Stigma and Mediating Social Factors on Infertility-Related Stress among Women Seeking Infertility Treatment in Southern Ghana." *Soc Sci Med*

- 65 (8): 1683-94.
- Drench, M. E., and R. H. Losee. 1996. "Sexuality and Sexual Capacities of Elderly People." *Rehabilitation nursing : the official journal of the Association of Rehabilitation Nurses* 21 (3): 118-23.
- Drosdzol, A., and V. Skrzypulec. 2009. "Evaluation of Marital and Sexual Interactions of Polish Infertile Couples." *J Sex Med* 6 (12): 3335-46.
- Elia, J., M. Delfino, N. Imbrogno, and F. Mazzilli. 2010. "The Impact of a Diagnosis of Couple Subfertility on Male Sexual Function." *J Endocrinol Invest* 33 (2): 74-6.
- Ellison, M. A., and J. E. Hall. 2003. "Social Stigma and Compounded Losses: Quality-of-Life Issues for Multiple-Birth Families." *Fertil Steril* 80 (2): 405-14.
- Elsenbruch, S., S. Hahn, D. Kowalsky, A. H. Offner, M. Schedlowski, K. Mann, and O. E. Janssen. 2003. "Quality of Life, Psychosocial Well-Being, and Sexual Satisfaction in Women with Polycystic Ovary Syndrome." *J Clin Endocrinol Metab* 88 (12): 5801-7.
- Engel, G. L. 1977. "The Need for a New Medical Model: A Challenge for Biomedicine." *Science* 196 (4286): 129-36.
- Engel, George L. 1980. "The Clinical Application of the Biopsychosocial Model." *The American Journal of Psychiatry* 137 (5): 535-544.
- Fahami, F., S. H. Quchani, S. Ehsanpour, and A. Z. Boroujeni. 2010. "Lived Experience of Infertile Men with Male Infertility Cause." *Iran J Nurs Midwifery Res* 15 (Suppl 1): 265-71.
- Fathalla, M. F. 1992. "Reproductive Health: A Global Overview." *Early human development* 29 (1-3): 35-42.
- Fidler A.T., and Bernstein J. 1999. "Infertility: From a Personal to a Public Health Problem." *Public Health Report* 114 (6): 494-511.
- Fingerman, Karen L., and Eric Bermann. 2000. "Applications of Family Systems Theory to the Study of Adulthood." *The International Journal of Aging & Human Development* 51 (1): 5-29.
- Fink, A. 1995. "How to Sample in Surveys." 17. Thousand Oaks: Sage.
- Fisher, J. R., G. H. Baker, and K. Hammarberg. 2010. "Long-Term Health, Well-Being, Life Satisfaction, and Attitudes toward Parenthood in Men Diagnosed as Infertile: Challenges to Gender Stereotypes and Implications for Practice." *Fertility and Sterility* 94 (2): 574-80.
- Fisher, J. R., and K. Hammarberg. 2012. "Psychological and Social Aspects of Infertility in Men: An Overview of the Evidence and Implications for Psychologically Informed Clinical Care and Future Research." *Asian journal of andrology* 14 (1): 121-9.
- Fowers, Blaine J., and David H. Olson. 1993. "Enrich Marital Satisfaction Scale: A Brief Research and Clinical Tool." *Journal of Family Psychology* 7 (2): 176-185.
- Franklin, Cynthia. 1995. "Expanding the Vision of the Social Constructionist Debates: Creating Relevance for Practitioners." *Families in Society* 76 (7): 395-407.
- Gameiro, S., B. Nazare, A. Fonseca, M. Moura-Ramos, and M. C. Canavarro. 2011. "Changes in Marital Congruence and Quality of Life across the Transition to Parenthood in Couples Who Conceived Spontaneously or with Assisted Reproductive Technologies." *Fertility and Sterility* 96 (6): 1457-62.
- Genero, Nancy P., Jean B. Miller, Janet Surrey, and Lawrence M. Baldwin. 1992. "Measuring Perceived Mutuality in Close Relationships: Validation of the Mutual Psychological Development Questionnaire." *Journal of Family Psychology* 6 (1): 36-48.
- George, D., and P. Mallery. 2003. "Spss for Windows Step by Step: A Simple Guide and Reference 11.0 Update (4th Ed)." 140. Munich: Allyn & Bacon.
- Gillett, W. R., K. R. Daniels, and G. P. Herbison. 1996. "Feelings of Couples Who Have Had a Child by Donor Insemination: The Degree of Congruence." *Journal of psychosomatic obstetrics and gynaecology* 17 (3): 135-42.
- Glenn, Norval D. 1998. "The Course of Marital Success and Failure in Five American 10-Year Marriage Cohorts." *Journal of Marriage & the Family* 60 (3): 569-576.
- Goldfarb, J., C. Austin, H. Lisbona, R. Loret de Mola, B. Peskin, and S. Stewart. 1997. "Factors Influencing Patients' Decision Not to Repeat Ivf." *Journal of assisted reproduction and genetics* 14 (7): 381-4.
- Gollenberg, A. L., F. Liu, C. Brazil, E. Z. Drobnis, D. Guzick, J. W. Overstreet, J. B. Redmon, A. Sparks, C. Wang, and S. H. Swan. 2010. "Semen Quality in Fertile Men in Relation to Psychosocial Stress." *Fertil Steril* 93 (4): 1104-11.
- Gourounti, K., F. Anagnostopoulos, and G. Vaslamatzis. 2011. "Psychometric Properties and Factor Structure of

- the Fertility Problem Inventory in a Sample of Infertile Women Undergoing Fertility Treatment." *Midwifery* 27 (5): 660-667.
- Gove, W. R., and G. R. Carpenter. 1982. "A Restatement of the Issue." In *The Fundamental Connection between Nature and Nurture*, eds W. R. Gove and G. R. Carpenter, 289-301. Lexington, MA: Lexington Books.
- Graham, James M., Yenling J. Liu, and Jennifer L. Jeziorski. 2006. "The Dyadic Adjustment Scale: A Reliability Generalization Meta-Analysis." *Journal of Marriage and Family* 68 (3): 701-717.
- Greil, A. L. 1997. "Infertility and Psychological Distress: A Critical Review of the Literature." *Social Science & Medicine* 45 (11): 1679-704.
- Greil, Arthur, Julia McQuillan, and Kathleen Slauson-Blevins. 2011. "The Social Construction of Infertility." *Sociology Compass* 5 (8): 736-746.
- Guo, B., and J. Huang. 2005. "Marital and Sexual Satisfaction in Chinese Families: Exploring the Moderating Effects." *Journal of sex & marital therapy* 31 (1): 21-9.
- Gurkan, L., M. C. Raynor, and W. J. Hellstrom. 2009. "Sex and the Infertile Male." *Semin Reprod Med* 27 (2): 186-90.
- Hanson, William E., John W. Creswell, Vicki L. Clark, Kelly S. Petska, and J. Creswell. 2005. "Mixed Methods Research Designs in Counseling Psychology." *Journal of Counseling Psychology* 52 (2): 224-235.
- Hardy, E., and M. Y. Makuch. 2002. "Gender, Infertility and Art." In *Current Practices and Controversies in Assisted Reproduction: Report of a Who Meeting*, eds E. Vayena, P. Rowe and P. D. Griffin, 272-289. Geneva: World Health Organization.
- Hart, V. A. 2002. "Infertility and the Role of Psychotherapy." *Issues in mental health nursing* 23 (1): 31-41.
- Havelka, M., J. D. Lucanin, and D. Lucanin. 2009. "Biopsychosocial Model--the Integrated Approach to Health and Disease." *Collegium antropologicum* 33 (1): 303-10.
- Hefeng, Huang. 2003. "Modern Assisted Reproductive Technology." 50-51. Bei Jing: People's Military Medical Press.
- Heitman E. 1995. "Infertility as a Public Health Problem: Why Assisted Reproductive Technologies Are Not the Answer." *Stanford Law and Policy Review* 6 (2): 89-102.
- Henderson-King, Donna H., and Joseph Veroff. 1994. "Sexual Satisfaction and Marital Well-Being in the First Years of Marriage." *Journal of Social and Personal Relationships* 11 (4): 509-534.
- Hendrick, Susan S. 1988. "A Generic Measure of Relationship Satisfaction." *Journal of Marriage & the Family* 50 (1): 93-98.
- Henson, R. K. 1999. "Multivariate Normality. What Is It and How Is It Assessed?" In *Advances in Social Science Methodology*, ed. B. Thompson, 93-211. Stamford, Connecticut: JAI Press Inc.
- Herbert D. L., Lucke J. C., and Dobson A. J. 2010. "Depression: An Emotional Obstacle to Seeking Medical Advice for Infertility." *Fertility and Sterility* 94 (5): 1817-21.
- Herrmann D., Scherg H., Verres R., von Hagens C., Strowitzki T., and Wischmann T. 2011. "Resilience in Infertile Couples Acts as a Protective Factor against Infertility-Specific Distress and Impaired Quality of Life " *J Assist Reprod Genet.* 28 (11): 1111-7.
- Heyman, Richard E., Steven L. Sayers, and Alan S. Bellack. 1994. "Global Marital Satisfaction Versus Marital Adjustment: An Empirical Comparison of Three Measures." *Journal of Family Psychology* 8 (4): 432-446.
- Hirsch, A. M., and Hirsch, S. M. 1989. "The Effect of Infertility on Marriage and Self-Concept." *Journal of obstetric, gynecologic, and neonatal nursing* 18 (1): 13-20.
- Hirsch, A. M., and S. M. Hirsch. 1995. "The Long-Term Psychosocial Effects of Infertility." *Journal of obstetric, gynecologic, and neonatal nursing* 24 (6): 517-22.
- Hogg, M.A., and D. Abrams. 1988. "Social Identifications: The Social Psychology of Intergroup Relations and Group Processes." 18. London: Routledge.
- Hurlbert, David F., Carol Apt, and Sarah M. Rabehl. 1993. "Key Variables to Understanding Female Sexual Satisfaction: An Examination of Women in Nondistressed Marriages." *Journal of sex & marital therapy* 19 (2): 154-165.
- Hynes, Gloria J., Victor J. Callan, Deborah J. Terry, and Cynthia Gallois. 1992. "The Psychological Well-Being of Infertile Women after a Failed Ivf Attempt: The Effects of Coping." *British Journal of Medical Psychology* 65 (3): 269-278.

- Imeson, M., and A. McMurray. 1996. "Couples' Experiences of Infertility: A Phenomenological Study." *J Adv Nurs* 24 (5): 1014-22.
- Inhorn, M. C. 2003. "Global Infertility and the Globalization of New Reproductive Technologies: Illustrations from Egypt." *Soc Sci Med* 56 (9): 1837-51.
- Ivankova, Nataliya V., John W. Creswell, and Sheldon L. Stick. 2006. "Using Mixed-Methods Sequential Explanatory Design: From Theory to Practice." *Field Methods* 18 (1): 3-20.
- James H. B., and Mark S. 2009. "The Wiley-Blackwell Handbook of Family Psychology." 5-20. Malden, MA: Wiley-Blackwell.
- Jindal, U. N., and G. I. Dhall. 1990. "Psychosexual Problems of Infertile Women in India." *Int J Fertil* 35 (4): 222-5.
- Johnson, C. L. 1996. "Regaining Self-Esteem: Strategies and Interventions for the Infertile Woman." *Journal of obstetric, gynecologic, and neonatal nursing : JOGNN / NAACOG* 25 (4): 291-5.
- Julie, Pallan. 2010. "Spss Survival Manual: A Step by Step Guide to Data Analysis Using Spss (4th Edition)." 151. Buckingham: Open University Press.
- Kainz, K. 2001. "The Role of the Psychologist in the Evaluation and Treatment of Infertility." *Women's health issues : official publication of the Jacobs Institute of Women's Health* 11 (6): 481-5.
- Kartchner, R., and L. Callister. 2003. "Giving Birth. Voices of Chinese Women." *J Holist Nurs* 21 (2): 100-16.
- Kedem, P., M. Mikulincer, Y. E. Nathanson, and B. Bartoov. 1990. "Psychological Aspects of Male Infertility." *The British journal of medical psychology* 63 (Pt 1): 73-80.
- Khademi, A., A. Alleyassin, M. Amini, and M. Ghaemi. 2008. "Evaluation of Sexual Dysfunction Prevalence in Infertile Couples." *The journal of sexual medicine* 5 (6): 1402-10.
- Klempner, Linda G. 1992. "Infertility: Identifications and Disruptions with the Maternal Object." *Clinical Social Work Journal* 20 (2): 193-203.
- Kline, Rex B. 2005. "Principles and Practice of Structural Equation Modeling." 56-57. NY: Guilford Press.
- Kondaveeti, N., J. Hamilton, B. Maher, C. Kirkham, R. F. Harrison, and E. V. Mocanu. 2011. "Psychosocial Trends in Couples Prior to Commencement of in Vitro Fertilisation (Ivf) Treatment." *Human fertility* 14 (4): 218-23.
- Kurdek, Lawrence A. 1992. "Dimensionality of the Dyadic Adjustment Scale: Evidence from Heterosexual and Homosexual Couples." *Journal of Family Psychology* 6 (1): 22-35.
- Laffont I, and Edelmann RJ. 1994. "Perceived Support and Counselling Needs in Relation to in Vitro Fertilization." *J Psychosom Obstet Gynaecol* 15 (4): 183-188.
- Laffont, I., and R. J. Edelmann. 1994. "Psychological Aspects of in Vitro Fertilization: A Gender Comparison." *Journal of psychosomatic obstetrics and gynaecology* 15 (2): 85-92.
- LaRossa, Ralph. 2005. "Grounded Theory Methods and Qualitative Family Research." *Journal of Marriage and Family* 67 (4): 837-857.
- Larsen, U., M. Hollos, O. Obono, and B. Whitehouse. 2010. "Suffering Infertility: The Impact of Infertility on Women's Life Experiences in Two Nigerian Communities." *J Biosoc Sci* 42 (6): 787-814.
- Larson, Jeffrey H., and Thomas B. Holman. 1994. "Premarital Predictors of Marital Quality and Stability." *Family Relations: An Interdisciplinary Journal of Applied Family Studies* 43 (2): 228-237.
- Lasker, J. N., E. D. Sogolow, L. M. Short, and D. A. Sass. 2011. "The Impact of Biopsychosocial Factors on Quality of Life: Women with Primary Biliary Cirrhosis on Waiting List and Post Liver Transplantation." *British journal of health psychology* 16 (3): 502-27.
- Lawrance, Kelli-An, and E. Byers. 1995. "Sexual Satisfaction in Long-Term Heterosexual Relationships: The Interpersonal Exchange Model of Sexual Satisfaction." *Personal Relationships* 2 (4): 267-285.
- Ledger, William L. 2009. "Demographics of Infertility." *Reproductive Biomedicine Online* 18 (Suppl 2): 11-4.
- Lee SH, Kau BJ, Lee MC, and Lee MS. 1995. "Psychosocial Responses of Infertile Couples Attending an Assisted Reproduction Program." *J Formos Med Assoc* 94 (Suppl): S26-33.
- Lee, Shu-Hsin, and Bih-Jaw Kuo. 2000. "Chinese Traditional Childbearing Attitudes and Infertile Couples in Taiwan." *Journal of Nursing Scholarship* 32 (1): 54.
- Lee, T. Y., and T. Y. Chu. 2001. "The Chinese Experience of Male Infertility." *West J Nurs Res* 23 (7): 714-25.
- Lee, T. Y., and G. H. Sun. 2000. "Psychosocial Response of Chinese Infertile Husbands and Wives." *Arch Androl* 45 (3): 143-8.
- Lee, T. Y., G. H. Sun, and S. C. Chao. 2001. "The Effect of an Infertility Diagnosis on the Distress, Marital and Sexual Satisfaction between Husbands and Wives in Taiwan." *Hum Reprod* 16 (8): 1762-7.

- LeMone, P. 1993. "Human Sexuality in Adults with Insulin-Dependent Diabetes Mellitus." *Image J Nurs Sch* 25 (2): 101-5.
- Levin, J. B., T. G. Sher, and V. Theodos. 1997. "The Effect of Intracouple Coping Concordance on Psychological and Marital Distress in Infertility Patients." *Journal of Clinical Psychology in Medical Settings* 4 (4): 361-372.
- Lew-Starowicz, M., and R. Gellert. 2009. "The Sexuality and Quality of Life of Hemodialyzed Patients--Ased Multicenter Study." *The journal of sexual medicine* 6 (4): 1062-71.
- Li Yinhe. 2011. "Report on Investigations of Family Formation and Family Relations in the Five City." In *China Society Yearbook(Vol 5)*, eds Ru Xin, Lu Xueyi and Li Peilin, 163. Leiden, The Netherlands: Koninklijke Brill NV.
- Locke, Harvey J., and Karl M. Wallace. 1959. "Short Marital-Adjustment and Prediction Tests: Their Reliability and Validity." *Marriage & Family Living* 21: 251-255.
- Loke, A. Y., P. L. Yu, and M. Hayter. 2012. "Experiences of Sub-Fertility among Chinese Couples in Hong Kong: A Qualitative Study." *J Clin Nurs* 21 (3-4): 504-12.
- Louis, G. M., K. J. Lum, R. Sundaram, Z. Chen, S. Kim, C. D. Lynch, E. F. Schisterman, and C. Pyper. 2011. "Stress Reduces Conception Probabilities across the Fertile Window: Evidence in Support of Relaxation." *Fertil Steril* 95 (7): 2184-9.
- Luteijn, Frans. 1994. "Personality and the Quality of an Intimate Relationship." *European Journal of Psychological Assessment* 10 (3): 220-223.
- Marshall, M. N. 1996. "Sampling for Qualitative Research." *Fam Pract* 13 (6): 522-5.
- Martins, M. V., B. D. Peterson, V. M. Almeida, and M. E. Costa. 2011. "Direct and Indirect Effects of Perceived Social Support on Women's Infertility-Related Stress." *Hum Reprod* 26 (8): 2113-21.
- Matthiesen, S. M., Y. Frederiksen, H. J. Ingerslev, and R. Zachariae. 2011. "Stress, Distress and Outcome of Assisted Reproductive Technology (Art): A Meta-Analysis." *Hum Reprod* 26 (10): 2763-76.
- McCabe, Marita P., Robert A. Cummins, and Yolanda Romeo. 1996. "Relationship Status, Relationship Quality, and Health." *Journal of Family Studies* 2 (2): 109-120.
- McDaniel, S. H., J. Hepworth, and W. J. Doherty. 1992. "Medical Family Therapy." 26. New York: Guildford.
- McDonald Evens, E. 2004. "A Global Perspective on Infertility: An under Recognized Public Health Issue." *Carolina Papers on International Health* 18 (spring): 1-42.
- McMahon, C. A., J. A. Ungerer, C. Tennant, and D. Saunders. 1997. "Psychosocial Adjustment and the Quality of the Mother-Child Relationship at Four Months Postpartum after Conception by in Vitro Fertilization." *Fertility and Sterility* 68 (3): 492-500.
- Mehta, A., S. R. Cohen, and L. S. Chan. 2009. "Palliative Care: A Need for a Family Systems Approach." *Palliat Support Care* 7 (2): 235-43.
- Merari, D., D. Feldberg, A. Elizur, J. Goldman, and B. Modan. 1992. "Psychological and Hormonal Changes in the Course of in Vitro Fertilization." *Journal of assisted reproduction and genetics* 9 (2): 161-9.
- Merari, Dalia, Angela Chetrit, and Baruch Modan. 2002. "Emotional Reactions and Attitudes Prior to in Vitro Fertilization: An Inter-Spouse Study." *Psychology & health* 17 (5): 629-640.
- Michael G. B., and Samuel S. 2008. "Contemporary Issues in Family Law and Mental Health." 135. Illinois: Charles C Thomas Pub Ltd
- Michael Y, George D, Tamera Y, and Raffy L. 2000. "Sexual Satisfaction among Married Women." *American Journal of Health Studies* 16 (2): 73-84.
- Miles, Laura M., Merle Keitel, Margo Jackson, Abigail Harris, and Fred Licciardi. 2009. "Predictors of Distress in Women Being Treated for Infertility." *Journal of Reproductive and Infant Psychology* 27 (3): 238-257.
- Miller, Ivan W., Christine E. Ryan, Gabor I. Keitner, Duane S. Bishop, and Nathan B. Epstein. 2000. "The McMaster Approach to Families: Theory, Assessment, Treatment and Research." *Journal of Family Therapy* 22 (2): 168-189.
- Millheiser, L. S., A. E. Helmer, R. B. Quintero, L. M. Westphal, A. A. Milki, and R. B. Lathi. 2010. "Is Infertility a Risk Factor for Female Sexual Dysfunction? A Case-Control Study." *Fertil Steril* 94 (6): 2022-5.
- Minuchin, Patricia. 1985. "Families and Individual Development: Provocations from the Field of Family Therapy." *Child development* 56 (2): 289-302.
- Mogobe, D. K. 2005. "Denying and Preserving Self: Batswana Women's Experiences of Infertility." *African journal of reproductive health* 9 (2): 26-37.

- Monga, M., B. Alexandrescu, S. E. Katz, M. Stein, and T. Ganiats. 2004. "Impact of Infertility on Quality of Life, Marital Adjustment, and Sexual Function." *Urology* 63 (1): 126-30.
- Mori, E., T. Nadaoka, Y. Morioka, and H. Saito. 1997. "Anxiety of Infertile Women Undergoing Ivf-Et: Relation to the Grief Process." *Gynecologic and obstetric investigation* 44 (3): 157-62.
- Morreale, M., R. Balon, M. Tancer, and M. Diamond. 2011. "The Impact of Stress and Psychosocial Interventions on Assisted Reproductive Technology Outcome." *J Sex Marital Ther* 37 (1): 56-69.
- Mrdjenovich, Adam J., Gary H. Bischof, and Jennifer L. Menichello. 2004. "A Biopsychosocial Systems Approach to Premature Ejaculation." *Canadian Journal of Human Sexuality* 13 (1): 45-56.
- Muller, M. J., G. Schilling, and G. Haidl. 1999. "Sexual Satisfaction in Male Infertility." *Arch Androl* 42 (3): 137-43.
- Munro, BH. 2005. "Statistical Methods for Health Care Research." 289-290. Philadelphia: Lippincott, Williams and Wilkins.
- Nachtigall, R. D., G. Becker, and M. Wozny. 1992. "The Effects of Gender-Specific Diagnosis on Men's and Women's Response to Infertility." *Fertil Steril* 57 (1): 113-21.
- Nahar, P. 2010. "Health Seeking Behaviour of Childless Women in Bangladesh: An Ethnographic Exploration for the Special Issue On: Loss in Child Bearing." *Soc Sci Med* 71 (10): 1780-7.
- Nasr-Esfahani, M. H., M. R. Deemeh, and M. Tavalae. 2010. "Artificial Oocyte Activation and Intracytoplasmic Sperm Injection." *Fertility and Sterility* 94 (2): 520-6.
- Nasr-Esfahani, M. H., S. Razavi, Z. Javdan, and M. Tavalae. 2008. "Artificial Oocyte Activation in Severe Teratozoospermia Undergoing Intracytoplasmic Sperm Injection." *Fertility and Sterility* 90 (6): 2231-7.
- Nene, U. A., K. Coyaji, and H. Apte. 2005. "Infertility: A Label of Choice in the Case of Sexually Dysfunctional Couples." *Patient Educ Couns* 59 (3): 234-8.
- Neuman, W.L. . 2006. "Social Research Methods: Qualitative and Quantitative Approaches(6th Ed)." 220. Boston, MA: Pearson.
- Newton, C. R., W. Sherrard, and I. Glavac. 1999. "The Fertility Problem Inventory: Measuring Perceived Infertility-Related Stress." *Fertility and Sterility* 72 (1): 54-62.
- Nornadiah Mohd Razali, and Yap Bee Wah. 2011. "Power Comparisons of Shapiro-Wilk,Kolmogorov-Smirnov,Lilliefors and Anderson-Darling Tests." *Journal of Statistical Modeling and Analytics* 2 (1): 21-33.
- Ogawa, M., K. Takamatsu, and F. Horiguchi. 2011. "Evaluation of Factors Associated with the Anxiety and Depression of Female Infertility Patients." *BioPsychoSocial medicine* 5 (1): 15.
- Ohl, J., F. Reder, A. Fernandez, K. Bettahar-Lebugle, C. Rongieres, and I. Nisand. 2009. "[Impact of Infertility and Assisted Reproductive Techniques on Sexuality]." *Gynecol Obstet Fertil* 37 (1): 25-32.
- Okonufua, F. E. 1997. "The Social Meaning of Infertility in Southwest Nigeria." *Health Transition Review* 7 (2): 205-220.
- Ombelet W, Cooke I, Dyer S, Serour G, and Devroey P. 2008. "Infertility and the Provision of Infertility Medical Services in Developing Countries." *Hum Reprod Update* 14 (6): 605-621.
- Orvieto, R., I. Bar-Hava, R. Yoeli, J. Ashkenazi, D. Rabinerson, J. Bar, and B. Fisch. 2004. "Results of in Vitro Fertilization Cycles in Women Aged 43-45 Years." *Gynecological endocrinology : the official journal of the International Society of Gynecological Endocrinology* 18 (2): 75-8.
- Overbeek, G., W. Vollebergh, R. de Graaf, R. Scholte, R. de Kemp, and R. Engels. 2006. "Longitudinal Associations of Marital Quality and Marital Dissolution with the Incidence of Dsm-Iii-R Disorders." *J Fam Psychol* 20 (2): 284-91.
- Ozkan, M., and B. Baysal. 2006. "Emotional Distress of Infertile Women in Turkey." *Clin Exp Obstet Gynecol* 33 (1): 44-6.
- Palha A.P, and Lourenço M.F. 2011. "Psychological and Cross-Cultural Aspects of Infertility and Human Sexuality." *Adv Psychosom Med* 31: 164-83.
- Papreen, N., A. Sharma, K. Sabin, L. Begum, S. K. Ahsan, and A. H. Baqui. 2000. "Living with Infertility: Experiences among Urban Slum Populations in Bangladesh." *Reproductive health matters* 8 (15): 33-44.
- Pauline B., William J. D., Ralph L., Walter R. S., and Suzanne K. S. 1993. "Sourcebook of Family Theories: A Contextual Approach. New York: Plenum Press." 333-334. New York: Plenum Press.
- Pennings, Guido. 2008. "Ethical Issues of Infertility Treatment in Developing Countries." *ESHRE Monographs* 2008 (1): 15-20.

- Peterson, B. D., C. R. Newton, and T. Feingold. 2007. "Anxiety and Sexual Stress in Men and Women Undergoing Infertility Treatment." *Fertil Steril* 88 (4): 911-4.
- Peterson, B. D., C. R. Newton, K. H. Rosen, and G. E. Skaggs. 2006. "Gender Differences in How Men and Women Who Are Referred for Ivf Cope with Infertility Stress." *Human Reproduction* 21 (9): 2443-9.
- Peterson, Brennan D., Christopher R. Newton, and Karen H. Rosen. 2003. "Examining Congruence between Partners' Perceived Infertility-Related Stress and Its Relationship to Marital Adjustment and Depression in Infertile Couples." *Family Process* 42 (1): 59-70.
- Peterson, Brennan D., Christopher R. Newton, Karen H. Rosen, and Robert S. Schulman. 2006. "Coping Processes of Couples Experiencing Infertility." *Family Relations: An Interdisciplinary Journal of Applied Family Studies* 55 (2): 227-239.
- Pierce, Carolyn. 2001. "The Impact of Culture on Rural Women's Descriptions of Health." *Journal of Multicultural Nursing & Health* 7 (1): 50-53.
- Qiu, Ren-Zong. 2002. "Sociocultural Dimensions of Infertility and Assisted Reproduction in the Far East." In *Current Practices and Controversies in Assisted Reproduction*, eds Vayena E, Rowe PJ and Griffin PD, 75-80. Geneva, Switzerland: World Health Organization.
- Ramezanzadeh, F., M. M. Aghssa, M. Jafarabadi, and F. Zayeri. 2006. "Alterations of Sexual Desire and Satisfaction in Male Partners of Infertile Couples." *Fertil Steril* 85 (1): 139-43.
- Rantala, M. L., and A. I. Koskimies. 1988. "Sexual Behavior of Infertile Couples." *Int J Fertil* 33 (1): 26-30.
- Redgment, C. J., D. Yang, M. Tsirigotis, N. Yazdani, T. al Shawaf, and I. L. Craft. 1994. "Experience with Assisted Fertilization in Severe Male Factor Infertility and Unexplained Failed Fertilization in Vitro." *Human Reproduction* 9 (4): 680-3.
- Ren, Xinhua Steve. 1997. "Marital Status and Quality of Relationships: The Impact on Health Perception." *Social Science & Medicine* 44 (2): 241-249.
- Renaud, Cheryl, E. Byers, and Suiming Pan. 1997. "Sexual and Relationship Satisfaction in Mainland China." *J Sex Res* 34 (4): 399-410.
- Rice PR, Ezzy D. 1999. "Sampling Strategies for Qualitative Research." In *Qualitative Research Methods - a Health Focus*, 40-50. SYDNEY: Oxford University Press.
- Roach, Arthur J., Larry P. Frazier, and Sharon R. Bowden. 1981. "The Marital Satisfaction Scale: Development of a Measure for Intervention Research." *Journal of Marriage & the Family* 43 (3): 537-546.
- Ruijs, G. J., F. M. Kauer, S. Jager, F. P. Schroder, J. Schirm, and J. Kremer. 1990. "Epidemiological Aspects of Chlamydial Infections and Tubal Abnormalities in Infertile Couples." *Eur J Obstet Gynecol Reprod Biol* 36 (1-2): 107-16.
- Rust, J., S. Golombok, and J. Collier. 1988. "Marital Problems and Sexual Dysfunction: How Are They Related?" *The British journal of psychiatry : the journal of mental science* 152: 629-31.
- Sabatelli, Ronald M. 1988. "Measurement Issues in Marital Research: A Review and Critique of Contemporary Survey Instruments." *Journal of Marriage & the Family* 50 (4): 891-915.
- Sadler, J. Z., and Y. F. Hulgus. 1992. "Clinical Problem Solving and the Biopsychosocial Model." *The American Journal of Psychiatry* 149 (10): 1315-23.
- Saleh, R. A., G. M. Ranga, R. Raina, D. R. Nelson, and A. Agarwal. 2003. "Sexual Dysfunction in Men Undergoing Infertility Evaluation: A Cohort Observational Study." *Fertil Steril* 79 (4): 909-12.
- Sandelowski, M. 1995. "Sample Size in Qualitative Research." *Res Nurs Health* 18 (2): 179-83.
- Sanders, K. A., and N. W. Bruce. 1997. "A Prospective Study of Psychosocial Stress and Fertility in Women." *Human Reproduction* 12 (10): 2324-9.
- Schmidt, L. 2009. "Social and Psychological Consequences of Infertility and Assisted Reproduction - What Are the Research Priorities?" *Human fertility* 12 (1): 14-20.
- Schmidt, L., U. Christensen, and B. E. Holstein. 2005. "The Social Epidemiology of Coping with Infertility." *Hum Reprod* 20 (4): 1044-52.
- Schmidt, L., B. Holstein, U. Christensen, and J. Boivin. 2005. "Does Infertility Cause Marital Benefit? An Epidemiological Study of 2250 Women and Men in Fertility Treatment." *Patient Educ Couns* 59 (3): 244-51.
- Schmidt, L., B. E. Holstein, J. Boivin, T. Tjornhoj-Thomsen, J. Blaabjerg, F. Hald, P. E. Rasmussen, and A. Nyboe Andersen. 2003. "High Ratings of Satisfaction with Fertility Treatment Are Common: Findings from the Copenhagen Multi-Centre Psychosocial Infertility (Compi) Research Programme." *Human Reproduction*

- 18 (12): 2638-46.
- Schneider, M. G., and M. S. Forthofer. 2005. "Associations of Psychosocial Factors with the Stress of Infertility Treatment." *Health & social work* 30 (3): 183-91.
- Schumm, W. R., E. D. Scanlon, C. L. Crow, D. N. Green, and D. L. Buckler. 1983. "Characteristics of the Kansas Marital Satisfaction Scale in a Sample of 79 Married Couples." *Psychological Reports* 53 (2): 583-588.
- Schumm W.R., Anderson S.A., Benigas J.E., McCutchen M.B., Griffin C.L., Morris J.E., and Race G.S. 1985. "Criterion-Related Validity of the Kansas Marital Satisfaction Scale." *Psychological Reports* 56 (3): 719-722.
- Schumm, Walter R., Lois A. Paff-Bergen, Ruth C. Hatch, Felix C. Obiorah, and et al. 1986. "Concurrent and Discriminant Validity of the Kansas Marital Satisfaction Scale." *Journal of Marriage & the Family* 48 (2): 381-387.
- Seibel, M. M., and M. L. Taymor. 1982. "Emotional Aspects of Infertility." *Fertility and Sterility* 37 (2): 137-45.
- Sheiner, E. K., E. Sheiner, R. Carel, G. Potashnik, and I. Shoham-Vardi. 2002. "Potential Association between Male Infertility and Occupational Psychological Stress." *J Occup Environ Med* 44 (12): 1093-9.
- Shek, D. 1995. "The Chinese Version of the Dyadic Adjustment Scale: Does Language Make a Difference?" *Journal of Clinical Psychology* 51 (6): 802-811.
- Shek, Daniel T. 1994. "Psychometric Properties of the Chinese Version of the Dyadic Adjustment Scale." *Psychologia: An International Journal of Psychology in the Orient* 37 (1): 7-17.
- Shek, Daniel T. L. 1998. "Reliability and Validity of the Kansas Marital Satisfaction Scale for Chinese Parents." *Psychological Reports* 83 (1): 81-82.
- Shek, Daniel T., and Sandra K. Tsang. 1993. "The Chinese Version of the Kansas Marital Satisfaction Scale: Some Psychometric and Normative Data." *Social Behavior and Personality* 21 (3): 205-214.
- Sheng, Xiaoming. 2011. "Cultural Capital and Gender Differences in Parental Involvement in Children's Schooling and Higher Education Choice in China." *Gender and Education* 24 (2): 131-146.
- Sherrod, R. A. 2004. "Understanding the Emotional Aspects of Infertility: Implications for Nursing Practice." *Journal of psychosocial nursing and mental health services* 42 (3): 40-7.
- Shindel, A. W., C. J. Nelson, C. K. Naughton, M. Ohebshalom, and J. P. Mulhall. 2008. "Sexual Function and Quality of Life in the Male Partner of Infertile Couples: Prevalence and Correlates of Dysfunction." *J Urol* 179 (3): 1056-9.
- Slade, P., C. O'Neill, A. J. Simpson, and H. Lashen. 2007. "The Relationship between Perceived Stigma, Disclosure Patterns, Support and Distress in New Attendees at an Infertility Clinic." *Human Reproduction* 22 (8): 2309-2317.
- Smith, J. F., T. J. Walsh, A. W. Shindel, P. J. Turek, H. Wing, L. Pasch, and P. P. Katz. 2009. "Sexual, Marital, and Social Impact of a Man's Perceived Infertility Diagnosis." *The journal of sexual medicine* 6 (9): 2505-15.
- Smith, K. B., C. F. Pukall, D. A. Tripp, and J. C. Nickel. 2007. "Sexual and Relationship Functioning in Men with Chronic Prostatitis/Chronic Pelvic Pain Syndrome and Their Partners." *Archives of sexual behavior* 36 (2): 301-11.
- Snell, William E., Terri D. Fisher, and Andrew S. Walters. 1993. "The Multidimensional Sexuality Questionnaire: An Objective Self-Report Measure of Psychological Tendencies Associated with Human Sexuality." *Annals of Sex Research* 6 (1): 27-55.
- Snyder, Douglas K. 1979. "Multidimensional Assessment of Marital Satisfaction." *Journal of Marriage & the Family* 41 (4): 813-823.
- Spanier, G. B. 1976. "Measuring Dyadic Adjustment: New Scales for Assessing Quality of Marriage and Other Dyads." *Journal of Marriage and Family* 38: 15-28.
- Spanier, Graham B., and Robert A. Lewis. 1980. "Marital Quality: A Review of the Seventies." *Journal of Marriage & the Family* 42 (4): 825-839.
- Sreshthaputra O., Sreshthaputra R. A., and T. Vutyavanich. 2008. "Gender Differences in Infertility-Related Stress and the Relationship between Stress and Social Support in Thai Infertile Couples." *J Med Assoc Thai* 91 (12): 1769-73.
- Stanik, C. E., and C. M. Bryant. 2012. "Sexual Satisfaction, Perceived Availability of Alternative Partners, and Marital Quality in Newlywed African American Couples." *J Sex Res* 49 (4): 400-7.
- Stanton, A. L., M. Lobel, S. Sears, and R. S. DeLuca. 2002. "Psychosocial Aspects of Selected Issues in Women's Reproductive Health: Current Status and Future Directions." *J Consult Clin Psychol* 70 (3): 751-70.

- Stanton, A. L., H. Tennen, G. Affleck, and R. Mendola. 1991. "Cognitive Appraisal and Adjustment to Infertility." *Women & health* 17 (3): 1-15.
- Susan Brownell, and Jeffrey N Wasserstrom. 2002. "Chinese Femininities/Chinese Masculinities: A Reader. Berkeley:University of California Press." 373. Berkeley: University of California Press.
- Tabachnick, Barbara G., and Linda S Fidell. 2007a. "Using Multivariate Statistics (5th Edition)." 117-118. New York: Harper Collins.
- . 2007b. "Using Multivariate Statistics(5th Edition) ", 125-128. New York: Harper Collins.
- Tanaka, Y., M. Kanazawa, S. Fukudo, and D. A. Drossman. 2011. "Biopsychosocial Model of Irritable Bowel Syndrome." *Journal of neurogastroenterology and motility* 17 (2): 131-9.
- Tang, C. S., C. Y. Wong, and A. M. Lee. 2001. "Gender-Related Psychosocial and Cultural Factors Associated with Condom Use among Chinese Married Women." *AIDS Educ Prev* 13 (4): 329-42.
- Tarabusi, M., M. L. Matteo, A. Volpe, and F. Facchinetti. 2000. "Stress-Response in Male Partners of Women Submitted to in Vitro Fertilization and Embryo Transfer." *Psychotherapy and psychosomatics* 69 (5): 275-9.
- Templeton, A. 1995. "Infertility-Epidemiology, Aetiology and Effective Management." *Health bulletin* 53 (5): 294-8.
- Thara, R., V. Ramachandran, and P. P. Hassan. 1986. "Psychological Aspects of Infertility." *Indian J Psychiatry* 28 (4): 329-34.
- Thonneau, P., S. Marchand, A. Tallec, M. L. Ferial, B. Ducot, J. Lansac, P. Lopes, J. M. Tabaste, and A. Spira. 1991. "Incidence and Main Causes of Infertility in a Resident Population (1,850,000) of Three French Regions (1988-1989)." *Human Reproduction* 6 (6): 811-6.
- Trudel, G. 2002. "Sexuality and Marital Life: Results of a Survey." *Journal of sex & marital therapy* 28 (3): 229-49.
- Tufféry, Stéphane. 2011. "Data Mining and Statistics for Decision Making." 88. Chichester, GB: John Wiley & Sons.
- Umezulike, A. C., and E. R. Efetie. 2004. "The Psychological Trauma of Infertility in Nigeria." *International journal of gynaecology and obstetrics: the official organ of the International Federation of Gynaecology and Obstetrics* 84 (2): 178-80.
- Vaijayanthimala k., Bharati Kumari k., and Panda Bharati. 2004. "Socio-Economic Heterogomy and Marital Satisfaction." *J. Hum. Ecol.* 15 (1): 9-11.
- Valsangkar, S., T. Bodhare, S. Bele, and S. Sai. 2011. "An Evaluation of the Effect of Infertility on Marital, Sexual Satisfaction Indices and Health-Related Quality of Life in Women." *J Hum Reprod Sci* 4 (2): 80-5.
- van Balen F., and Bos H. M. W. 2004. "Infertility, Culture, and Psychology in Worldwide Perspective." *Journal of Reproductive and Infant Psychology* 22 (4): 245-247.
- Van Balen F., and Inhorn M.C. 2002. "Introduction. Interpreting Infertility: A View from the Social Sciences." In *Infertility around the Globe. New Thinking on Childlessness, Gender, and Reproductive Technologies*, eds F. Van Balen and M.C. Inhorn, 3-32. Berkely: University of California Press.
- Van Velsor, Patricia R., and Deborah L. Cox. 2000. "Use of the Collaborative Drawing Technique in School Counseling Practicum: An Illustration of Family Systems." *Counselor Education and Supervision* 40 (2): 141-152.
- Velupillai, Y. N., C. J. Packard, G. D. Batty, V. Bezlyak, H. Burns, J. Cavanagh, K. Deans et al. 2008. "Psychological, Social and Biological Determinants of Ill Health (Psobid): Study Protocol of a Population-Based Study." *BMC public health* 8: 126.
- Waite, L. J., and E. L. Lehrer. 2003. "The Benefits from Marriage and Religion in the United States: A Comparative Analysis." *Popul Dev Rev* 29 (2): 255-76.
- Waldinger, R. J., S. T. Hauser, M. S. Schulz, J. P. Allen, and J. A. Crowell. 2004. "Reading Others Emotions: The Role of Intuitive Judgments in Predicting Marital Satisfaction, Quality, and Stability." *J Fam Psychol* 18 (1): 58-71.
- Weijmar Schultz, W., and H. Van de Wiel. 2003. "Sexuality, Intimacy, and Gynecological Cancer." *Journal of sex & marital therapy* 29 (Suppl1): 121-128.
- Whisman, M. A., C. T. Sheldon, and P. Goering. 2000. "Psychiatric Disorders and Dissatisfaction with Social Relationships: Does Type of Relationship Matter?" *Journal of Abnormal Psychology* 109 (4): 803-808.
- Whiteford, L. M., and L. Gonzalez. 1995. "Stigma: The Hidden Burden of Infertility." *Soc Sci Med* 40 (1): 27-36.
- Wielinski, C. L., S. C. Varpness, C. Erickson-Davis, A. J. Paraschos, and S. A. Parashos. 2010. "Sexual and

- Relationship Satisfaction among Persons with Young-Onset Parkinson's Disease." *J Sex Med* 7 (4 Pt 1): 1438-44.
- Wiersema, N. J., A. J. Drukker, B. T. Mai, H. N. Giang, T. N. Nguyen, and C. B. Lambalk. 2006. "Consequences of Infertility in Developing Countries: Results of a Questionnaire and Interview Survey in the South of Vietnam." *J Transl Med* 4: 54.
- Williams, Lee, Richard Bischoff, and Jacqueline Ludes. 1992. "A Biopsychosocial Model for Treating Infertility." *Contemporary Family Therapy: An International Journal* 14 (4): 309-322.
- Wittmann, D., S. Foley, and R. Balon. 2011. "A Biopsychosocial Approach to Sexual Recovery after Prostate Cancer Surgery: The Role of Grief and Mourning." *Journal of sex & marital therapy* 37 (2): 130-44.
- World Association for Sexual Health. 1999. Declaration of Sexual Rights. Accessed April 18,2012, <http://www.worldsexology.org/content/sexual-rights-0>
- World Health Organization. 1992. "Recent Advances in Medically Assisted Conception. Who Technical Report Series 820. Geneva: World Health Organization Publications." 1-7.
- "The World Health Organization Quality of Life Assessment (WHOQOL): Position Paper from the World Health Organization." 1995. *Social Science & Medicine* 41 (10): 1403-9.
- Wortham, S. 1996. "Are Constructs Personal?" *Theory and Psychology* 6 (1): 79-84.
- Wright, J., C. Duchesne, S. Sabourin, F. Bissonnette, J. Benoit, and Y. Girard. 1991. "Psychosocial Distress and Infertility: Men and Women Respond Differently." *Fertility and Sterility* 55 (1): 100-8.
- Xiao, Z., P. Mehrotra, and R. Zimmerman. 2011. "Sexual Revolution in China: Implications for Chinese Women and Society." *AIDS Care* 23 Suppl 1: 105-12.
- Xin, Guo, Chen Yimin, Huang Na, Li Ying, LV Yanhong, Cai Yamei, and Wang Xiaoyan. 2006. "Analysis on Situation and Influence Factors of Domestic Violence among Infertility Couples." *China Journal of Public Health* 22 (5): 552-554.
- Yagmur, Y., and H. Oltuluoglu. 2012. "Social Support and Hopelessness in Women Undergoing Infertility Treatment in Eastern Turkey." *Public Health Nurs* 29 (2): 99-104.
- Yasan, A., and F. Gorgen. 2009. "Marital Satisfaction, Sexual Problems, and the Possible Difficulties on Sex Therapy in Traditional Islamic Culture." *J Sex Marital Ther* 35 (1): 68-75.
- Younis, A. I., K. A. Zuelke, K. M. Harper, M. A. Oliveira, and B. G. Brackett. 1991. "In Vitro Fertilization of Goat Oocytes." *Biology of reproduction* 44 (6): 1177-82.
- Zeng J.P. 2004. "Three Ethical Inequalities of Sex Purpose and Sex Morals." *Medicine and Philosophy* 25 (9): 63-65.[in Chinese].
- Zhang Yan, Yang Qing, and Mao Zongfu. 2005. "Infertility and Its Influencing Factors by the Epidemiological Research." *Reproduction and Contraception* 25 (9): 570-575.
- Zorn, B., J. Auger, V. Velikonja, M. Kolbezen, and H. Meden-Vrtovec. 2008. "Psychological Factors in Male Partners of Infertile Couples: Relationship with Semen Quality and Early Miscarriage." *International Journal of Andrology* 31 (6): 557-564.
- Zuo, Jiping 1992. "The Reciprocal Relationship between Marital Interaction and Marital Happiness: A Three Wave Study." *Journal of Marriage and the Family* 54 (4): 870-878.

APPENDICEX

Appendix 1 Kolmogorov-Smirnov Test/Shapiro-Wilk Test of Normality on Specific Infertility Stress of the Sample for Different Biosocial Demographics

Variables	Social concern				Sexual concern				Relationship concern				Rejection of childless lifestyle				Need for parenthood				Global stress			
	Sk	Ku	K-S/S-W	p	Sk	Ku	K-S/S-W	p	Sk	Ku	K-S/S-W	p	Sk	Ku	K-S/S-W	p	Sk	Ku	K-S/S-W	p	Sk	Ku	K-S/S-W	p
Men (n=254)																								
Age group																								
Age 1 (40)	.128	-.464	.982*	.78	-.181	-.214	.984*	.83	-.541	-.510	.935*	.02	.845	.743	.942*	.04	.197	.009	.985*	.86	-.303	-.350	.981*	.74
Age 2 (103)	-.167	-.430	.082	.08	.559	.444	.067	.20	.445	.400	.092	.03	-.026	-.400	.092	.03	.085	-.668	.077	.14	.465	.452	.055	.20
Age 3 (78)	-.295	-.395	.086	.20	.302	.466	.108	.03	.812	1.630	.099	.06	.181	.101	.090	.19	.081	-.217	.095	.08	-.362	.059	.074	.20
Age 4 (33)	.094	-.287	.984*	.91	-.133	-.046	.977*	.70	.391	-.453	.972*	.53	.107	-.377	.985*	.91	-1.144	.675	.882*	.00	-.548	.706	.959*	.24
Education level																								
Level 1 (145)	-.004	-.397	.054	.20	.649	1.154	.073	.06	.197	-.146	.079	.03	.333	-.062	.089	.01	-.088	-.320	.052	.20	.380	.311	.059	.20
Level 2 (76)	-.371	.009	.088	.20	.323	.544	.068	.20	.752	1.381	.089	.20	-.050	-.218	.053	.20	-.105	-.124	.084	.20	.071	.105	.049	.20
Level 3 (33)	.129	-.451	.985*	.91	.058	-1.258	.929*	.03	.147	-1.039	.953*	.17	.018	-.019	.984*	.91	-.416	.018	.977*	.70	-.525	-1.028	.916*	.02
Economic level																								
Class1 (138)	-.155	-.567	.070	.10	.358	.315	.075	.05	.122	-.083	.091	.01	.419	-.302	.084	.02	.077	-.486	.068	.20	.224	.226	.044	.20
Class 2 (58)	-.281	.117	.086	.20	.315	.434	.070	.20	.983	2.261	.123	.03	-.269	.467	.093	.20	-.335	1.092	.100	.20	-.300	.319	.059	.20
Class 3 (58)	.210	.032	.082	.20	.678	2.967	.112	.08	.695	.577	.109	.09	.198	-.180	.079	.20	-.449	-.605	.142	.01	-.459	.235	.075	.20
Length of marriage																								
MT1 (111)	-.205	-.117	.079	.08	.430	.978	.068	.20	.124	-.429	.111	.00	.460	-.100	.103	.01	.227	-.366	.066	.20	.086	.213	.047	.20
MT2 (80)	-.096	-.787	.088	.20	.333	.564	.059	.20	.757	.863	.095	.07	-.167	.244	.073	.20	-.621	.026	.088	.20	.109	.516	.051	.20
MT3 (63)	-.116	.081	.087	.20	.409	.775	.086	.20	.477	-.155	.103	.09	-.019	-.237	.057	.20	-.173	.231	.087	.20	-.342	.103	.059	.20
Type of infertility																								
Type 1 (96)	-.354	-.707	.109	.01	.256	.305	.106	.01	.458	.373	.075	.20	.274	-.418	.084	.09	-.196	-.285	.064	.20	-.111	.066	.069	.20
Type 2 (38)	.633	-.066	.952*	.10	.374	.052	.978*	.66	.382	-.275	.976*	.58	.005	-.567	.964*	.26	-.484	-.140	.971*	.43	.943	1.379	.943*	.05
Type 3 (23)	-.095	-.532	.976*	.84	-.940	.136	.894*	.02	-.040	-.094	.970*	.69	.247	2.239	.948*	.26	.029	.216	.953*	.33	-.314	.022	.983*	.95
Type 4 (97)	-.116	-.218	.054	.20	.052	-.335	.071	.20	.023	-.527	.089	.05	-.031	.055	.094	.04	.032	-.223	.077	.19	-.321	-.274	.087	.07

Appendix 1 Kolmogorov-Smirnov Test/Shapiro-Wilk Test of Normality on Specific Infertility Stress of the Sample for Different Biosocial Demographics (continued)

Variables	Social concern				Sexual concern				Relationship concern				Rejection of childless lifestyle				Need for parenthood				Global stress			
	Sk	Ku	K-S/ S-W	p	Sk	Ku	K-S/ S-W	p	Sk	Ku	K-S/ S-W	p	Sk	Ku	K-S/ S-W	p	Sk	Ku	K-S/ S-W	p	Sk	Ku	K-S/ S-W	p
Infertility duration																								
IT1 (173)	-.060	-.087	.048	.20	.227	.385	.068	.50	.545	.569	.065	.07	.280	.186	.088	.02	.140	-.458	.078	.01	.033	-.007	.042	.20
IT2 (50)	-.230	-.925	.126	.05	.654	.954	.145	.01	.229	.322	.089	.20	-.580	1.106	.092	.20	-.669	.238	.090	.20	.023	1.163	.093	.20
IT3 (31)	-.398	-.048	.965*	.40	.467	.815	.975*	.66	.304	-.956	.943*	.99	.112	-.785	.975*	.66	-.772	2.480	.925*	.03	.020	-.236	.987*	.95
Women(n=254)																								
Age group																								
Age 1 (70)	-.163	-.211	.066	.20	.216	-.306	.062	.20	-.037	.066	.090	.20	-.322	-.524	.080	.20	-.279	-.247	.085	.20	-.063	-.627	.054	.20
Age 2 (107)	-.025	.005	.060	.20	.624	.331	.088	.04	.486	.401	.074	.18	-.317	.070	.081	.08	-.219	-.336	.079	.09	.069	-.222	.042	.20
Age 3 (50)	.410	-.039	.133	.03	.114	-.961	.099	.20	.350	-.273	.091	.20	.619	-.104	.130	.04	.117	-.161	.092	.20	.748	.521	.104	.20
Age 4 (27)	.341	.046	.978*	.82	.312	-.089	.967*	.54	-.038	-.069	.985*	.97	.208	.101	.959*	.36	-.310	-.837	.963*	.42	-.316	1.109	.975*	.73
Education level																								
Level 1 (150)	-.234	-.147	.053	.20	.255	-.243	.055	.20	.209	.445	.093	.01	-.067	-.527	.047	.20	-.230	-.015	.061	.20	.057	-.314	.054	.20
Level 2 (77)	.560	.282	.100	.05	.521	-.178	.104	.04	.272	-.158	.069	.20	.016	.059	.069	.20	-.332	.277	.071	.20	.131	-.120	.043	.20
Level 3 (27)	.468	.916	.976*	.76	.687	-.079	.941*	.13	1.149	2.364	.928*	.06	.107	-.655	.967*	.52	.117	-.590	.979*	.85	.897	.754	.944	.15
Economic level																								
Class 1 (138)	-.214	.024	.072	.07	.234	-.218	.078	.04	.104	.466	.089	.01	.006	-.368	.061	.20	-.221	.007	.056	.20	-.058	-.566	.060	.20
Class 2 (58)	.437	-.064	.104	.18	.633	-.197	.125	.03	.480	-.282	.103	.20	-.053	-.339	.075	.20	-.461	.142	.124	.03	.396	.074	.104	.18
Class 3 (58)	.548	.818	.082	.20	.455	-.313	.091	.20	.382	.378	.074	.20	-.148	-.326	.081	.20	.082	.007	.076	.20	.213	-.037	.084	.20
Length of marriage																								
MT 1 (111)	-.012	.147	.056	.20	.357	-.627	.097	.01	.433	.264	.082	.07	-.282	-.429	.072	.20	-.140	-.490	.065	.20	.115	-.906	.067	.20
MT 2 (80)	-.011	-.132	.057	.20	.583	.298	.081	.20	.145	.416	.090	.17	-.024	-.160	.065	.20	-.003	.157	.079	.20	.245	.231	.055	.20
MT 3 (63)	.388	.173	.099	.20	-.047	-.369	.124	.02	.247	.265	.074	.20	.217	.034	.103	.09	.344	-.585	.110	.06	.005	1.337	.119	.03
Type of infertility																								
Type 1 (96)	.464	.375	.093	.38	.727	.236	.118	.00	.264	.274	.074	.20	-.009	-.438	.055	.20	-.043	-.110	.092	.04	.483	-.272	.076	.20
Type 2 (38)	.337	.091	.985*	.89	.036	-.685	.968*	.33	.303	.178	.976*	.58	-.154	-.479	.978*	.65	-.158	.059	.977*	.62	.074	.683	.956*	.13
Type 3 (23)	.222	-.855	.939*	.17	.160	-1.155	.943*	.21	1.107	3.218	.914*	.05	-.686	.937	.958*	.43	.104	-1.074	.953*	.33	.170	-.846	.967*	.62
Type 4 (97)	-.327	.224	.097	.03	.126	-.388	.064	.20	.016	.189	.088	.06	.145	-.077	.071	.20	-.517	.615	.071	.20	-.264	.194	.057	.20

Appendix 1 Kolmogorov-Smirnov Test/Shapiro-Wilk Test of Normality on Specific Infertility Stress of the Sample for Different Biosocial Demographics (continued)

Variable	Social concern				Sexual concern				Relationship concern				Rejection of childless lifestyle				Need for parenthood				Global stress			
	Sk	Ku	K-S/S-W	p	Sk	Ku	K-S/S-W	p	Sk	Ku	K-S/S-W	p	Sk	Ku	K-S/S-W	p	Sk	Ku	K-S/S-W	p	Sk	Ku	K-S/S-W	p
Infertility duration																								
IT 1 (173)	-.085	-.065	.054	.20	.388	-.411	.079	.01	.298	.172	.058	.20	-.102	-.393	.045	.20	-.187	-.190	.063	.09	.113	-.455	.048	.20
IT 2 (50)	.294	.021	.075	.20	.365	.165	.084	.20	.024	.378	.082	.20	-.177	-.216	.076	.20	.365	.209	.123	.06	.127	.283	.110	.18
IT 3 (31)	.275	-.435	.968*	.47	.192	.233	.970*	.53	.621	.846	.964*	.36	.329	-.023	.977*	.73	-.045	-.546	.977*	.71	.536	.811	.963	.35

Note:

1. “Sk” refers to skewness, “Ku” refers to kurtosis; “K-S” refers to Kolmogorov-Smirnov test; “S-W” refers to Shapiro-Wilk Test; “*” means the statistical value of Shapiro-Wilk Test, others without “*” means the statistical value of Kolmogorov-Smirnov test.
2. Age group: Age 1 =20 - 25 years old, Age 2=26-30 years old, Age 3=31-35 years old, Age 4=36 years old or more;
3. Education level: Level 1=Primary level, Level 2=Middle level, Level 3=High level;
4. Economic level: Class 1=Low class, Class 2=Medium class, Class 3=High class;
5. Length of marriage: MT1=1-3 years, MT2=4-6 years, MT3=7 years or more;
6. Type of infertility diagnosis: Type 1=Male factor, Type 2=Female factor, Type 3=Combined factors, Type 4=Unexplained factors;
7. Length of infertility: IT1=1-3 years, IT2=4-6 years, IT3=7 years or more.

Appendix 2 Test of Homogeneity of Variance on Perceived Infertility Stress of the Sample for Different Demographical Variables

Variables	Social concern		Sexual concern		Relationship concern		Rejection of childless lifestyle		Need for parenthood		Global stress	
	F	p	F	p	F	p	F	p	F	p	F	p
Men (n=254)												
Age group	.340	.796	4.465	.004	.635	.593	3.277	.022	.539	.656	.650	.583
Education level	.505	.604	1.173	.311	.511	.601	.478	.621	1.064	.347	2.027	.134
Economic level	1.976	.141	1.826	.163	.172	.842	.400	.671	1.603	.203	1.684	.188
Length of marriage	1.559	.212	.212	.809	.783	.458	.160	.852	.046	.955	.993	.372
Type of infertility	1.438	.232	4.162	.007	2.599	.053	.591	.621	1.941	.123	1.091	.354
Infertility duration	1.490	.227	.656	.520	.549	.578	1.362	.258	.555	.575	.803	.449
Women (n=254)												
Age group	.665	.574	.818	.485	3.658	.013	.057	.982	1.490	.218	.507	.677
Education level	1.411	.266	.735	.481	.8354	.435	.366	.694	.068	.934	.666	.515
Economic level	.184	.832	.399	.672	6.799	.001	.324	.723	.339	.713	1.105	.333
Length of marriage	.328	.721	1.468	.232	1.427	.242	2.373	.095	7.191	.001	2.388	.094
Type of infertility	.057	.982	.848	.469	2.314	.076	1.055	.369	.640	.590	.481	.696
Infertility duration	1.113	.330	1.665	.191	.012	.988	1.036	.957	4.652	.010	.982	.376

Appendix 3 Kolmogorov-Smirnov Test/Shapiro-Wilk Test of Normality on Various Aspects of Sexuality of the Sample For Different Biosocial Demographics

Variables	Sexual esteem				Sexual consciousness				Sexual motivation				Sexual satisfaction			
	Sk	Ku	K-S/S-W	<i>p</i>	Sk	Ku	K-S/S-W	<i>p</i>	Sk	Ku	K-S/S-W	<i>p</i>	Sk	Ku	K-S/S-W	<i>p</i>
Men (n=254)																
Age group																
Age 1 (40)	.364	-.423	.971*	.397	.172	.024	.970*	.349	-.055	1.568	.937*	.028	-.021	-.430	.973*	.456
Age 2 (103)	.342	-.373	.088	.048	.086	-.203	.102	.010	-.241	-.304	.111	.003	-.268	-.297	.098	.017
Age 3 (78)	.028	-.710	.105	.033	.054	.122	.133	.002	.198	.075	.117	.010	-.081	-.371	.392	.076
Age 4 (33)	.229	-.412	.962*	.292	-.379	.348	.975*	.632	-.456	-.265	.948*	.113	.038	.199	.950*	.133
Education level																
Level 1 (145)	.388	-.304	.097	.002	.079	.184	.116	.000	-.161	.297	.086	.010	-.055	-.115	.070	.082
Level 2 (76)	.006	-.327	.095	.089	.129	-.024	.101	.052	-.107	-.652	.087	.200	-.091	-.473	.107	.033
Level 3 (33)	-.174	-.856	.964*	.329	-.282	-.405	.955*	.185	-.266	-.170	.973*	.576	.015	-.319	.967*	.393
Economic level																
Class1 (138)	.211	-.327	.084	.019	.092	.097	.091	.007	.166	-.299	.092	.006	.002	-.038	.089	.009
Class 2 (58)	-.054	-.839	.073	.200	.042	-.004	.098	.200	-.444	.669	.095	.200	-.232	-.523	.130	.017
Class 3 (58)	.406	-.626	.111	.073	-.024	-.454	.156	.001	-.313	-.499	.100	.200	.043	-.614	.082	.200
Length of marriage																
MT1 (111)	.275	-.440	.076	.142	.186	-.114	.105	.004	-.030	-.277	.099	.010	-.174	-.581	.093	.020
MT2 (80)	.333	-.489	.090	.164	-.060	-.326	.091	.100	.084	-.317	.101	.042	-.288	-.187	.097	.061
MT3 (63)	-.016	-.411	.087	.200	-.119	.547	.136	.006	-.390	.198	.137	.005	.331	.801	.104	.089
Type of infertility																
Type 1 (96)	.017	-.950	.113	.004	-.119	-.229	.084	.092	-.094	-.310	.066	.200	.032	-.248	.082	.108
Type 2 (38)	.247	-.946	.942*	.047	-.071	.065	.950*	.306	-.260	.085	.959*	.181	-.153	-.290	.958*	.167
Type 3 (23)	-.025	.031	.974*	.791	.083	.095	.968*	.632	.043	1.193	.953*	.344	.181	-.707	.954*	.358
Type 4 (97)	-.047	-.799	.094	.034	.364	-.127	.131	.000	.075	-.152	.114	.004	-.085	-.072	.111	.005

Appendix 3 Kolmogorov-Smirnov Test/Shapiro-Wilk Test of Normality on Various Aspects of Sexuality of the Sample For Different Biosocial Demographics (continued)

Variables	Sexual esteem				Sexual consciousness				Sexual motivation				Sexual satisfaction			
	Sk	Ku	K-S/S-W	<i>p</i>	Sk	Ku	K-S/S-W	<i>p</i>	Sk	Ku	K-S/S-W	<i>p</i>	Sk	Ku	K-S/S-W	<i>p</i>
Infertility duration																
IT1 (173)	.248	-.584	.079	.011	.089	-.058	.108	.000	.047	-.358	.103	.000	-.220	-.395	.085	.004
IT2 (50)	.215	-.496	.081	.200	.071	-.775	.115	.099	-.271	.363	.097	.200	.015	.451	.098	.200
IT3 (31).	.091	.307	.955*	.211	-1.407	2.639	.861*	.001	-.685	-.411	.919*	.022	-.742	.301	.943*	.102
Women (n=254)																
Age group																
Age 1 (70)	.609	.503	.150	.000	.142	-.380	.108	.043	.586	-.148	.136	.003	-.191	-.525	.112	.029
Age 2 (107)	.421	-.065	.136	.000	.257	.090	.077	.131	.392	-.266	.097	.014	-.080	-.496	.085	.053
Age 3 (50)	.931	.734	.190	.000	.328	-.210	.124	.055	.087	-.234	.092	.200	-.065	-.337	.107	.200
Age 4 (27)	-.213	.304	.981*	.876	-.194	-.667	.970*	.363	.138	-.247	.956*	.301	.340	.054	.977*	.777
Education level																
Level 1 (150)	.385	.573	.108	.001	.217	-.191	.077	.031	.392	-.191	.086	.009	-.135	-.463	.087	.008
Level 2 (77)	.688	-.256	.200	.000	.083	-.256	.066	.20	.298	-.327	.087	.200	-.022	-.574	.087	.200
Level 3 (27)	.385	.000	.961*	.381	.446	.800	.957*	.311	.701	.444	.949*	.198	.141	-.028	.985*	.952
Economic level																
Class 1 (138)	.476	.232	.093	.006	.218	-.019	.097	.003	.248	-.251	.065	.200	-.261	-.237	.088	.011
Class 2 (58)	.203	.523	.155	.001	.190	-.399	.098	.200	.687	.310	.127	.022	.067	-.703	.095	.200
Class 3 (58)	.730	.015	.193	.000	.006	-.105	.122	.031	.389	-.251	.105	.169	.003	-.710	.091	.200
Length of marriage																
MT 1 (111)	.189	.299	.108	.003	.169	-.093	.072	.200	.573	-.407	.115	.001	-.140	-.453	.093	.020
MT 2 (80)	.843	.184	.140	.000	.114	-.012	.108	.022	.218	-.364	.093	.087	.144	-.420	.097	.063
MT 3 (63)	.455	.582	.181	.000	.289	-.356	.118	.030	.057	-.222	.110	.055	-.035	-.365	.103	.093
Type of infertility																
Type 1 (96)	.753	-.029	.154	.000	.002	-.208	.083	.096	.559	.040	.108	.008	.012	-.611	.077	.200
Type 2 (38)	-.466	.676	.946*	.064	.237	-.797	.959*	.301	.690	-.580	.966*	.140	.308	-.670	.965*	.284
Type 3 (23)	.106	-.412	.970*	.691	.039	-.321	.961*	.474	.039	.001	.974*	.789	-.190	-.257	.953*	.336

Appendix 3 Kolmogorov-Smirnov Test/Shapiro-Wilk Test of Normality on Various Aspects of Sexuality of the Sample For Different Biosocial Demographics (continued)

Variables	Sexual esteem				Sexual consciousness				Sexual motivation				Sexual satisfaction			
	Sk	Ku	K-S/S-W	<i>p</i>	Sk	Ku	K-S/S-W	<i>p</i>	Sk	Ku	K-S/S-W	<i>p</i>	Sk	Ku	K-S/S-W	<i>p</i>
Type 4 (97)	.448	-.396	.133	.000	.377	.221	.126	.001	.295	-.173	.086	.076	-.238	.155	.122	.001
Infertility duration																
IT 1 (173)	.389	-.157	.123	.000	.195	-.212	.076	.016	.377	-.312	.104	.000	-.092	-.298	.080	.009
IT 2 (50)	-.804	.785	.175	.001	.054	-.121	.092	.200	.223	-.811	.155	.004	.101	-.771	.084	.200
IT 3 (31)	-.404	1.801	.933	.054	.472	.248	.955	.209	-.514	-.874	.920	.024	-.376	-.471	.958	.257

Note:

1. “Sk” refers to skewness, “Ku” refers to kurtosis; “K-S” refers to Kolmogorov-Smirnov test; “S-W” refers to Shapiro-Wilk Test; “*” means the statistical value of Shapiro-Wilk Test, others without “*” means the statistical value of Kolmogorov-Smirnov test.
2. Age group: Age 1 =20 - 25 years old, Age 2=26-30 years old, Age 3=31-35 years old, Age 4=36 years old or more;
3. Education level: Level 1=Primary level, Level 2=Middle level, Level 3=High level;
4. Economic level: Class 1=Low class, Class 2=Medium class, Class 3=High class;
5. Length of marriage: MT1=1-3 years, MT2=4-6 years, MT3=7 years or more;
6. Type of infertility diagnosis: Type 1=Male factor, Type 2=Female factor, Type 3=Combined factors, Type 4=Unexplained factors;
7. Length of infertility: IT1=1-3 years, IT2=4-6 years, IT3=7 years or more.

Appendix 4 Test of Homogeneity of Variance on Various Aspects of Sexuality of the Sample for Different Demographical Variables

Variables	Sexual esteem		Sexual consciousness		Sexual motivation		Sexual satisfaction	
	F	p	F	p	F	p	F	p
Men(n=254)								
Age group	1.436	.233	.465	.707	1.669	.174	1.674	.173
Education level	.089	.915	.371	.691	2.769	.065	.250	.779
Economic level	2.111	.123	.717	.489	.558	.573	2.055	.130
Length of marriage	.243	.784	2.886	.058	.301	.740	3.086	.047
Type of infertility diagnosis	7.554	.000	1.805	.147	2.115	.099	.248	.862
Infertility duration	.254	.776	6.550	.002	.048	.953	4.185	.016
Women(n=254)								
Age group	.775	.509	1.042	.374	.542	.654	.405	.750
Education level	.098	.907	1.962	.143	.578	.562	.603	.548
Economic level	.064	.938	.155	.857	.009	.991	4.076	.018
Length of marriage	.369	.692	.046	.955	.374	.688	1.219	.297
Type of infertility diagnosis	1.604	.189	.975	.405	.001	.982	1.104	.348
Infertility duration	4.473	.012	.386	.680	1.165	.314	1.717	.182

Appendix 5 Test of Normality on Marital Adjustment and Marital Satisfaction in Men and Women for Different Demographical Variables

Variables	Dyadic consensus				Dyadic cohesion				Dyadic satisfaction				Affectional expression				DAS total				Marital satisfaction			
	Sk	Ku	K-S/S-W	p	Sk	Ku	K-S/S-W	p	Sk	Ku	K-S/S-W	p	Sk	Ku	K-S/S-W	p	Sk	Ku	K-S/S-W	p	Sk	Ku	K-S/S-W	p
Men(n=254)																								
Age group																								
Age 1(40)	-.361	.554	.979*	.634	-.089	-.119	.976*	.531	-1.719	4.221	.858*	.000	-.642	.123	.951*	.080	-.264	-.563	.969*	.344	-.366	-.166	.976*	.533
Age 2(103)	-.212	-.132	.065	.200	-.021	.151	.083	.077	-1.457	1.444	.183	.000	-.605	.452	.175	.000	-.553	.130	.067	.200	-.356	.478	.113	.002
Age 3 (78)	.038	.001	.075	.200	.147	-.405	.081	.200	-.964	-.072	.163	.000	-.851	1.035	.160	.000	-.370	-.279	.092	.100	-.057	.851	.095	.081
Age 4 (33)	.497	.436	.968*	.433	1.033	2.720	.937*	.055	-.431	-1.028	.928*	.030	1.569	5.030	.870*	.001	.129	-.832	.960*	.259	.072	-.593	.967*	.412
Education level																								
Level 1(145)	-.177	.505	.061	.200	.269	1.127	.073	.058	-1.302	.865	.198	.000	-.152	2.259	.169	.000	-.510	.390	.094	.003	-.396	.225	.119	.000
Level 2 (76)	-.054	-.505	.064	.200	.034	.119	.097	.075	-.900	-.054	.134	.002	-.407	-.291	.136	.001	-.447	-.666	.113	.017	-.114	-.326	.107	.032
Level 3 (33)	-.076	-1.073	.961*	.273	.224	-1.226	.937*	.054	-1.253	.733	.849*	.000	-.426	.385	.962*	.291	-.256	-.948	.954*	.175	.663	.254	.950*	.137
Economic level																								
Class1(138)	-.082	.397	.049	.200	.514	.926	.081	.026	-1.586	2.143	.181	.000	.017	2.797	.148	.000	-.560	.446	.079	.033	-.545	.104	.107	.001
Class 2 (58)	-.018	-.710	.077	.200	.169	-.219	.080	.200	-.636	-.859	.164	.001	-.486	.518	.130	.016	-.155	-.872	.110	.077	-.338	-.413	.095	.200
Class 3 (58)	-.058	-.077	.078	.200	-.143	-.153	.099	.200	-.878	-.049	.136	.009	-.375	-.040	.132	.013	-.011	-.291	.067	.200	.771	1.506	.172	.000
Length of marriage																								
MT1 (111)	-.291	-.141	.067	.200	-.116	-.066	.078	.092	-1.566	2.498	.151	.000	-.759	.720	.161	.000	-.547	.184	.081	.067	-.258	.326	.076	.137
MT2 (80)	-.088	.122	.064	.200	.081	.132	.083	.20	-1.109	.792	.143	.000	-.553	.204	.157	.000	-.286	.178	.060	.200	-.418	.813	.107	.023
MT3(63)	.506	.078	.096	.200	.837	1.347	.103	.097	-.551	-1.149	.156	.001	.502	2.730	.110	.055	.029	-.791	.088	.200	-.143	.128	.085	.200
Type of infertility																								
Type 1 (96)	-.389	-.068	.093	.038	-.318	.336	.080	.148	-.938	1.306	.117	.002	-.572	.066	.151	.000	-.356	-.128	.050	.200	-.152	.055	.094	.036
Type 2 (38)	.445	2.613	.943*	.052	2.134	5.806	.786*	.000	1.540	3.288	.850*	.000	1.406	4.289	.897*	.002	1.905	6.178	.842*	.000	-.916	.435	.910*	.005
Type 3 (23)	.216	-.796	.955*	.368	-.766	2.953	.928*	.099	-.982	2.303	.939*	.175	-.195	-.545	.959*	.451	.224	-.690	.956*	.393	-.566	.936	.941*	.184
Type 4 (97)	.495	-.485	.119	.002	.233	-.243	.090	.052	-.551	.180	.096	.028	-.936	.724	.168	.000	.364	.161	.057	.200	-.124	.508	.072	.200

Appendix 5 Test of Normality on Marital Adjustment and Marital Satisfaction in Men and Women for Different Demographical Variables (continued)

Variables	Dyadic consensus				Dyadic cohesion				Dyadic satisfaction				Affectional expression				DAS total				Marital satisfaction			
	Sk	Ku	K-S/S-W	p	Sk	Ku	K-S/S-W	p	Sk	Ku	K-S/S-W	p	Sk	Ku	K-S/S-W	p	Sk	Ku	K-S/S-W	p	Sk	Ku	K-S/S-W	p
Infertility duration																								
IT1 (173)	-.088	-.157	.061	.200	-.010	-.109	.071	.034	-1.242	.987	.153	.000	-.671	.395	.172	.000	-.295	-.189	.067	.058	-.119	.282	.077	.014
IT2 (50)	-.525	.744	.113	.136	-.022	-.172	.069	.200	-.957	-.314	.155	.002	-.795	.767	.159	.003	-.648	-.127	.125	.049	-.928	1.206	.186	.000
IT3 (31)	.445	-.465	.116*	.200	.758	.675	.144*	.103	-.674	-.724	.153*	.063	1.188	3.564	.123*	.200	-.070	-.651	.098*	.200	-.058	-.737	.093*	.200
Women(n=254)																								
Age group																								
Age 1 (70)	.253	-.608	.096	.179	-.117	-.219	.125	.008	-.210	1.221	.092	.200	-.139	.081	.162	.000	.299	1.134	.102	.068	.105	-.622	.113	.026
Age 2 (107)	-.550	-.019	.106	.005	-.266	-.733	.091	.028	-.112	.092	.100	.010	-.310	-.668	.128	.000	-.515	-.000	.103	.007	-.320	.345	.113	.002
Age 3 (50)	-.464	-.850	.163	.002	.157	-.132	.094	.200	.021	-.817	.101	.200	.280	.024	.125	.023	-.585	-.099	.174	.001	.341	-.474	.151	.006
Age 4 (27)	-.442	1.844	.967*	.531	-.120	-.707	.960*	.375	-.494	.089	.951*	.225	-.129	-.759	.947*	.182	-.394	.425	.978*	.813	-.148	-.653	.968*	.550
Education level																								
Level 1 (150)	-.356	.177	.079	.024	-.107	-.460	.069	.077	-.372	.960	.073	.052	-.170	-.537	.125	.000	-.498	1.113	.069	.074	-.150	-.348	.070	.072
Level 2 (77)	-.651	-.050	.137	.001	-.164	-.542	.099	.049	-.033	-.274	.096	.079	-.432	-.352	.171	.000	-.739	.193	.164	.000	.205	-.391	.130	.002
Level 3 (27)	-.399	.597	.982*	.914	.014	-.1.161	.940*	.119	-.295	-1.049	.937*	.101	-.035	-.777	.979*	.835	-.257	-.042	.984*	.939	.211	-.830	.955*	.278
Economic level																								
Class 1 (138)	-.432	.099	.088	.012	-.101	-.524	.068	.072	-.160	.154	.068	.200	-.297	-.635	.146	.000	-.378	.359	.072	.076	-.272	-.211	.090	.008
Class 2 (58)	-.176	-.432	.103	.196	-.231	-.644	.099	.200	-.669	.827	.117	.048	.213	.651	.143	.005	-.684	1.003	.082	.200	.315	-.419	.116	.051
Class 3 (58)	-.618	.714	.102	.200	-.212	-.101	.076	.200	.047	-.248	.087	.200	-.013	-.568	.103	.200	-.486	.578	.121	.034	-.082	-.252	.107	.098
Length of marriage																								
MT 1 (111)	-.111	-.361	.059	.200	-.033	-.650	.078	.095	-.709	2.209	.079	.081	-.200	-.559	.121	.000	-.584	1.512	.082	.064	-.229	-.041	.109	.003
MT 2 (80)	-.723	.902	.080	.200	-.128	-.684	.112	.014	.071	-.194	.093	.084	-.364	-.262	.140	.001	-.281	.385	.092	.092	-.086	-.526	.097	.058
MT 3 (63)	-.618	-.362	.134	.007	-.258	-.278	.082	.200	.144	.131	.079	.200	.250	.065	.148	.001	-.516	-.093	.123	.019	.037	-.304	.125	.017
Type of infertility																								
Type 1 (96)	-.386	.458	.083	.104	.072	-.644	.116	.003	-.263	-.001	.078	.177	-.505	-.204	.149	.000	-.456	1.659	.103	.014	-.163	-.195	.084	.090
Type 2 (38)	-.378	-.019	.980*	.703	.057	-.838	.975*	.542	.133	-.707	.977*	.623	.435	-.156	.961*	.207	-.135	-.547	.984*	.841	-.255	-.701	.945*	.061
Type 3 (23)	-.603	-.606	.930*	.108	-.024	-1.145	.949*	.276	.343	-1.023	.932*	.122	-.380	-.545	.930*	.110	-.691	1.047	.960*	.473	.287	-1.180	.908*	.038
Type 4 (97)	-.153	-.462	.077	.191	-.384	-.106	.113	.004	-.351	1.120	.065	.200	.014	-.683	.104	.012	-.350	.195	.062	.200	.195	-.535	.111	.005

Appendix 5 Test of Normality on Marital Adjustment and Marital Satisfaction in Men and Women for Different Demographical Variables (continued)

Variables	Dyadic consensus				Dyadic cohesion				Dyadic satisfaction				Affectional expression				DAS total				Marital satisfaction			
	Sk	Ku	K-S/ S-W	p	Sk	Ku	K-S/ S-W	p	Sk	Ku	K-S/ S-W	p	Sk	Ku	K-S/ S-W	p	Sk	Ku	K-S/ S-W	p	Sk	Ku	K-S/ S-W	p
Infertility duration																								
IT 1 (173)	-.287	.101	.059	.200	-.102	-.583	.071	.033	-.354	.705	.081	.007	-.148	-.641	.118	.000	-.478	.777	.071	.033	.089	-.196	.095	.001
IT 2 (50)	-.977	1.023	.116	.092	-.460	.039	.117	.083	-.022	.321	.084	.200	-.529	.603	.149	.007	-.837	1.094	.151	.006	-.279	-.412	.128	.039
IT 3 (31)	-.253	-1.089	.947*	.130	.205	-.505	.983*	.883	-.147	-.500	.967*	.442	.154	-.508	.918*	.021	-.114	-.526	.976*	.680	.272	-.251	.965*	.398

Note:

1. “Sk” refers to skewness, “Ku” refers to kurtosis; “K-S” refers to Kolmogorov-Smirnov test; “S-W” refers to Shapiro-Wilk Test; “*” means the statistical value of Shapiro-Wilk Test, others without “*” means the statistical value of Kolmogorov-Smirnov test.
2. Age group: Age 1 =20 - 25 years old, Age 2=26-30 years old, Age 3=31-35 years old, Age 4=36 years old or more;
3. Education level: Level 1=Primary level, Level 2=Middle level, Level 3=High level;
4. Economic level: Class 1=Low class, Class 2=Medium class, Class 3=High class;
5. Length of marriage: MT1=1-3 years, MT2=4-6 years, MT3=7 years or more;
6. Type of infertility diagnosis: Type 1=Male factor, Type 2=Female factor, Type 3=Combined factors, Type 4=Unexplained factors;
7. Length of infertility: IT1=1-3 years, IT2=4-6 years, IT3=7 years or more.

Appendix 6 Test of Homogeneity of Variance Marital Adjustment and Marital Satisfaction in Men and Women for Different Demographical Variables

Variables	Dyadic consensus		Dyadic cohesion		Dyadic satisfaction		Affectional expression		DAS total		Marital satisfaction	
	F	p	F	p	F	p	F	p	F	p	F	p
Men(n=254)												
Age group	1.524	.209	1.085	.356	5.353	.001	.715	.544	2.121	.098	.458	.712
Education level	1.977	.141	1.807	.166	.994	.372	.047	.954	5.153	.006	.303	.739
Economic level	2.769	.065	.523	.594	5.191	.006	1.896	.152	3.303	.038	2.248	.108
Length of marriage	.836	.434	.761	.468	10.658	.000	2.032	.133	3.186	.043	1.690	.187
Type of infertility	2.212	.087	.694	.557	.410	.746	.457	.713	2.087	.102	.351	.789
Infertility duration	.441	.644	2.939	.055	4.878	.008	1523	.220	.686	.505	1.465	.233
Women(n=254)												
Age group	2.820	.040	4.199	.006	5.711	.001	2.106	.100	6.815	.000	.867	.459
Education level	.749	.474	.294	.746	1.662	.192	1.551	.214	1.078	.342	.778	.460
Economic level	.443	.643	.657	.519	2.493	.085	.033	.968	.985	.375	.014	.986
Length of marriage	1.782	.171	.602	.548	1.322	.268	.672	.512	1.112	.331	.684	.506
Type of infertility	2.529	.058	1.666	.157	2.314	.076	2.309	.077	5.724	.001	.559	.643
Infertility duration	.851	.428	.242	.786	.037	.964	1.875	.155	.078	.925	.798	.451

Appendix 7 Basic Information Questionnaire

English Version

Instruction: The following questions are about your basic social demographic information, and including your infertility. You can give self information based on your actual status.

1. Sex: (1) Male (2) Female
2. Current Age: _____ years old
3. What is the highest level of education that you have completed?
 (1) Primary school (2) Junior middle school
 (3) Senior high school (4) Junior college
 (5) University or above
4. What is the estimated household monthly income?
 (1) Less than 1000 RMB (2) 1000 RMB - 1999RMB
 (3) 2000 RMB - 2999RMB (4) 3000 RMB and over
5. How long have you lived together with your partner with marriage relationship?
_____ Years.
6. What is the infertility diagnosis for your partner and yourself?
 (1) Male factor (2) Female factor
 (3) Combined female and male Factor (4) Unexplained
7. What do the tests show as the causes of the difficulty in getting pregnant?
 (1) Problem with the sperm (sperm count) (2) High semen viscosity
 (3) Varicocele (4) Problem with the fallopian tubes
 (5) A problem with ovulation (6) Endometriosis
 (7) No reason found (unexplained) (8) other reason: _____
8. How long are you trying to get pregnant until now to see doctor to discuss fertility treatment? _____ Years.

Chinese Version

社会人口学基本信息问卷(中文版)

填答说明：以下是有关您的社会人口学基本情况，也涉及不孕不育的相关信息。请在最合适的 内打√，或在_____内写下正确信息。

1. 性别： (1)男 (2)女
2. 年龄：_____周岁
3. 您的教育程度：
 (1)小学 (2)初中
 (3)高中 (4)大专
 (5)大学或以上
4. 全家的月收入为：
 (1)少于 1000 元 (2)介于 1000 - 1999 元
 (3)介于 2000 - 2999 元 (4)3000 元及 3000 元以上
5. 您和您的伴侣婚后一起生活了多久？_____年。
6. 您和您伴侣的不孕不育诊断结论是什么？
 (1) 男方因素 (2) 女方因素
 (3) 双方因素 (4) 原因不清楚
7. 通过检查显示的怀孕困难的原因是什么？
 (1)精子的问题(精子数量) (2)精液黏度高
 (3)精索静脉曲张 (4)输卵管的问题
 (5)排卵的问题 (6)子宫内膜异位
 (7)未发现原因(不清楚) (8)其他原因_____
8. 您和您伴侣从都想要孩子开始到现在来看医生有多长时间？_____年。

Appendix 8 Dyadic Adjustment Scale

English Version

Instruction: 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. (Please indicate with circle number from Item 1 to Item 15)

No.	Items	Always Agree	Almost Always Agree	Occasionally Disagree	Frequently Disagree	Almost Disagree	Always Disagree
1	Handling family finances	5	4	3	2	1	0
2	Matters of recreation	5	4	3	2	1	0
3	Religious matters	5	4	3	2	1	0
4	Demonstrations of affection	5	4	3	2	1	0
5	Friends	5	4	3	2	1	0
6	Sex relations	5	4	3	2	1	0
7	Conventionality (correct or proper behavior)	5	4	3	2	1	0
8	Philosophy of life	5	4	3	2	1	0
9	Ways of dealing with parents or in-laws	5	4	3	2	1	0
10	Aims, goals, and things believed important	5	4	3	2	1	0
11	Amount of time spent together	5	4	3	2	1	0
12	Making major decisions	5	4	3	2	1	0
13	Household tasks	5	4	3	2	1	0
14	Leisure interests and activities	5	4	3	2	1	0
15	Career decisions	5	4	3	2	1	0

Please indicate below approximately how often the following items occur between you and your partner. (Please indicate with circle number from Item 16 to Item 22)

No.	Items	All the time	Most of the time	More often than not	Occasionally	Rarely	Never
16	How often do you discuss or have you considered divorce, separation, or terminating your relationship	5	4	3	2	1	0
17	How often do you or your mate leave the house after a fight?	5	4	3	2	1	0
18	In general, how often do you think that things between you and your partner are going well?	5	4	3	2	1	0
19	Do you confide in your mate?	5	4	3	2	1	0
20	Do you ever regret that you married?	5	4	3	2	1	0
21	How often do you and your partner quarrel?	5	4	3	2	1	0
22	How often do you and your mate "get on each other's nerves"?	5	4	3	2	1	0

No.	Items	Every day	Almost every day	Occasionally	Rarely	Never
23	Do you kiss your mate?	4	3	2	1	0
24	Do you and your mate engage in outside interests together?	4	3	2	1	0

How often would you say do the following events occur between you and your mate?

No.	Items	More often than once a day	Once a day	Once or twice a week	Once or twice a month	Less than once a month	Never
25	Have a stimulating exchange of ideas	5	4	3	2	1	0
26	Laugh together	5	4	3	2	1	0
27	Calmly discuss something	5	4	3	2	1	0
28	Work together on a project	5	4	3	2	1	0

These are some things about which couples sometimes agree and sometimes disagree. Indicate if either item below caused differences of opinions or were problems in your relationship during the past few weeks (Check Yes or No).

29	Being too tired for sex.	Yes	No
30	Not showing love.	Yes	No

31. The numbers on the following line represent different degrees of happiness in your relationship. The middle point, “happy”, represents the degree of happiness of most relationships. Please circle the number that best describes the degree of happiness, all things considered, of your relationship.

Extremely Unhappy	Fairly Unhappy	A Little Unhappy	Happy	Very Happy	Extremely Happy	Perfect
0	1	2	3	4	5	6

32. Which of the following statements best describes how you feel about the future of your relationship?

5	I want desperately for my relationship to succeed, and would go to almost any length to see that it does.
4	I want desperately for my relationship to succeed, and will do all I can to see that it does.
3	I want desperately for my relationship to succeed, and will do my fair share to see that it does.
2	It would be nice if my relationship succeeded, but I can't do much more than I am doing now to help it succeed.
1	It would be nice if it succeeded, but I refuse to do any more than I am doing now to keep the relationship going.
0	My relationship can never succeed, and there is no more that I can do to keep the relationship going.

Chinese Version

婚姻调适自评问卷(中文版)

填答说明：在婚姻关系中, 很多人都会对一些事情和配偶有不同的看法。请根据你们夫妇对这些看法的一致程度, 选择一个最适合你的答案。

序号	题 目	非常 一致	一 致	有 点 一 致	有 点 不 一 致	不 一 致	非常 不 一 致
1	家庭花销 (或是理财) 的处理方面	5	4	3	2	1	0
2	在娱乐活动方面	5	4	3	2	1	0
3	在宗教信仰方面	5	4	3	2	1	0
4	在情感的表达方面	5	4	3	2	1	0
5	在交朋友方面	5	4	3	2	1	0
6	在性关系方面	5	4	3	2	1	0
7	在观念和习惯方面	5	4	3	2	1	0
8	在对待人生的态度方面	5	4	3	2	1	0
9	对待双方父母的方式	5	4	3	2	1	0
10	做事的目的和目标	5	4	3	2	1	0
11	我和爱人认为在共同相处时间的多少方面	5	4	3	2	1	0
12	在对事情作出重要决定方面	5	4	3	2	1	0
13	在家务分工方面	5	4	3	2	1	0
14	在业余时间中的爱好和活动	5	4	3	2	1	0
15	有关职业 (或工作) 的决定	5	4	3	2	1	0

下列情况在你和配偶的相处中, 多久出现一次, 请在右列的选项中圈出最符合的频率。

序 号	题 目	总 是	大 部 分 时 间	有 时	偶 尔 一 次	几 乎 没 有	从 不
16	你有没有与配偶讨论或曾经考虑离婚, 分居或终止你们之间的关系?	5	4	3	2	1	0
17	你或你的配偶有没有在争吵或打架后离家而去?	5	4	3	2	1	0
18	一般来说, 你有多少时候认为你们夫妇间的关系是好的?	5	4	3	2	1	0
19	你是否信赖你的配偶?	5	4	3	2	1	0
20	你是否曾经后悔结婚?	5	4	3	2	1	0
21	你和你配偶之间有多少时候会吵架?	5	4	3	2	1	0
22	你和你配偶之间有多少时候会让对方感到心烦?	5	4	3	2	1	0

序号	题 目	每天都有	几乎每天都有	不经常有	很少有	从来没有
23	你有没有亲吻你的配偶？	4	3	2	1	0
24	你和你的配偶有没有一同外出进行一些社交或有趣的活动？	4	3	2	1	0

你觉得下列事件发生在你们夫妻之间的频率为何？

序号	题 目	非常频繁	每天一次	一周一次或两次	一个月一次或两次	一个月不到一次	从不
25	有启发性或激励性的意见交流	5	4	3	2	1	0
26	一起欢笑	5	4	3	2	1	0
27	冷静地讨论一些事情	5	4	3	2	1	0
28	一起进行一件事或一个计划	5	4	3	2	1	0

在过去几周当中，以下的事情是否曾导致你们夫妇间有不同的意见，或这些事情已经成为你们婚姻关系中的问题？（请选择是或否）

29	我疲倦得不想有性行为	是	否
30	我没有向对方表示爱意	是	否

31. 你认为你们夫妻关系快乐程度是

非常不快乐	很不快乐	不太快乐	快乐	很快乐	非常快乐	极度快乐
0	1	2	3	4	5	6

32. 你认为以下那一句子最能够描述你对你们未来婚姻关系的感受？（只选择一项）

5	我非常渴望这段婚姻关系可以成功，并且会不顾一切的尽全力达到这个目的。
4	我非常希望这段婚姻关系可以成功，并将尽力去实现这个愿望。
3	我希望这段婚姻关系可以成功，并且会做我应做的去实现。
2	如果这段婚姻关系能够成功的话当然很好，但我不想再做更多的努力来使它成功。
1	如果这段婚姻关系能够成功的话当然很好，但我拒绝做更多的努力来维持婚姻关系的持续。
0	这段婚姻关系是永远不能成功的，而我也真的无能为力。

Appendix 9 Kansas Marital Satisfaction Scale

English version

Instruction: The following three questions are your marital satisfaction, please give your reply according to your real feeling after reading them. Thanks for your answer and your cooperation.

Q1 How satisfied are you with your marriage?

- | | |
|---|--|
| <input type="checkbox"/> 1 Extremely Dissatisfied | <input type="checkbox"/> 2 Very Dissatisfied |
| <input type="checkbox"/> 3 Somewhat dissatisfied | <input type="checkbox"/> 4 Mixed |
| <input type="checkbox"/> 5 Somewhat satisfied | <input type="checkbox"/> 6 Very satisfied |
| <input type="checkbox"/> 7 Extremely satisfied | |

Q2 How satisfied are you with your husband/wife as a spouse?

- | | |
|---|--|
| <input type="checkbox"/> 1 Extremely Dissatisfied | <input type="checkbox"/> 2 Very Dissatisfied |
| <input type="checkbox"/> 3 Somewhat dissatisfied | <input type="checkbox"/> 4 Mixed |
| <input type="checkbox"/> 5 Somewhat satisfied | <input type="checkbox"/> 6 Very satisfied |
| <input type="checkbox"/> 7 Extremely satisfied | |

Q3 How satisfied are you with your relationship with your husband/wife?

- | | |
|---|--|
| <input type="checkbox"/> 1 Extremely Dissatisfied | <input type="checkbox"/> 2 Very Dissatisfied |
| <input type="checkbox"/> 3 Somewhat dissatisfied | <input type="checkbox"/> 4 Mixed |
| <input type="checkbox"/> 5 Somewhat satisfied | <input type="checkbox"/> 6 Very satisfied |
| <input type="checkbox"/> 7 Extremely satisfied | |

Chinese version

婚姻满意度问卷（中文版）

填答说明：以下 3 个题目是关于您对婚姻的满意度调查，请您在仔细阅读每道题目后，按照自己的真实感受进行作答，感谢您认真的选择及积极的配合。

Q1.你对你的婚姻满意程度有多少？

- | | |
|----------------------------------|---------------------------------------|
| <input type="checkbox"/> 1 极度不满意 | <input type="checkbox"/> 2 很不满意 |
| <input type="checkbox"/> 3 有点不满意 | <input type="checkbox"/> 4 界乎满意与不满意之间 |
| <input type="checkbox"/> 5 有点满意 | <input type="checkbox"/> 6 很满意 |
| <input type="checkbox"/> 7 极度满意 | |

Q2.你的丈夫/妻子作为一个配偶,你对她/他的满意程度有多少？

- | | |
|----------------------------------|---------------------------------------|
| <input type="checkbox"/> 1 极度不满意 | <input type="checkbox"/> 2 很不满意 |
| <input type="checkbox"/> 3 有点不满意 | <input type="checkbox"/> 4 界乎满意与不满意之间 |
| <input type="checkbox"/> 5 有点满意 | <input type="checkbox"/> 6 很满意 |
| <input type="checkbox"/> 7 极度满意 | |

Q3.你对你们夫妻之间关系的满意程度有多少？

- | | |
|----------------------------------|---------------------------------------|
| <input type="checkbox"/> 1 极度不满意 | <input type="checkbox"/> 2 很不满意 |
| <input type="checkbox"/> 3 有点不满意 | <input type="checkbox"/> 4 界乎满意与不满意之间 |
| <input type="checkbox"/> 5 有点满意 | <input type="checkbox"/> 6 很满意 |
| <input type="checkbox"/> 7 极度满意 | |

Appendix 10 Fertility Problem Inventory

English version

Instruction: The following statements express different opinions about a fertility problem. Please indicate the degree to which you agree or disagree with each statement.

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Agree Slightly	Moderately Agree	Strongly Agree
1. Couples without a child are just as happy as those with children.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Pregnancy and childbirth are the two most important events in a couple's relationship.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. I find I've lost my enjoyment of sex because of the fertility problem.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. I feel just as attractive to my partner as before.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. For me, being a parent is a more important goal than having a satisfying career	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. My marriage needs a child.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. I don't feel any different from other members of my sex.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. It's hard to feel like a true adult until you have a child.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. It doesn't bother me when I'm asked questions about children.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. A future without a child would frighten me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11. I can't show my partner how I feel because it will make him/her feel upset.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12. Family don't seem to treat us any differently.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13. I feel like I've failed at sex.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14. The holidays are especially difficult for me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
15. I could see a number of advantages if we didn't have a child.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
16. My partner doesn't understand the way the fertility problem affects me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17. During sex, all I can think about is wanting a child.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
18. My partner and I work well together handling questions about our infertility.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
19. I feel empty because of our fertility problem.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

20. I could visualize a happy life together, without a child.	<input type="radio"/>					
21. It bothers me that my partner reacts differently to the problem.	<input type="radio"/>					
22. Having sex is difficult because I don't want another disappointment.	<input type="radio"/>					
23. Having a child is not the major focus of my life.	<input type="radio"/>					
24. My partner is quite disappointed with me.	<input type="radio"/>					
25. At times, I seriously wonder if I want a child.	<input type="radio"/>					
26. My partner and I could talk more openly with each other about our fertility problem.	<input type="radio"/>					
27. Family get-togethers are especially difficult for me.	<input type="radio"/>					
28. Not having a child would allow me time to do other satisfying things.	<input type="radio"/>					
29. I have often felt that I was born to be a parent.	<input type="radio"/>					
30. I can't help comparing myself with friends who have children.	<input type="radio"/>					
31. Having a child is not necessary for my happiness.	<input type="radio"/>					
32. If we miss a critical day to have sex, I can feel quite angry.	<input type="radio"/>					
33. I can't imagine us ever separating because of this.	<input type="radio"/>					
34. As long as I can remember, I've wanted to be a parent.	<input type="radio"/>					
35. I still have lots in common with friends who have children.	<input type="radio"/>					
36. When we try to talk about our fertility problems, it seems to lead to an argument.	<input type="radio"/>					
37. Sometimes I feel so much pressure, that having sex becomes difficult.	<input type="radio"/>					
38. We could have a long, happy relationship without a child.	<input type="radio"/>					
39. I find it hard to spent time with friends who have young children.	<input type="radio"/>					
40. When I see families with children I feel left out.	<input type="radio"/>					
41. There is a certain freedom without children that appeals to me.	<input type="radio"/>					
42. I will do just about anything to have a child.	<input type="radio"/>					
43. I feel like friends or family are leaving us behind.	<input type="radio"/>					
44. It doesn't bother me when others talk about their children.	<input type="radio"/>					
45. Because of infertility, I worry that my partner and I are drifting apart.	<input type="radio"/>					
46. When we talk about our fertility problem, my partner seems comforted by my comments.	<input type="radio"/>					

Chinese version

生育失败压力自评问卷(中文版)

填答说明：下面是有关生育问题的一些看法，请您按照自己的判断，在最适合的选项上划 X，不必过多深思，直接选择就可以。

题 目	强烈不同意	中等不同意	稍微不同意	稍微同意	中等同意	强烈同意
1.没有孩子的夫妻和有孩子的夫妻是一样幸福的。						
2.怀孕和生孩子是夫妻关系中最重要的两个事情。						
3.因为生育问题，我觉得自己已经不再有性的愉快了。						
4.我觉得对我的配偶来说我跟以前一样有吸引力。						
5.对我来说，成为父母比拥有成功的事业是我更重要的目标。						
6.我的婚姻需要一个孩子。						
7.我没有因为生育问题觉得和其他与我同性别的人有区别。						
8.如果没有孩子,你很难觉得自己是一个真正的成年人。						
9.当被问及孩子的事情时，我并不觉得困扰。						
10.没有孩子的将来会让我觉得害怕。						
11.我不能在配偶面前显露我的感受,因为我觉得这会让配偶很失望。						
12.家里的人对我和配偶没有什么不同的对待。						
13.我觉得我在性方面很失败。						
14.假期对我来说尤其难度过。						
15.如果没有孩子，对我和配偶来说会有很多有利的方面。						
16.我配偶不理解生育问题对我的影响。						
17.在夫妻性生活中，我脑海里全部都是想要一个孩子。						
18.我和配偶在生育问题上处理得很好。						
19.因为我和配偶的生育问题，我现在觉得很空虚。						
20.我可以预见到没有孩子的两个人的幸福生活。						
21.我配偶对生育问题的反应和我很不一样，我觉得很困扰。						
22.因为我不想再一次失望,过性生活对我来说变得很困难。						
23.要孩子并不是我生活的中心事情。						
24.我配偶对我相当失望。						

题 目	强 烈 不 同 意	中 等 不 同 意	稍 微 不 同 意	稍 微 同 意	中 等 同 意	强 烈 同 意
25.有些时候,我真的犹豫自己是不是要孩子。						
26.我配偶和我可以比较开明地互相谈论我们的生育问题。						
27.当和家里亲人在一起,面对他们对生育问题的指指点点,我感到很烦恼。						
28.如果没有孩子,我可以有时间做其它让我感到满足的事情。						
29.我经常觉得我生来就是做父亲(母亲)的料。						
30.我总忍不住跟我有孩子的朋友进行比较。						
31.孩子并不是我生活幸福所必需的。						
32.如果我和配偶错过了过性生活的关键的一天,我会觉得相当地愤怒。						
33.我不能想象我和配偶有一天会因为生育问题而分开。						
34.从我记事时起,我就一直想成为父亲(母亲)。						
35.我跟有孩子的朋友们还是有很多共同点的。						
36.每当我和配偶尝试谈论生育问题时,每次似乎都要引发一场争吵。						
37.有时候我感到太多的压力,以至于过性生活变得很困难。						
38.没有孩子,我和配偶也能保持一种长久、幸福的关系。						
39.我发现跟有孩子的朋友一起消磨时间是挺难的。						
40.当我看到有孩子的家庭时,我觉得自己被遗忘了。						
41.如果我没有孩子,我认为自己可以自由地去做其它事情。						
42.我将尽一切可能去有一个孩子。						
43.我觉得家人和朋友正在把我和配偶抛弃。						
44.当别人谈论他们的孩子的时候,不会对我造成困扰。						
45.因为生育问题,我担心我和配偶的关系会逐渐疏远。						
46.当我和配偶谈论生育问题时,我配偶认为我的建议有意义。						

Appendix 11 Multidimensional Sexuality Questionnaire

English version

Instruction: Listed below are several statement related to sexuality, please read each item carefully and decide to what extent it is characteristic of you. For each statement fill in the response on the computer sheet that indicates how much it applies to you by using the following scale.

Items	Not at all Characteristic of me	Slightly characteristic of me	Somewhat Characteristic of me	Moderately characteristic of me	Very characteristic of me
1. I am confident about myself as a sexual partner.					
2. I am a pretty good sexual partner.					
3. I am better at sex than most other people.					
4. I would rate myself pretty favorably as a sexual partner.					
5. I would be very confident in a sexual encounter.					
6. I am very aware of my sexual feelings.					
7. I'm very aware of my sexual motivations.					
8. I tend to think about my sexual feelings.					
9. I'm very alert to changes in my sexual desires.					
10. I am very aware of my sexual tendencies.					
11. I'm very motivated to be sexually active.					
12. I'm strongly motivated to devote time and effort to sex.					
13. I have a strong desire to be sexually active.					
14. It's really important to me that I involve myself in sexual activity.					

Items	Not at all Characteristic of me	Slightly characteristic of me	Somewhat Characteristic of me	Moderately characteristic of me	Very characteristic of me
15. I strive to keep myself sexually active.					
16. I am very satisfied with the way my sexual needs are currently being met.					
17. I am very satisfied with my sexual relationship.					
18. My sexual relationship meets my original expectations.					
19. My sexual relationship is very good compared to most.					
20. I am very satisfied with the sexual aspects of my life.					

Chinese version

性状况自评问卷(中文版)

填答说明:下面是关于性状况的描述,请仔细阅读每一条,然后决定您的特征程度。请按照自己的判断,在各选择项对应的空白处划 X,所有题目都是单选。

题目	一点也不 是我的特征	轻微有一点 我的特征	有几分 我的特征	中等程度上 有我的特征	非常有我 的特征
1. 我对自己作为一个性伴侣很有信心。					
2. 我是一个非常好的性伴侣。					
3. 我在性方面比别人在行。					
4. 我认为自己是相当不错的性伴侣。					
5. 在性生活中,我很自信的。					
6. 我很清楚我的性感受。					
7. 我很清楚我的性动机。					
8. 我常会考虑自己的性感受。					
9. 我对自己性欲望的变化是很敏感的。					
10. 我很清楚我的性倾向。					
11. 过性生活,我非常积极的。					
12. 自己能积极地在性生活方面投入时间和精力。					
13. 自己在性生活方面主动性的愿望是非常强的。					
14. 对我来说,过性生活是很重要的。					
15. 我一直努力保持自己在性生活方面的主动性。					
16. 我很满意自己的性需要目前得以满足的方式。					

17. 我对自己和配偶的性关系感到非常满意。					
18. 我和配偶的性关系符合我最初的期望。					
19. 我和配偶的性关系和大多数人相比是非常好的。					
20. 我很满意生活当中自己性方面的事情。					

Appendix 12 Interview Questions

English version

1. What are your feelings concerning the infertility process? And what's your meaning or perspective on infertility?
2. What are your feelings of the contributing factor to the infertility diagnosis?
3. Why do you choose to pursue infertility treatment?
4. Has the infertility experience affected marital relationship and any of your relationships with family members or friends?
5. What are your perceptions regarding couples who can't conceive naturally?
6. Do you feel your or/and your partner's fertility problems will influencing your marriage?
7. What's your understanding or perspective on sexuality? And what do you think marital sex life is important or not for you and your partner comparing with procreation?
8. Did you have communication with your partner about sexuality in your experiencing infertility?
9. In general, which of you is more powerful (or active) in making decision for marital sex life?

定性访谈提纲(中文版)

1. 在经历不孕不育的过程中，你的感受是怎样的？你对不孕不育的理解、态度和观点是怎样的？
2. 你对导致不孕不育诊断的原因的感受是如何？
3. 为什么你要进行不孕不育的治疗？
4. 不孕不育对你和伴侣的婚姻关系是否产生了影响？和其它家庭成员的关系是否也受到影响？
5. 你对那些不能正常自然生育的夫妻是如何看待的？
6. 你觉得你或你伴侣出现生育问题是否会影响到你的婚姻？
7. 你对“性”是如何看待和理解的？你认为，与生育相比较，婚姻性生活对你和伴侣来说是否很重要？
8. 在经历不孕不育的生活中，你是否和伴侣在性方面有一些交流？
9. 总体来说，在婚姻性生活中，你和伴侣谁的决定最主要？（或是谁说了算）

Appendix 13 Approved Letter from Human Research Ethics Committee of Curtin University



Office of Research and Development

Human Research Ethics Committee

TELEPHONE 9266 2784
FACSIMILE 9266 3793
EMAIL hrec@curtin.edu.au

memorandum

To	Professor Rosemary Coates, Public Health
From	A/Professor Joan Wardrop Acting, Chair Human Research Ethics Committee
Subject	Protocol Approval HR 103/2009
Date	7 October 2009
Copy	Dr Gareth Merriman, Public Health Prof Bruce Maycock, Public Health Dr Yun Zhao, Public Health Peng Tao, Public Health Graduate Studies Officer, Faculty of Health Sciences

Thank you for your application submitted to the Human Research Ethics Committee (HREC) for the project titled "*Infertility and Marital Well-being Among Infertile, Chinese Couples from Hei Longjiang Province in China*". Your application has been reviewed by the HREC and is **approved**. The Committee has requested six monthly monitoring reports to be submitted to the Research Ethics Office.

- You have ethics clearance to undertake the research as stated in your proposal.
- The approval number for your project is **HR 103/2009**. *Please quote this number in any future correspondence.*
- Approval of this project is for a period of twelve months **06-10-2009 to 06-10-2010**. To renew this approval a completed Form B (attached) must be submitted before the expiry date **06-10-2010**.
- If you are a Higher Degree by Research student, data collection must not begin before your Application for Candidacy is approved by your Faculty Graduate Studies Committee.
- The following standard statement **must be** included in the information sheet to participants:

This study has been approved by the Curtin University Human Research Ethics Committee (Approval Number HR 103/2009). The Committee is comprised of members of the public, academics, lawyers, doctors and pastoral carers. Its main role is to protect participants. If needed, verification of approval can be obtained either by writing to the Curtin University Human Research Ethics Committee, c/- Office of Research and Development, Curtin University of Technology, GPO Box U1987, Perth, 6845 or by telephoning 9266 2784 or by emailing hrec@curtin.edu.au.

Applicants should note the following:

It is the policy of the HREC to conduct random audits on a percentage of approved projects. These audits may be conducted at any time after the project starts. In cases where the HREC considers that there may be a risk of adverse events, or where participants may be especially vulnerable, the HREC may request the chief investigator to provide an outcomes report, including information on follow-up of participants.

The attached **FORM B** should be completed and returned to the Secretary, HREC, c/- Office of Research & Development:

When the project has finished, or

- If at any time during the twelve months changes/amendments occur, or
- If a serious or unexpected adverse event occurs, or
- 14 days prior to the expiry date if renewal is required.
- An application for renewal may be made with a Form B three years running, after which a new application form (Form A), providing comprehensive details, must be submitted.

Regards,

A/Professor Joan Wardrop
Acting, Chair Human Research Ethics Committee

Appendix 14 Agreement Letter from the Ethical Committee of the First Clinical College, Harbin Medical University

哈尔滨医科大学
The First Clinical College of Harbin Medical University
(The First Affiliated Hospital of Harbin Medical University)

Address: No. 23 Youzheng Street Harbin, Nan Gang District, Harbin City, China
The First Affiliated Hospital of Harbin Medical University
Tel: 0451-53643849
Website: www.54dr.com

研究同意书
Research Consent Form

哈尔滨医科大学第一临床医学院伦理委员会同意

澳大利亚科廷科技大学健康科学系博士研究生彭涛，于2009年7月始至2011年12月止，得以在本院生殖医学科开展“不孕不育夫妻心理健康与婚姻质量”的相关科学研究活动。

The Ethical Committee of The First Clinical College of Harbin Medical University agrees that

The researcher Peng Tao, who is the Ph.D. student of Health Science Faculty of Curtin University of Technology (Australia), has authority to implement his research to the target populations (infertile couples), including questionnaire survey and interview about Infertility and Marital Well-being during the period from July 2009 to December 2011.

哈尔滨医科大学第一临床医学院伦理委员会 主任
Director of the Ethical Committee,
The First Clinical College of Harbin Medical University, China



The First Clinical College of Harbin Medical University, China

Appendix 15 Informed Consent to Participate in Research

English version

Hello! My name is Peng Tao. I am conducting a research about the marital well-being in infertile couples. You are being asked to participate in a research. Your participation is totally voluntary, definitely you can refuse to attend this study without any lost or penalty.

1. Purpose of the research: The purpose of this study is to examine the link between infertility, sexuality and marital well-being. The information gained from this research will help explain the relationship among these aspects noted above, also could be useful in developing intervention to help infertile couples cope with their problems and improve their lives.

2. Process of the Research: If you decide to take part in this study, you will be the potential participants, and will be invited to ask questions, which are about your background, your sexuality, and relationship in your marriage. Your answers to the questions on the survey will be anonymous, all the recodes of your response will be preserved confidentially, only the researcher and authorized persons can access to the study records. In addition, in the proceeding of whole study, we do not ask you to provide your name, home address, work place and other related personal identity information. In addition, you will then be asked to participate in additional interview, the researcher (Peng Tao) will communicate with you on some issues. When you agree, the interview will be implemented after you finish the questionnaire survey. Of course, you can choose another day for this interview within one week. Definitely, you have right to discontinue this participation freely at any time.

3. Cost of the Research: There are no costs for this research.

4. Potential Risk: The research seldom has psychological risk, if you feel any anxious or uncomfortable about any of the question, you can choose to skip over that question or cancel the survey. However, if you have inquiry about your rights as a research participant, or have complaints about the research, please contact with Human Research Ethics Committee of Curtin University at (0061-8)9266-2784 or directly give phone (0451-53633849) to the ethical committee of the First Clinical College, Harbin Medical University.

5. Benefits of the Research: The research will help explain the relationship among level of infertility-related stress, sexuality and marital well-being. You may benefit from your participation in the study, e.g. counseling service, couple relationship management, more importantly, your participation may provide meaningful evidence for health promotion and marital well-being maintaining for the couple with fertility problems.

6. Contact Person: If you have any questions, at any time, about this research, or want to discuss any possible study-related infertility, please contact Mr. Peng Tao at telephone number 15004506291, or send message to email: pengtao1@china.com.

The following information is for you before you give your signature on the blow.

1. You are given opportunity on discussing the study information with the researcher before the formal research implementation.
2. You are clearly about the purpose of the research, the survey/interview process, benefits and risks from the research.
3. You are voluntary to participate in this research, which means you are free that you can refuse or stop participation in this research at any time without any responsibility.
4. You understand that you will remain anonymous at all times, and you assert that all your personal detail information will be treated as confidential.
5. All information you provided are only for the research.

Based on these information above mentioned, please make your choice, and sign here with X.

Agree _____

Disagree _____

Thanks for your cooperation, and support this study.

参与研究知情同意书(中文版)

您好!我是彭涛。我正在进行一个有关不孕不育夫妇婚姻质量的研究。真诚邀请您参加这个研究的调查。您参与这个研究完全是出于自己的个人意愿,即使您拒绝接受这个研究的相关调查,也不会对您产生任何损失。

1. 本研究的目的: 本研究着重探寻不孕不育夫妇经历生育失败的压力、性状况的变化对婚姻质量影响,以及相互间的关系。本研究将有助于获得相关信息,并协助不孕不育夫妇有效应对面临的压力,并为改善不孕不育夫妇的生活质量提供积极干预措施。

2. 本研究的过程: 如果您决定参与这个研究,您将有可能成为这个研究的被调查者,而且将被邀请针对相关问题进行回答。这些问题包括个人的基本信息,以及涉及性状况和婚姻关系方面的议题。您对这些问题的回答完全是匿名的,所有的调查结果将予以严格保密,只有研究人员和授权的人士才能接触到这样调查材料。在整个调查进行中,我们不会询问您的姓名、家庭住址、工作单位以及其它能确认您身份的有关信息。此外,您还将被邀请参与本研究中的访谈调查,研究者(彭涛)将和您交流一些与研究内容有关的一些议题。如果您接受这个访谈调查,我们将在您完成这个问卷调查后进行,或是在1周内您在方便的时间和与我们联系,进行访谈。对于相关调查,你有权利随时退出。

3. 参与研究的费用: 您参与本研究将不会涉及任何费用。

4. 参与本研究可能会发生的伤害: 本研究很少会带来心理上的伤害。如果某些问题使您感到焦虑或不舒服,您可以忽略这些问题或是取消调查。如果您想获知自身作为被调查者的权利,或是对该研究的进行有任何抱怨,请致电科廷大学人类研究伦理委员会,电话是0061-8)9266-2784;或是直接与哈尔滨医科大学第一临床医学院学术伦理委员会联系,电话是:0451-53633849。

5. 参与本研究的收益: 您的参与将有助于本研究探究生育失败压力、性状况的变化以及不孕不育夫妇婚姻质量之间的关系。此外,您在参与调查的过程中,

可以获得研究人员提供的咨询服务、夫妻关系经营的建议和指导。尤为重要的是，您的参与为不孕不育夫妇的健康促进和保持良好的婚姻适应提供了有意义的依据。

6. 本研究的联系者：如果您对本研究有任何疑问，或是想要探讨不孕不育的相关研究，请随时和彭涛联系，联系电话：15004506291，也可发送电子邮件到 pengtao1@china.com

在您同意参与本研究，并正式签字之前，请确认如下信息：

1. 在正式参加该研究之前，您有机会和研究者交流相关的信息。
2. 您对于本研究的目的、调查/访谈的过程和该研究可能存在的利弊已经很清楚。
3. 您是自愿参加这个研究，也可以拒绝参加，或随时退出相关的研究活动，且不附带任何责任。
4. 您已经懂得在该研究的整个活动中，您将是匿名参加，而且您确信您的个人隐私信息将受到保护。
5. 在本研究中，您提供的所有信息只是为了学术研究。

针对上述的研究知情同意书，请您对是否参加本研究作出选择(在横线上打**X**)：

同意参加_____

不同意参加_____

谢谢您的合作，和对本研究的支持！