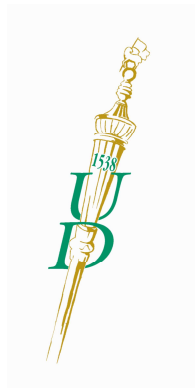


THESIS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY (PHD)

Psychological characteristics of Hungarian infertile couples on personal, couple and sociocultural levels

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TABLE OF CONTENTS

List of abbreviations	4
Figures	5
Tables	5
1. Introduction	7
1.1. Clinical definition and epidemiology of infertility	9
1.2. Etiological factors of infertility	10
1.3. Diagnostic and medical treatments of infertility	11
1.4. Statement of the problem	13
2. Conceptual framework	14
2.1. Medical perspective.....	15
2.2. Psychosocial perspective.....	16
2.2.1. Crisis theory	16
2.2.2. Psychological adjustment to infertility.....	17
2.2.3. Psychological outcomes of infertility on the personal level	18
2.2.4. Gender differences in reactions to infertility.....	19
2.2.5. Psychological outcomes of infertility on the partner level.....	21
2.2.6. Effects of gender role attitudes in experiencing infertility.....	24
2.2.7. Childbearing intentions and gender-role orientations – a cultural approach	26
2.2.8. Hungarian scientific works on psychosocial aspects of infertility.....	28
2.3. Aims of the thesis	29
2.3.1. Specific aims of the study I “Exploratory analysis with psychosocial aspects in Hungarian infertile men and women”	31
2.3.2. Specific aims of the study II “Depression and psychosocial consequences of infertility on the level of couples”	32
2.3.3. Specific aims of the study III. “Fertility specific quality of life in international setting”	32
3. Materials and methods	34
3.1. Study populations and settings.....	34
3.2. Measurements.....	35
3.2.1. Questionnaires used in the study I “Exploratory analysis with psychosocial aspects in Hungarian infertile men and women”	35
3.2.2. Questionnaires used in study II “Depression and psychosocial consequences of infertility on the level of couples”.....	38
3.2.3. Questionnaires used in the study III “Fertility specific quality of life in international setting”	39
3.3. Statistical analysis	40
4. Results	43

4.1. Study I “Exploratory analysis with psychosocial aspects in Hungarian infertile men and women”	43
4.1.1. Sample characteristics	43
4.1.2. Gender differences	44
4.1.3. Differences from reference populations	45
4.1.4. Predictors of fertility problems	46
4.2. Study II “Depression and psychosocial consequences of infertility on the level of Hungarian couples”	50
4.2.1. Depression categories in the Hungarian infertile sample and in the general population	50
4.2.2. Correlations between severity of depression and sociodemographic characteristics	51
4.2.3. Relations between depression and infertility-related concerns on levels of the person and the couple.....	53
4.2.4. Relations between depression and fertility specific quality of life on levels of the person and the couple	56
4.3. Study III “Fertility specific quality of life in international setting”	56
4.3.1. Study population	56
4.3.2. Differences between countries and genders	57
4.3.3. Differences in gender role attitudes	61
5. Discussion	64
5.1. Study I “Exploratory analysis with psychosocial aspects in Hungarian infertile men and women”	64
5.2. Study II “Depression and psychosocial consequences of infertility on the level of couples”	66
5.3. Study III “Fertility specific quality of life in international setting”	69
5.4. Conclusions	72
5.5. Main statements.....	73
5.6. Limitations and suggestions for further research	74
5.7. Implications for the practice.....	76
6. Summary	79
7. References:	81
7.1. References to the thesis	81
7.2. List of publications.....	98
8. Keywords	100
9. Acknowledgements	101
10. Annex: Publications related to the thesis	102

LIST OF ABBREVIATIONS

ART: assisted reproductive technologies

DAS: Dyadic Adjustment Scale

ET: embryo transfer

FertiQoL: International Fertility Specific Quality of Life Questionnaire

FPI: Fertility Problem Inventory

FPI1: social concerns (first scale of the Fertility Problem Inventory)

FPI2: sexual concerns (second scale of the Fertility Problem Inventory)

FPI3: relational concerns (third scale of the Fertility Problem Inventory)

FPI4: rejection of childfree lifestyle (fourth scale of the Fertility Problem Inventory)

FPI5: need for parenthood (fifth scale of the Fertility Problem Inventory)

GHQ-12: Short form of General Health Questionnaire

GYEMSZI: Institute of Pharmacy Health Quality and Organisational Development/Gyógyszerészeti és Egészségügyi Minőség- és Szervezetfejlesztési Intézet

ICSI: intracytoplasmic sperm injection

IUI: intrauterine insemination

IVF: in vitro fertilization

ICMART: International Committee for Monitoring Assisted Reproductive Technology

KSH: Hungarian Central Statistical Office/Központi Statisztikai Hivatal

LKM-20: Leipzig Questionnaire on Motives to have a Child

LKM1: „Desire for emotional stabilization and finding meaning” subscale of LKM-20

LKM2: „Fear of personal constraints” subscale of LKM-20

LKM3: „Desire for social recognition” subscale of LKM-20

LKM4: „Fear of financial constraints” subscale of LKM-20

LM: Life Meaning subscale from the Brief Stress and Coping Inventory

MF: Masculinity-Femininity scale of the Minnesota Multiphasic Personality Inventory

MFRQ-MR: Male-Female Relations Questionnaire – Marital Roles subscale

MMPI: Minnesota Multiphasic Personality Inventory

OEP: National Health Fund/Országos Egészségpénztár

PAQ: Personal Attribute Questionnaire

QoL: quality of life

TFR: total fertility rate

WHO: World Health Organization

FIGURES

Figure 1. Total fertility rate. Number of children per woman in Europe.	7
Figure 2. Mean age of women at first childbirth in Europe.	8
Figure 3. Biopsychosocial model for infertility	14
Figure 4. The conceptual framework that represents four levels with factors effecting infertility-related stress.....	31
Figure 5. FertiQoL-scores and gender role attitude categories in the group of German men and women	62
Figure 6. FertiQoL-scores and gender role attitude categories in the group of Hungarian men and women	63

TABLES

Table 1. Causes of infertility in total cases in assisted reproductive care reported in years 2009, 2010, 2011 in Hungary.....	10
Table 2. Assisted reproduction treatment data registered by National Health Insurance Fund (OEP) in year 2012 in Hungary.....	12
Table 3. Success rate of total embryotransfers in assisted reproductive care reported in years 2009, 2010, 2011 in Hungary.....	12
Table 4. Short description of the studies the thesis based on.....	30
Table 5. Sociodemographic characteristics of the pilot-study sample	43
Table 6. Gender role attitudes, child wish motives, subjective well-being, marital adjustment and fertility related stress according to genders in the pilot-study.....	44
Table 7. Differences from reference populations in the pilot-study	46
Table 8. Hierarchical linear regression results for global fertility problems (FPI)	47
Table 9. Hierarchical linear regression results for social concerns (FPI1)	48
Table 10. Hierarchical linear regression results for relational concerns (FPI3).....	49
Table 11. Hierarchical linear regression results for need for parenthood (FPI5).....	50
Table 12: Rate of depression categories in the Hungarian infertile sample and in the general population.....	51
Table 13: Descriptive statistics in the total sample and in the three depression categories	52
Table 14: Female infertility-related concerns in comparison with their own and their partner's depression.....	54
Table 15: Male infertility-related concerns in comparison with their own and their partner's depression.....	55
Table 16: Female and male fertility specific quality of life correlated with their own and their partner's depression and duration of child wish.....	56
Table 17. Socio-demographic and medical characteristics of subjects with comparison between German and Hungarian groups.....	58

Table 18. Cross-country and gender differences in FertiQoL-, PAQ-scores	59
Table 19. Differences in FertiQoL- and PAQ-scores according to education with multivariate analysis of variance	60
Table 20. Correlations between FertiQoL and PAQ dimensions in the German and Hungarian groups	61

1. INTRODUCTION

Nowadays the greatest economic and social challenge for most of the developed countries is the decreasing trend of the population in line with the increasing numbers of the aging population. Effects of this trend dominate in many countries of Europe including Hungary. These kinds of problem impact on public health and economic development: labour market sources, health insurance system, educational and social systems [1].

Total fertility rate (TFR) in Hungary has been at a lowest-low stage (around 1.3) for some years [2, 3], although the number of desired children remained on a quite high level [4] (Figure 1). Realizing one's own family plans is strongly influenced by nurture supporting policies [3, 5], but also positive family policy can take only slowly a favourable effect on fertility [1].

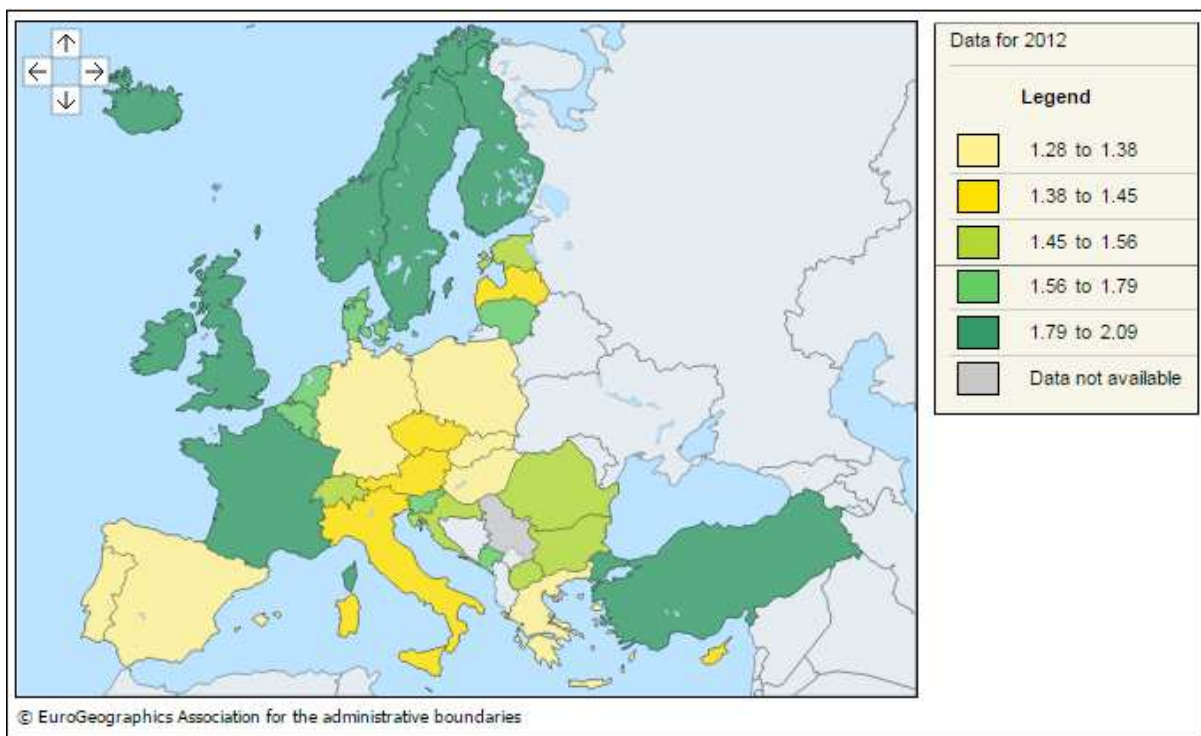


Figure 1: Total fertility rate. Number of children per woman in Europe

Source: Eurostat [6]

Total fertility rate represents the fertility of a given population by the number of children that a woman would have in her reproductive life span calculated from all age-specific fertility rates for women at reproductive age in a given year [7].

The age of mothers at the birth of their first child increased in the last decades in Hungary as well as in Europe (Figure 2). Considering the decline of female fertility after 25 years and an acceleration of decline after 35 years, the trend of delaying parenthood could result in birth of fewer babies than desired [3]. At the same time, postponed parenthood has several medical and social consequences and only a part of them are known and observed [8]. Both advantages and disadvantages of postponed parenthood are present in the fields of economy, society structure, family life and personal well-being.

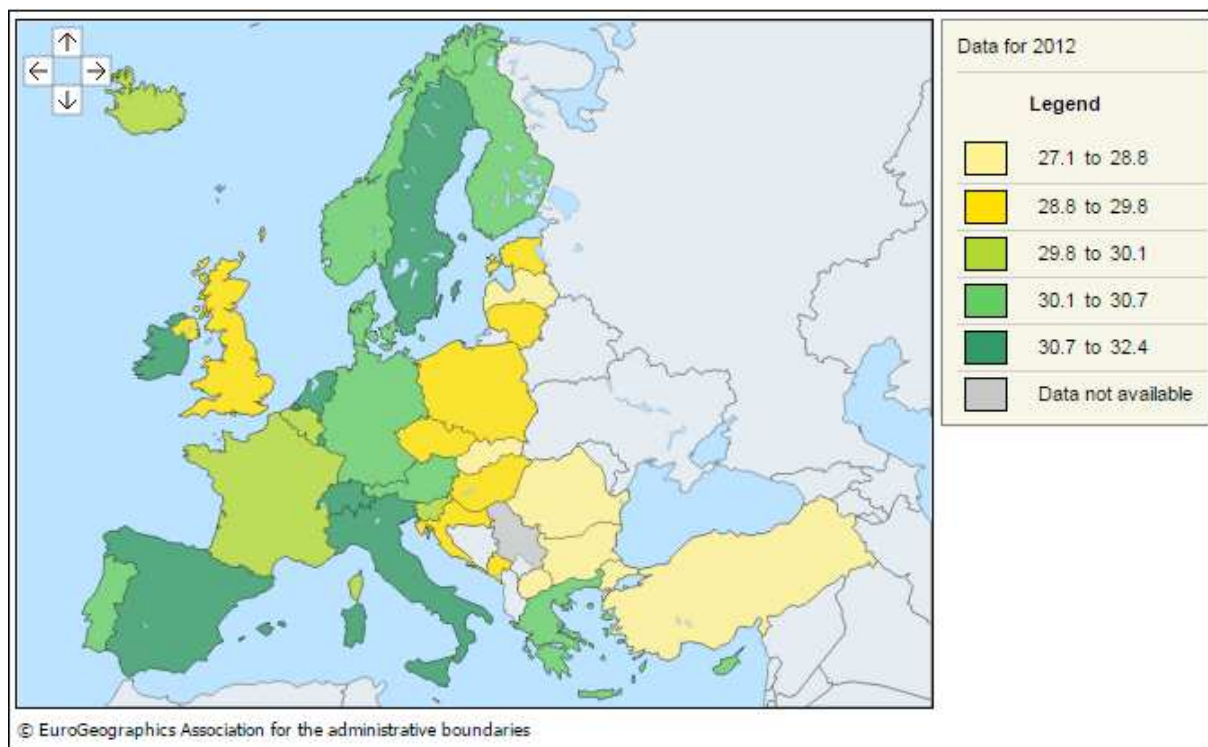


Figure 2. Mean age of women at first childbirth in Europe.

Source: Eurostat [9]

For the purpose of this thesis, the most important consequence of postponed parenthood is that couples with older age have a greater chance for remaining childless. In this process voluntary childlessness turns into involuntary childlessness. From this approach, fertility trends can contribute to the increasing numbers of diagnosed infertility cases and assisted reproductive treatments.

The topic of reproductive problems has nowadays a high of interest because – according to strict statistical estimates – approximately 10% of reproductive population has to face infertility in developed countries including Hungary [10].

Several scientific areas are involved with the topic of infertility to explore new knowledge about its causes, consequences, and treatment possibilities. These areas include first of all gynaecology, endocrinology, andrology, genetics, psychology, anthropology and ethics. In the context of population decline, psychosocial consequences of medically determined reproductive problems provide a special field for scientific inquiry and these psychosocial aspects are needed to be researched on the level of persons.

1.1. CLINICAL DEFINITION AND EPIDEMIOLOGY OF INFERTILITY

According to a clinical definition of the International Committee for Monitoring Assisted Reproductive Technology (ICMART) and the World Health Organisation (WHO), infertility is considered as “a disease of the reproductive system defined by the failure to achieve a clinical pregnancy after 12 months or more of regular unprotected sexual intercourse” (p. 2686) [11]. However, a proper definition of infertility is still missing in the literature. Newer and newer debates within the researchers try to find one or more specific definitions of subfertile and infertile conditions [12-15]. Authors agreed that there was a need to differentiate the wide range of infertility considering the severity of reduced fertility (slightly, moderately, seriously), the number of prior unsuccessful treatments and the age of partners. At the same time, infertility causes psychosocial strains for the couple, so an even more proper definition would contain the psychosocial aspects of involuntary childlessness, too [16].

Subfertility refers not only to the inability to become pregnant, but also to inability to maintain a pregnancy or to carry a pregnancy to a live birth [17]. There is a distinction between primary and secondary infertility. If a couple has never been able to conceive, it is defined as primary infertile, whereas the couple who has already conceived but currently has fertility problems, it is diagnosed as having secondary infertility. In a worldwide estimate, prevalence of infertility is approximately 9 % and life-time prevalence is rated about 16% in the developed countries [10]. This study defined involuntary childless couples using the clinical definition of infertility, while a demographic report – using the demographic definition of infertility which works with a two- or five-year period by determining infertility – calculated the rate of infertility 4-5% in Hungary [18]. Nevertheless, we can summarize that prevalence of temporary infertility is quite high but long-term involuntary childlessness – primary without medical treatment – is a rare occurrence [19].

1.2. ETIOLOGICAL FACTORS OF INFERTILITY

The organic causes of infertility affect both men and women. In 30-35% of the cases only a female cause is in the background of the infertility, and also in 30-35% of the cases only the man is infertile. In 20-25% of the cases, infertility is a combined problem [20]. Approximately in 10-15% of the cases, the causes of infertility can not be identified. However, the number of unexplained infertilities has been reduced by using new diagnostic technologies. Hungarian reports of fertility clinics show similar rates of causes in three consecutive years (Table 1).

Table 1. Causes of infertility in total cases in assisted reproductive care reported in years 2009, 2010, 2011 in Hungary

Causes	2009		2010		2011	
	Number of reported cases	%	Number of reported cases	%	Number of reported cases	%
Female	1998	29.8	1773	32.5	1445	31.8
Male	2310	34.5	1882	34.4	1621	35.6
Mixed	1545	23.0	1129	20.7	905	20.0
Unexplained	849	12.7	679	12.4	575	12.6
Total	6702	100.0	5463	100.0	4550	100.0

Source: Institute of Pharmacy Health Quality and Organisational Development (GYEMSZI) [21-23]

Primary causes of infertility in women are hormone problems, ovarian cysts, structural abnormalities in the fallopian tubes or in the womb which hinder the producing and releasing of mature eggs, the proper transport of the egg to the uterus or the proper implantation of the fertilized egg in the womb [20]. In men, fertility impairments consists of low number or/and improper motility or/and high rate of abnormally formed sperms. In some cases, there is not any measureable quantity of sperm in the semen.

The most common risk factors of infertility are life styles factors [24]. Delayed child bearing can increase the risk of reproductive impairments in women such as hormonal anomalies with anovulation (e.g. polycystic ovarian syndrome), and endometriosis and also in men, such as hormonal changes, genital inflammation or cancer. Smoking and abnormally low or high body weight reduce fertility, whereas caffeine and drinking prolong the time to pregnancy. Radiation, chemicals and other toxic environmental agents can adversely affect the reproductive system. Psychological stress, especially on the work place for women, can decrease the

reproductive success. Oncologic treatments by cancer survivals can reduce the fertility perseverance, as well. Sexually transmitted infections and disease increase the risk of damaging the reproductive tracks [25].

1.3. DIAGNOSTIC AND MEDICAL TREATMENTS OF INFERTILITY

A large proportion of couples with fertility problems seek medical care and receive a kind of assisted reproduction treatment (ART) [10]. Diagnostic and treatment processes in the reproductive medicine are stated by the Hungarian College of Obstetrics and Gynaecology [26] and are regulated by the Act of Health [27]. The first medical consultation always should consist of a general interview about the couple's medical and sexual history in order to explore e.g. improper sexual behaviours [20]. The evaluation of female's fertility involves analysis of hormone levels throughout the woman's cycle, of daily body temperature and of sperm antibodies which focus on abnormal hormonal functioning [25, 28]. A more invasive workup could include endometrial biopsy, hysterosalpingogram and laparoscopy for exploring structural abnormalities in the ovaries, the fallopian tubes, the uterus and the peritoneal cavity. For men, the most common diagnostic procedures are analysis of sperm count and motility and form hormonal-level assessments.

The most common assisted reproductive treatments are nowadays intracytoplasmic sperm injection (ICSI) and in vitro fertilization (IVF) [29]. In these procedures hormonally stimulated oocytes are fertilized with a concentration of sperm (IVF) or with one single sperm (ICSI) out of the female body in a laboratory procedure and embryos are transferred after a few days into the woman's uterus (embryo transfer, ET). Some times not every fertilized egg is placed to the uterus but they could be frozen and used in a later cycle (frozen embryo transfer cycle, FET). ART does not include intrauterine insemination (IUI) where concentrated sperm from the partner or donor is placed into the woman's womb close to the time of ovulation [11].

The current law in Hungary provides the patients having health insurance with diagnostic procedure, five times with IVF-cycle, six times with insemination treatment free of charge. Medications up to 70% are also supported by National Health Insurance Fund (OEP) [27, 30]. Overall, 12 centres contracted with OEP providing free of charge services are obligated to report for public access about their individual reimbursed work regarding fertility cycles [23, 31]. Table 2 reports the numbers of the assisted reproductive cycles and their costs for the

budget in year 2012: almost 6.5 thousands cycles were financed with more than 2 billions Hungarian Forint.

Table 2. Assisted reproduction treatment data registered by National Health Insurance Fund (OEP) in year 2012 in Hungary

Age groups	Number of patients	Number of cycles	Costs ¹
20-30 yrs	2164	2747	846
30-40 yrs	1926	2485	799
40-50 yrs	925	1248	398
Total	5015	6480	2043

Data were selected for homogenous patient groups 6530, 6540, 6550, 6560 including cycles of in vitro fertilization (IVF) and intracytoplasmic sperm injection (ICSI).

Data are provided by National Health Insurance Fund (OEP), permission for availability through Act 2012/LXIII about reusing of public data.

¹ Costs are given in million Hungarian Forint

Table 3. Success rate of total embryo transfers in assisted reproductive care reported in years 2009, 2010, 2011 in Hungary

Results	2009		2010		2011	
	Number of cycles	ET %	Number of cycles	ET %	Number of cycles	ET %
Total embryo transfers (ET)	5844	100.0	4987	100.0	4161	100.0
Clinical pregnancy	1990	34.0	1649	33.0	1462	35.2

Source: Institute of Pharmacy Health Quality and Organisational Development (GYEMSZI) [21-23]

Clinical pregnancy could be reached in 33-35.2 percentages of the successful embryo transfers (ET) (Table 3). At the same time, delivery rates per cycles of assisted fertilization outside the female's body (in vitro fertilization and intracytoplasmic sperm injection) were between 25,3 % and 29,9 % in Hungary in year 2008 according to an international report of European Society of Human Reproduction and Embryology (ESHRE) [32]. The estimated percentage of babies conceived through ART on national birth pointed to 0.96% [33]. Our estimate based on international and national registers resulting in 1.03% after [32, 34]. We have to notice that the national register [33] calculates only with cases of cycles supported by health insurance and the international report [32] includes data from both private financed and reimbursed cycles, but reported only by the half of the fertility clinics. Data collecting clinics offer an oral report about almost 50% of private financed cases which are not included in the

national register. Moreover, babies conceived with hormonal induction give 1.46% of the national birth [33]. In the estimate based on reproductive medical practice, percentage of babies conceived through assisted reproduction could be between 2 and 5% [35]. In 2010, rate of ART infants per national birth ranged in Europe between 0.6 and 5.9 [29]. This difference could be attributed to differences in methods and failures of data collection.

1.4. STATEMENT OF THE PROBLEM

Reproductive problems have a great of importance in Europe because population decline could lead to drastic demographic changes [2]. To help more babies to the world, the technology in reproductive medicine and assisted reproduction has been developed to a great extent. On the other hand, we have to be careful to see infertility not only as a medical condition but also as an experience of human beings and psychosocial support is an integral element of reproductive health care in many European countries [36]. However, there is no protocol in Hungary for providing psychosocial counselling for couples recouring to assisted reproduction technologies covered by health insurance. In this situation, a study investigating psychological responses of infertile couples has deep significance. The topic of this thesis is an investigation of psychosocial aspects of couples facing infertility. By planning the study, our aim was to investigate aspects from the health psychological approach – including couples' shared reactions and culturally determined importance of becoming a parent – in the field of gynaecological and reproductive health care.

Experiencing involuntary childlessness affects personal, relational and social levels as described in the literature of infertility [37, 38]. Because of our interdisciplinary point of view, the focus of the thesis was put on all the three levels. Our aim is to concentrate on personal psychological adjustment to infertility, couple-levelled psychological reactions and society-based or culturally impacts on experiencing infertility.

2. CONCEPTUAL FRAMEWORK

The conceptual frameworks in which we designed our studies are extended and specialized versions of **biopsychosocial theory** of somatic disorders [20, 25, 37]. The biopsychosocial model is originally a discipline which deals with the biological, psychological and social-cultural factors equally in the evolution of a somatic disease and at the same time it also considers that the consequences of the somatic diseases affect all biological, psychological and social fields [39].

Infertility specific conceptual frameworks offer a specified but broad perspective to explore and understand also psychosocial aspects of infertility. We know other models which take all the variables into account which could moderate the persons' reactions and the joint reactions of couples and put an accent on how personal and couple-level perceptions and answers interact within a couple relationship [38].

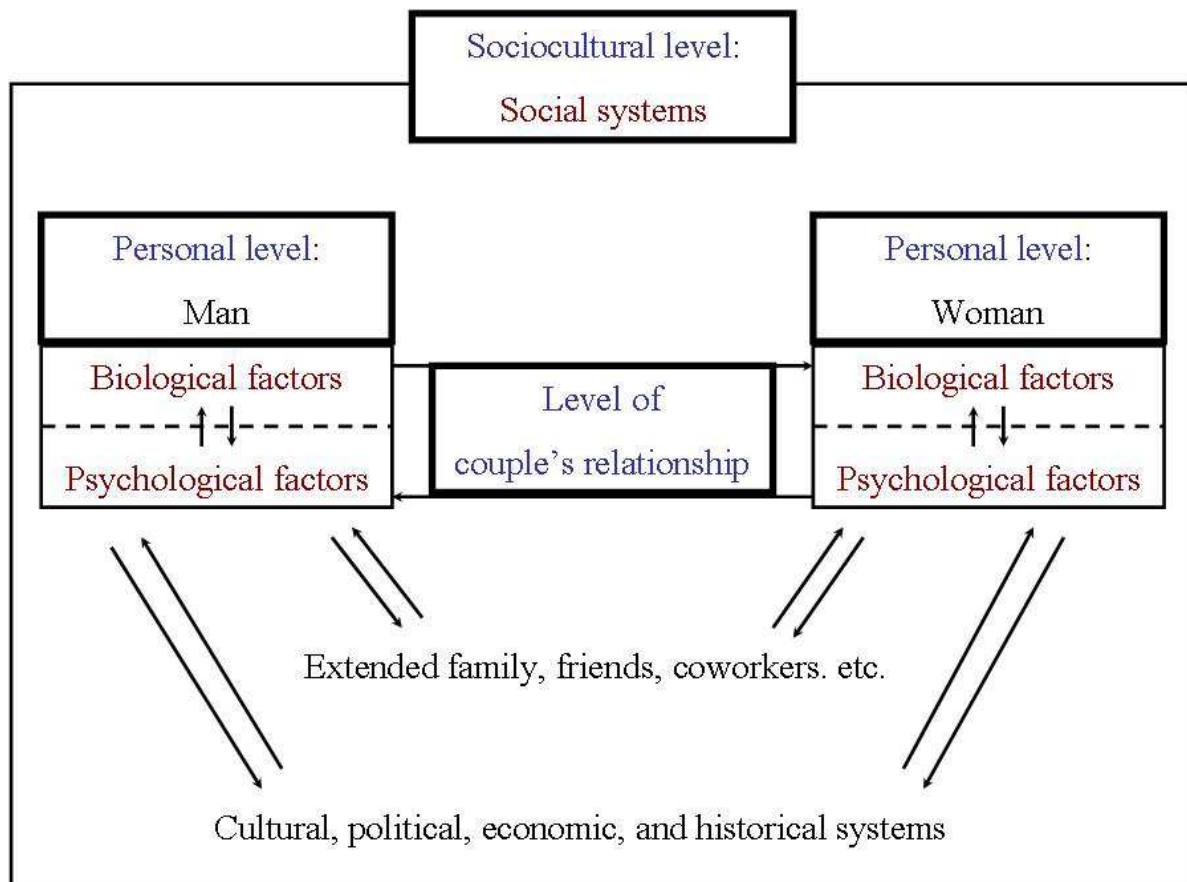


Figure 3. Biopsychosocial model for infertility

After Williams et al. [20]

In the past decades, social scientists such as psychologists, sociologists, anthropologists, behavioural scientists brought new evidences in the research of public health, medicine and nursing regarding infertility and assisted reproduction [40]. In biopsychosocial approach of infertility, biological, psychological and social aspects interact in a complex way addressing existential, physical, emotional and interactional levels in one's life [37]. We want to follow this integrated scientific guideline and accentuate the psychosocial adjustment to infertility on multiple levels. Figure 3 represents biological and psychological factors interacting within both infertile men and woman manifesting the personal level of the experience of infertility. Social aspects include three groups of influent factors: the couple relationship; social relations such as family, friends; and cultural-historical, political and economical systems which provide the sociocultural background for understanding infertility reactions. The level of couple's relationship is a specific field of the figure consisting of partners' diverse and mutual interactions and representing the couple as a united phenomenon in the brighter social system. In the following, we highlight some elements of the complex and diversified field of biopsychosocial approach which were relevant and used as background in our studies.

2.1. MEDICAL PERSPECTIVE

Infertility as described with the classic clinical definition refers to a medical condition with a specific length in time [11, 15]. Medical factors connected to infertility – such as type of the diagnosis, duration of the child wish, number of treatment cycles, the geographical and financial availability of different ART treatments and the communication with doctors and nurses working in the reproductive medicine – could be the basic elements in determining the experience of and adjustment to infertility [38]. Many organic causes can be found among etiological factors of infertility which relate mostly to structural or functional abnormalities in the reproductive system (described above). Diagnostics and treatments as physical stressors could raise some side effects, e.g. mood disorders in hormonal stimulating or anxiety of surgery or other invasive techniques [37]. As assisted reproductive treatments require a deep immersion of dealing with body-focused attention and controlled life styles it can add an extra psychological burden to the couple.

Women are generally more treatment-oriented but they experience the medical procedures very stressful, which are in their cases much more invasive, complicated, humbling and even more costly than reproductive techniques involving men. Stronger infertility-related psycho-

logical strains in women than in men could be seen plausible consequences of the fact that the majority of assisted reproductive tests and techniques involve only the female body [41, 42]. At the same time, Edelmann and Connolly [43] concluded that gender differences in psychological well-being of infertile men and women did not deviate from gender differences in psychological well-being in the general population and it was not confirmed that female infertility-specific distress increased in a greater extend during the treatment than male distress. Infertility treatments create psychological burden, anxiety also for men and influence many areas of their life, e.g. sexuality [44]. However, men may cope with unwanted childlessness and reproductive treatments in different ways than women do [45]. Carmeli and Birenbaum-Carmeli [46] investigated among the first researchers the position of the man in the assisted reproduction and uncovered that they felt having a marginalized role in the female-oriented treatments and they felt themselves also uncomfortable although the treatments involved them mainly not so directly than their partner. New evidence in research focuses on experiences of infertile men, especially in topics of male factor infertility and treatments using donor sperm [47].

2.2. PSYCHOSOCIAL PERSPECTIVE

2.2.1. Crisis theory

It was a great milestone in the history of the research of psychological factors in infertility when scientific inquiry established the infertility consequence model instead of the psychogenic infertility model. Emotional distress has begun to be researched as a consequence and not as a cause of infertility [48]. Infertility is considered as a major life span crisis because becoming parent is generally evaluated as a desirable social role and an important stage of personality development [25, 28, 49]. Transition to parenthood includes several other socially determined meanings and as adult social status, normality, sexual adequacy, matching the gender role expectations, ensuring the continuity of the family line and the survival of the species [25, 28]. In this sense, infertility, manifesting in the postponement or the lack of the predictable developmental event was called as a non-event transition by Koropatnick et al [50]. Infertility as a life crisis indicates a grief process with the loss of expectations of the future, the loss of potential children, the loss of pregnancy, miscarriage and failed IVF-cycles, the loss of control over one's own body, the loss of self-esteem and security [20, 48]. For many couples, facing infertility is one of the hardest life crises affecting physical and

emotional well-being of the person, marital and sexual satisfaction and quality of other social relations and cultural systems [41, 44, 51-54]. Gerrity [37] summarizes that infertility can be evaluated both as an acute life crisis and as a non-event with long-term complications on several life domains.

2.2.2. Psychological adjustment to infertility

Psychological adjustment is a widely used term for the patients' healthy rebalancing to their new circumstances shaped by a prolonged or long-term physical disorder or disease [55]. Psychological adjustment consists of physiological, emotional, cognitive and behavioural aspects so it means an adaptation in multiple life domains, over the time and over individuals as they show heterogeneity in how to adjust [56]. One of the best fitting and authoritative model used for psychological adjustment to infertility is the stress and coping model [37, 55]. This model presumes that individuals appraise primary with cognitive efforts a situation potential for harm or benefit; while in the secondary appraisal one assesses the situation's controllability and one's own available resources for coping with the situation [57]. Problem-focused copings such as problem-solving or positive reappraisal involve direct actions for changing or resolving a situation. Emotion-focused copings such as denial or avoidance refer to change the feelings or thought regarding the stressor, especially used in situations when the source of the stress is out of one's own control. At the same time, research on disease-related coping has been broadened involving perceived threat of the disease to life goals, disease-specific expectations and finding meaning in the illness experience [56]. In the case of infertility, adjustment of both partners is required because it involves both members of the couple. Coping styles could be moderators of stress in dealing with infertility if they act as the provider of good adjustment depending on gender differences and on the reactions of the partner [58, 59]. Another moderator of stress is the perceived social support. The greatest support is provided by the partner but supporting family members and friends could be other sources in adjusting to infertility [52, 60, 61].

Adaptation to infertility is resulted in a wide range from experiencing distress, negative feelings to a successful adjustment that strengthens one's self-esteem, psychological flexibility and social boundaries. The experience of (chronic) **distress** is a result of the above mentioned cognitive appraisals if the person is persistently judging the event as threatening many important domains of his/her life and if the person does not find his/her coping resources sufficient for the adaptation [62]. At the same time, **quality of life** refers to one's perceived position in

life in the culture and value system he/she lives in and related to his/her “goals, expectations, standards and concerns” (p. 1403.) [63]. Furthermore, quality of life contains physical (e.g. pain triggered by the disease; treatments), psychological (e.g. emotional, cognitive reactions), interpersonal (e.g. social support), cultural (e.g. norms regarding individualism, independence), spiritual (e.g. finding hope, believe in transcendence), financial (e.g. having a job), temporal and philosophical dimensions of life [64, 65]. Constructs of quality of life and health-related quality of life overlap each other, but they are not synonyms, and health-related quality of life presents a more specific relation to one’s actual state of health. Health-related quality of life assigned “to to the duration of the life in function of the perception of physic, psychological and social limitations and the decrease of opportunities due to the disease, its sequels, the treatment and/or the health policies” ([64], p. 419). Infertility-related quality of life - as other disease- or state-specific quality of life - involves improved psychosocial outcomes in adjustment to involuntary childlessness instead of the negative psychological reactions [66]. Fertility-specific quality of life consists of one’s emotional and mind-body reactions, relational development and social support provided mainly by the family and friends.

2.2.3. Psychological outcomes of infertility on the personal level

Although a huge body of literature describes the complex relationship of mood disorders and fertility, further research is needed to investigate how mood disorders influence the development of infertility and which mood problems show up during infertility [67]. Our overview focuses mainly on the emotional reactions to infertility. Couples facing infertility may experience a range of negative feelings as shock, anger, denial, guilt, grief and isolation [28, 48]. Denial is a common reaction to sudden changes and saves one from the overwhelming situation in a short-time range. Anger is often experienced with the loss of control over the function of one’s own body, especially during medical treatments [20]. Infertile individuals may feel anger against family and friends expressing social pressure towards becoming a parent and other persons who have children, mistreat their children or undergo abortion or even jealousy of other women who conceive and get a baby [48]. Perceived stigmatization is also common in men and women dealing with fertility problems and predicts less perceived social support [68]. Infertility can lead to isolation resulting in not disclosing the secret of involuntary childlessness (typical for men [68]) or avoiding frustrating meetings with parents and child-centred family holidays [48, 69, 70]. Self-blame is also a common reaction to infertility offering an “easily available” cause for infertility. Changes of hope and disappointment dur-

ing each cycle is called as “emotional roller-coaster” [25] indicating feelings of anxiety before ovulation, hopefulness around the time of ovulation, and depression after failure to conceive or miscarriage.

Unwanted childlessness is a paranormative crisis [50] evoking more depressive and anxious symptoms than can be measured in parents [45, 67, 71-79]. More depression and anxiety is especially true in childless women compared with mothers.[76-80]. On the other hand, more depressive symptoms are not always proven in the infertile population [43, 81, 82] or even less depression can be detected in an infertile cohort than in the matched population [83, 84]. Level of depression in infertility is below the clinical cut-off [85]. One part of the relevant studies put the prevalence of moderately severe and severe depression in an infertile population on 5-15% [52, 74, 86, 87], whereas several other studies agreed in a value around 30% [67, 72, 88, 89]. Differences depend on the different measurements. Depression is diagnosed in women with a higher risk within 3 years before or after the assisted reproductive treatment which underpins that great burdens can be experienced during infertility [83].

Depressive symptoms are strongly bounded with infertility specific distress [62, 68, 90, 91]. Fertility-related concerns, especially social concerns, have a negative correlation with self-esteem [92] and resilience [93, 94], and correlate positively with self-compassion and self-judgement [95]. It is also proven that not only women but also men with unfulfilled child wish are rather at risk of being under psychological distress than parents [80, 96]. A systematic review [97] pointed to psychosocial protectors against infertility-related distress which were optimism as a personality trait, problem-focused coping style, positive marital/family function, social support, situation appraisal involving acceptance and secure attachment. Neuroticism as a personality trait, self-criticism, vulnerability to depression, use of avoidance or escaping coping strategies, situation appraisals involving helplessness and marital dissatisfaction were identified as risk factors for distress connected to infertility.

2.2.4. Gender differences in reactions to infertility

Gender – considered as cultural sex – concerns roles, norms and values mainly constructed and influenced by the culture and the society. Whereas biological sex made a constant and determined distinguish between men and women, gender can be seen as a social construct which refers psychological, social and cultural differences of female and male characteristics and which – because of their cultural roots – could change over time and through interpersonal interactions [98]. The definition of gender reflects femininity and masculinity, which

are basic senses of female and male gender identity, respectively. Though, the terms of feminine and masculine are not only associated with characteristics of one sex, but also with attributes and behaviours of both sexes; masculine and feminine patterns and representations are activated in specific interpersonal situations [99],

Investigations of gender differences in medical sciences and health psychology cover differences in mortality and morbidity, health-protective and health-risking behaviours, psychological reactions and coping styles regarding the continuum of health and disease.

Most of the qualitative and quantitative psychological studies in reproductive medicine focus on gender differences by considering emotional reactions to infertility. Main results summarize that women show an expanded emotional sensitivity while facing their infertility and express more depressive, anxious and negative feelings about their status than men [45, 59, 61, 77, 85, 100-103]. Moreover, women have less self-esteem and are not so satisfied with their lives than men [71]. Gender differences in psychological responses are typical at the beginning of infertility and infertility treatments [43].

Generally, infertile women report lower levels of quality of life [53] and women score lower in fertility specific emotional and cognitive-physical domains than men [101]. Infertility-related distress is also experienced more often by women than men [58, 71] and infertile men express more rarely fertility problem concerns connected to life satisfaction, sexuality, self-esteem, self-blame and avoidance of friends [104]. Wives in the infertile couple tend to experience involuntary childlessness with a greater impact than other life stressors, and men, however, react to infertility in a similar way like to other problems of their life [105].

Similarly to the reactions and adjustment to infertility, the use of coping strategies is different in some degree in women and men, although the meta-analysis of Jordan and Revenson [45] underlined that differences between coping styles were not categorically dependent on gender. Women facing infertility tended to choose for coping strategies regarding the avoidance or escaping from the situation, positive reappraisal and seeking social support. Another study [58] found even confronting coping and taking responsibility more typical in women, whereas men use more often distancing, self-controlling and planful problem solving.

As infertility seems to be a basically different experience for males and females, psychosocial investigations and support regarding infertility should be based on this difference, as well [71].

The perspective approach from personal aspects to sociocultural influences is the base of reviewing the relevant scientific literature and building up our thesis structure. In the following, we summarize studies regarding partnership and social influences which fit into the biopsychosocial framework.

2.2.5. Psychological outcomes of infertility on the partner level

General considerations about marital satisfaction, attachment and sexuality

Relationship quality in maintaining couple relationships has been always a considerable interest of research [106]. Romantic relationships are based on a combination of three innate behavioural systems: attachment, care giving and sex [107]. Relational stability is provided by joint commitment and investigations of the wife and the husband [108]. Couple's engagement in shared activities depends on their own openness to novelty and exploring jointly new experiences [109]. Marital interactions are influenced furthermore by cognitive appraisal, shared emotions, physiological responses, behavioural patterns, support perceived from the partner, personality and attachment style of the individuals, microcontextual (e.g. children, life stressors) and macrocontextual aspects (e.g. the culture the couple lives in) [106].

Attachment theories of infants conceptualized by Bowlby and Ainsworth was applied in romantic relationship studies dealing with three attachment styles or attachment-related strategies, namely secure style/secure-based strategy (appraising events less threatening, holding optimistic expectations about coping with stressful situation, acknowledging and displaying emotions, secure relation to the partner etc.), anxious style/hyperactivating strategy (attaining proximity to the attachment figure, ensuring the other's attention of support, fear of possible distancing and rejection etc.) and avoidant/deactivating strategy (maximizing distance from the partner, avoiding closeness because of its demanding and discomfort for them etc.) [109, 110]. Research has found that gratifying and stable relationships are maintaining more often by securely attached persons who tend to report about more marital satisfaction and adjustment. Attachment security involves constructive dyadic communication on both verbal and non-verbal levels and positive reciprocity showing respect, admiration and gratitude to the romantic partner. On the other hand, avoidant attachment activates unforgiveness and less perceived gratitude from the partner. Insecure attachment can evoke disturbance during sexual activities when avoidant individuals remain emotionally detached during sex or anxious persons engage in sex primarily to placate a partner, feel accepted, and avoid abandonment. Ad-

ditionally, relational tensions related to fidelity, betrayal, and jealousy also often ruin sexual satisfaction.

Sexuality is a core component of couple relationships. Sexual satisfaction is affected by individual characteristics (e.g. physical and mental health, incorporated gender and sexual roles, sociodemographic determinants), relationship-related aspects (e.g. marital satisfaction and adjustment, attachment, commitment to the partnership, love, sexual functioning), familial and other social aspects (e.g. family relationship, parenthood, family- and work-related distress) and cultural factors (e.g. religion, beliefs) [111].

A huge body of literature documents how specific life stressors and transitions throughout the life time affect the marital functioning. Marriages tend to show surprising resilience with specific marital processes during stressful life events so extremely emotional-loaded events (disease of one spouse, death of a child) can be experienced as a joint loss but also a source of sustaining strong marriages [106]. Family resilience model is one of the models developed for researchers and clinicians to understand e.g. spouse reactions within family processes empowering families going through prolonged adversities [112]. Key processes for family resilience are identified as family belief systems, organizational patterns, communication and problem-solving. This framework offers the interpretation of acute crisis or permanent stressful changing conditions as family challenges instead of family deficits.

Experiencing involuntary childlessness can lead to fertility specific negative emotions, different types of cognitions and behaviours, which influence not only personal but also couple relational and other social areas of one's life [41, 44, 51-53]. Infertility itself is a joint crisis for the couple and can be analyzed as a couple-level stressor but it does not consequently mean that infertile couples have a worse marital relationship than couples without fertility problems. Results of different studies about marital satisfaction in involuntary childless couples are inconsistent. Infertility as a joint experience can strengthen the relationship, but on the other hand, the failure in fulfilling child wish, gender roles, and burdens of the reproductive interventions can generate conflicts and communication problems between the members of the couple [45, 53, 77, 80, 113].

Sexuality is strongly interconnected to fertility and fertility problems. Sexuality may lose its role as a joint pleasure because its primary purpose becomes the "baby-making". Consequently, it ruins sexual intimacy with decreasing the numbers of the intercourses, the spontaneity and joy [69, 76, 80] however partners desire more intimacy [76, 77]. On the other hand, research on sexual satisfaction found only marginal differences between fertile and infertile

couples [71]. Sexual disorders resulting from diagnosis and infertility treatments are quite frequent manifesting in impairments in the arousal phase in women and premature ejaculation in men [44].

As first reactions to infertility-related stress, men show more distancing and denial against infertility and often withdraw from their partner [70]. Men using active-confronting coping (emotion expression, seek advice) and meaning-based coping feel higher benefit on marital relationship, whereas keeping infertility in secret, difficult marital communication and using active-avoidance coping resulted in lower marital satisfaction for them [114]. Men also tend to notice their partner's reactions to infertility rather than their own [70], and worry about the emotional pain of their wives [61, 69], and tend to imagine their partner more depressive than wives assess themselves [77]. Infertile men often don't consider their own emotional needs in order to be able to provide more support for their spouse, but this behaviour should not be interpret as if men don't experience distress and don't need empathy [115]. On the other hand, perceived support from the male partner leads directly to less relational and sexual infertility-related concerns and indirectly to less social concerns and reframing of the childfree lifestyle in women [116].

Communication between partners is essential in decreasing depression and infertility-related stress [117, 118]. Without effective marital communication and interactions, unfulfilled child wish may indicate application of negative coping styles on the personal level and lead to maladaptive interactions on the relational level [119]. Ridenour et al [38] described three crucial component of positive communication providing better marital functioning for infertile couples: open emotional sharing, marital evaluation and shared decision-making. Open emotional sharing ensures that the partners provide emotional support and understanding for each other [37, 120]. In marital evaluation, individual perceptions become congruent and unified couple perceptions are formed. Shared decision-making provides collaboration and shared responsibility in decisions regarding infertility topics [38].

Previous researches were interested rather only in infertile women's personality and psychosocial characteristics and their reactions to infertility. Recent studies have investigated psychosocial aspects also of men and rather of both members of the infertile couple to get a broader perspective of the quality of facing involuntary childlessness [59, 85, 121]. In the recent years, several studies were conducted in order to investigate experiences of infertile couples as a unit and how personal reactions influence the partner's reactions [59, 85, 103, 117, 122, 123]. This methodological setting is very important, because unwanted childless-

ness is a joint problem of the couple, so when child wish as a joint goal is unfulfilled, it concerns both members of the couple directly and the personal psychological responses to the crisis affect the partner's reactions to the fertility problems, too.

Depression has a strong relation to marital dissatisfaction and the lack of perceived social support, pre- and post-IVF-treatments, as well [79, 124]. At the same time, depressive symptoms have not only an effect on the psychical functions of the person but also on the psychological adjustment of the partner. Peterson et al [125] found that female depression could influence male infertility-related stress reaction, but male depression and female distress remained independent. Partner and family support perceived by the infertile woman can also decrease the infertility specific distress in the male partner [60]. At the same time, Pasch et al [113] found that men feel more negative emotions in the marital communication if their wives wanted to talk with them about infertility, in turn men's involvement in fertility issues resulted in their own positive emotions in the marital communication and their partners positive appraisal of the marital relationship. Female marital satisfaction is higher when both partners are using task-orientated coping to alter the infertility status and the husband show less emotional-focused coping [126]. Furthermore, the high emotion-oriented coping by both partners are related to more male psychological distress. The usage of active-avoidance by both women and men is associated with lower personal, marital and social stress in the partner [59]. Male marital stress is related positively to female active-confronting coping, and negatively to female meaning based coping. At the same time, using meaning based coping by the man relates to increased social distress in woman.

Quality of life factors of the partners are similar when men report higher and women lower level of depression [85]; if depression is increased, own and partner's quality of life is similarly appraised [121]. Congruent perception within the couples requires interdependence of individual and mutual perceptions and empathetic reciprocity [38]. The latter is based on two-sided interactions compelling the partner to shift from a self-centred perspective to a more altruistic perspective to be able to understand themselves, their partner and their relationship in a better way [127].

2.2.6. Effects of gender role attitudes in experiencing infertility

Masculine and feminine traits and attitudes are mainly associated with the stereotyped gender roles, but this distinction bases on social and cultural determination, thus feminine and masculine attributes are not essentially assigned to female and males, respectively, but both can be

attributed equally to women and men and contribute to self-concepts of both genders (as described above, section 2.2.4. Gender differences) [128]. Gender role studies boomed in second half of the 20th century: theories of Bem [129] and Spence and colleagues [130] have become some of the most popular and most utilized concepts regarding gender-role-related self-esteem, attitudes, and gender-schematic processing. Their measurements, the BSRI (Bem Sex Role Inventory) and the PAQ (Personal Attribute Questionnaire), tend to be valid and reliable instruments of gender-role attitudes in the last decades [131]. As genders show even less differences on the masculine and feminine scales over time, it is recommended to refer instrumental and expressive attitudes as more congruent terms of the constructs what these instruments measure than masculine and feminine attitudes [132]. Instrumentality conveys assertiveness, individual dependence and action, whereas expressivity refers to expression of emotions, interpersonal communication and awareness of other's feelings. In the psychological literature, terms of agency and communion provide also a broad utility: agency describes one's existence as an individual stressing the self and separation, whereas communion reflects the participation of one individual in a larger system underlying the connection to others [133, 134].

Hofstede [135] conceptualized a cultural model to identify societies on four cultural-based dimensions. One of them distinguished societies into two groups: masculine and feminine ones. Societies are defined as masculine where individuals are encouraged to act in traditional gender roles, in other words men are supposed to be assertive, tough, and focused on material success, whereas women are supposed to be more modest, tender, and concerned with the quality of life. In femininity-dominant societies, gender roles overlap and both genders are supposed to be modest, tender, and concerned with the quality of life.

An interesting evidence regarding the Masculine-Feminine dimension of the Hofstede-system is that masculine societies show on a national level more gender role related stress than feminine societies [136]. However, self-reported instrumentality (independent of the societal classification by Hofstede) is associated with less gender role stress and better psychological adjustment [136, 137].

Many studies emphasize marked gender differences in psychological response to involuntary childlessness although gender role identification could be a better predictor for infertility related strains than could only gender [138, 139]. A critical study [43] also pointed out that women's more adverse reaction to infertility was based on that unwanted childlessness had a

different meaning for men and women, mobilized different coping strategies in them and women expressed their feelings more readily to strangers than men.

Infertility can reduce of partners' self-perception of femininity or masculinity and raise doubt in their gender roles [37]. At the same time, femininity and masculinity can not be conceptualized as bipolar ends of a gender-differentiating continuum [129]. Although, traditionally feminine attitudes are considered as female characteristics and traditionally masculine attitudes as male traits, both women and men can develop a multifactorial construct of feminine and masculine aspects in their self-concepts, attributes and behaviours [99].

Berg et al. [138] indicated that masculinity correlated with emotional stability and marital satisfaction. Furthermore, infertile women with more masculine attitudes are less anxious than women with a feminine sex-role type [140]. When gender roles are realized in a more traditional way, it causes more distress for a woman, but not for a man. Positively and negatively valued instrumental (masculine) attributes in infertile women were described as predictors of lower and higher distress in another study [139]. However, gender role orientation did not predict cognitive appraisals of infertility as stressful and infertility-related distress was neither impacted by femininity. The role of feminine attitudes may not be neglected as other authors emphasized their effect on stress level regarding involuntary childlessness, and women in an infertile group have more feminine attributes than women in the general population [133-135].

Additionally, gender differences were salient generally in other health-related issues, but especially femininity, masculinity, and the importance of traditional gender roles were observed in the last decades. Dissatisfaction with gender roles and life in general and feeling their role burdening are associated to poor health regarding women and men as well [141]. Other studies summarize that strong adherence to traditional gender roles or failing to fulfil traditional gender roles may cause mental health problems [142, 143].

2.2.7. Childbearing intentions and gender-role orientations – a cultural approach

Research of parenthood intentions is not systematically structured. Relating studies addressed the meaning of parenthood to the person and the role of parenthood in the adult development [144]. Transition to parenthood is a great milestone in the personal psychological development. Whether someone intends to become a parent is influenced by many pros and contras, expected costs and benefits, although fertility intention choices are not made after a relational evaluation of advantages and disadvantages [145]. On the one hand, childbearing motivations

involve personal and social intentions and evoke, on the other hand, personal and social restraints [146]. The most common personal motive for having a child is happiness [147, 148]. Nevertheless, personal positive motivations include enhanced well-being and identity, experiencing love, becoming a parent, partner attachment and other powerful emotional benefits, e.g. fun, stimulation, feeling of pride [144, 147, 148]. Potential financial disadvantages (e.g. prenatal health care, delivery costs, clothing, housing, food, education), social handicaps, restriction on freedom and flexibility, concerns about how to care a child and about the child's health as negative motivations can contribute to postpone parenthood or even restrain to have child(ren) [144, 146, 147]. Worries about financial restraints result in the trend that individuals first want to create fundamental basic conditions for living with children and only later decide to have them [146].

Some studies embarked to identify which aspects could take an effect on the intensity of childbearing intentions. Younger persons were found to view parenthood as a greater personal value and to express stronger motives than their older counterparts [144, 145]. Nevertheless, more common than different motives were identified between age groups, cause of postponed parenthood (subfertility) tend to be an important factor for the motivations and older women and men showed more instrumental benefits upon having children than emotional-related motives. However, fertility intentions and embracing a professional career are seen to be interfering, women with high academic degree do not plan fewer children than less educated women in Europe [149]. Differences were revealed between women from different cultures: in an individual society, parenthood emerges as a personal development, while its social significance and the enhanced status as adults were pronounced in a collective society [147]. With cultural changes in the Western countries, childbearing has become an option rather than the only way of fulfilling life [144].

Another psychosocial focus of infertility research is how male and female roles, parenthood motives and fulfilling parental desires connect. Many studies identify biological motherhood as a core embodiment of femininity and report that the absence of biological offspring indicates a failure in fulfilling feminine gender role, and can result in higher depression and frustration for women [150-153]. In a study investigating parental motives, women at their twenties have typically a kind of naïve and idealized picture of gender roles and traditional values of experiencing love [144]. Social pressure to have a child affects women stronger and more directly than men. Failure to meet these expectations leads to use maladaptive copings during infertility treatment as well [154, 155]: more than a half of infertile women surveyed in four

European countries feel themselves “inadequate as a woman” [156]. At the same time, fatherhood plays today emotionally a more important role in a man’s life than earlier [150, 157] and the stereotypical point of view that parenthood is not such a central issue for men than for women has to be reconsidered [158]. A former study [159] indicated that femininity correlated with positive expectations of the parenting role, its salience and parental intentions for both men and women. Men also report about feelings that male infertility affects their masculine identity negatively and threatens their virility [157, 160]. Some authors concluded that a strong pronatalist familial and cultural background increased also the level of suffering in men, particularly when a male factor was diagnosed [47, 161]. In contrary, in a follow-up study, the statement that male factor infertility reduces masculinity seems to be inaccurate [158].

Desire for a child and consequences of failure to conceive are culturally and socially contingent: the stronger gender roles are internalized, the stronger individuals with infertility problems feel themselves as defected [43, 45, 57, 153].

2.2.8. Hungarian scientific works on psychosocial aspects of infertility

In Hungary, population-based sociological studies focus mainly on gender role attitudes, fertility intentions, the phenomenon of postponing parenthood and the background factors of discrepancy of strong child wish and low fertility [18, 162-164].

Similarly as in the international scientific mainstream in the 20th century, psychological causes of infertility, mainly in couples with unexplained infertility remained in the centre of scientific inquiry for a long time and only results of case reports were published [165-167]. A summary of infertility, IVF and ET with biopsychosocial approach has been already published for 20 years.

However, previous investigations on infertility-related psychosocial consequences have not been conducted in Hungary. Our study is among the new projects which want to investigate the importance of more psychosocial factors in experiencing infertility. It is remarkable that parallel in time with our investigations, more studies were conducted with Hungarian samples of infertile women with regard to infertility-related psychosocial consequences [16, 75]. In contrast with the psychological outcomes of infertile, the rate of infertile couples is estimated as high as in other European countries and many Hungarian people seek help at fertility centres [14, 23, 35], and reproductive professionals reported about increasing and untreated psychosocial consequences affecting their patients [168, 169]. Consequently there is an urgent

need for establishing a mutual professional forum and defining a protocol of psychosocial counselling in infertility.

2.3. AIMS OF THE THESIS

- (1) Our aim is to conduct an investigation on psychosocial aspects in experiencing infertility because this scientific research area has been neglected in Hungary so far. In order to investigate better the Hungarians' psychosocial characteristics and reactions may have been influenced by special cultural factors, international comparisons are used as well.
- (2) We want to get a general and widespread view of psychological factors of Hungarian infertile individuals. In our studies, we concentrated on the psychological consequences of involuntary childlessness like infertility-specific stress and infertility specific quality of life. We examine the couples together to be able to measure their shared reactions. Among the psychological factors, we take an accent on the gender-role attitudes which are culturally associated to parenting and affect reactions to unwanted childlessness.

The thesis is based on a Hungarian pilot-study (study I.) and a couple-level analysis of Hungarian participants (study II.) nested in an international comparison study (study III.) (Table 4). In this sense, we address *specific aims* to each study:

Table 4. Short description of the studies the thesis based on

Study	Aim	Study population	Independent variable(s)	Dependent variable(s)
Study I: Exploratory analysis with psychosocial aspects in Hungarian infertile men and women (pilot study)	To explore associations between several psychosocial aspects of infertility in a Hungarian sample	University-based fertility clinic patients in Hungary N=53 (27 women, 26 men)	Gender role aspects Child wish motives Subjective well-being Marital adjustment	Social concerns Relational concerns Need for parenthood Total concerns
Study II: Depression and psychosocial consequences of infertility on the level of couples (Hungarian couple-level study)	To investigate if infertility-related is associated with severity of depression of the person and of the partner	Fertility clinic patients and their partners in Hungary N=126 couples	One's own and partner's Depression	One's own and partner's Sexual concerns Relational concerns Rejection of childfree lifestyle Need for parenthood
	To detect the correlation between fertility specific quality of life and depression in the persons and in the couples		One's own and partner's Depression	One's own and partner's Emotional QoL Mind/Body QoL Relational QoL Social QoL
Study III: Fertility specific quality of life in international setting (international comparison study)	To compare infertility specific quality of life between a German and a Hungarian infertile population	Fertility clinic patients and partners in Germany and Hungary N=270 couples (126 Hungarian, 144 German couples)	Instrumentality Expressivity	Emotional QoL Mind/Body QoL Relational QoL Social QoL

2.3.1. *Specific aims of the study I “Exploratory analysis with psychosocial aspects in Hungarian infertile men and women”*

- (1) We want to see if Hungarian infertile people show the same characteristics, reactions in gender and reference group comparisons as their fellows in other Western countries do. (e.g. Levels of depression, infertility-related stress are higher in women than in men).
- (2) We want to investigate biopsychosocial relationships on the basis of experiencing infertility. Our conceptual framework would investigate a general consequence-pattern of infertility. In order to explore whether factors have an effect on the experience and frustration of involuntary childlessness, we constructed four levels to the framework (Figure 4).

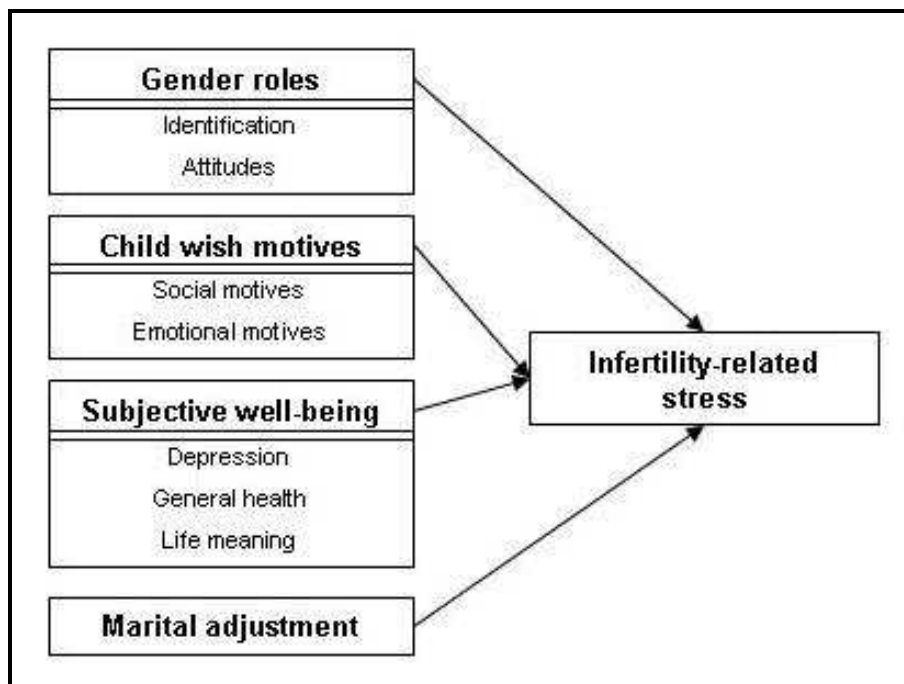


Figure 4. The conceptual framework that represents four levels with factors affecting infertility-related stress

On the first level, gender roles as socially determined factors are represented because the failure in transition to parenthood could have a strong connection to these roles. Not only belonging to a gender category, but also gender identification and attitudes about gender roles can predict the experience and emotional burdens of infertility

[138]. We put to the second level the child wish motives containing both social and personal aspects developed and shaped by socialization and having a source from one's own characteristics. The third level of the framework contains the subjective well-being factors, as depression, general/mental health, and life meaning, to get a view of one's general psychical status through testing negative and positive coping styles. On the fourth level, marital adjustment can be found because infertility can be considered also as a couple-level stressor [45]. According to our conceptions, factors from all the four level can influence the intensity of infertility-related stress.

2.3.2. Specific aims of the study II “Depression and psychosocial consequences of infertility on the level of couples”

In our pilot study (study I), we found an association only between depression and the relational concerns of infertility (s. 4. RESULTS: 4.1.4. Predictors of fertility problems). So we wanted to revise these findings because a huge body of literature revealed a strong correlation between mood changes and infertility burdens [62, 68, 85, 90, 91, 97, 125, 170]. Our aim was to carry out a more detailed analysis not only between depression and infertility-related stress but also between depression and fertility specific quality of life in the Hungarian infertile population.

- (1) We aimed to detect (a) the prevalence of depressive symptomatology and severe depression in a Hungarian infertile population. We investigate (b) if infertility specific stress is associated with the severity of depression so that a person with severe depression experience also more concerns connected to infertility and (c) if infertility specific stress is related to the partner's depression level, so that the person report about more fertility problems if the partner has severe depression.
- (2) The other aim is to investigate a relation between depression and fertility specific quality of life (a) at the level of the person and also (b) at the level of partners.

2.3.3. Specific aims of the study III. “Fertility specific quality of life in international setting”

The pilot-study has proven the recent observations that two determinants namely gender-role attitudes and quality of life are enhanced as personal issues regarding infertility. The impact of couple relationship and culturally determined need for parenthood were significantly salient as well. (s. 4. RESULTS: 4.1.4. Predictors of fertility problems)

On the base of hypothetic influences of culturally determined issues like childbearing intentions, we planned an international comparison study. We realized the limitations of the pilot-study (study I), so we had to revise the methodology of the study. Principally, we aimed to plan a focused international comparison study with strictly selected questions based on the results of the pilot study.

In the study III, we compare some infertility-related conditions of Hungary and Germany. Analyses based on Generations and Gender Survey emphasize differences in attitudes towards social aspects like parenting intentions and gender role orientations [162, 171, 172]: Hungarians put a higher value on traditional conceptions, e. g. in regard with gender roles while women and men in Western regions of Germany share both traditional and egalitarian values. Other studies summarize that individuals from a European but very traditional sociocultural context are more affected by infertility related emotional strains than those from a less traditional culture [173, 174].

This study investigates the unique domains of infertility-related quality of life (QoL) and its relations to gender role attitudes in Germany and Hungary. The aim of the study is twofold.

- (1) We want to describe differences in sociodemographic variables, infertility specific quality of life and gender role attitudes in German and Hungarian infertile samples of couples. We hypothesize that strains of infertility are experienced in different ways in these two countries. We expect that Hungarian couples suffer from involuntary childlessness in a greater extent, and have worse quality of life than do German couples. At the same time, we suppose that Hungarian individuals follow a more traditional gender role model than Germans, so that traditional femininity is of greater value for Hungarian women and traditional masculinity for Hungarian men than for their German fellows.
- (2) We want to examine the differences concerning infertility-related quality of life among persons with different gender role attitudes. As gender roles and reproduction are strongly linked, it is expected that experiencing infertility is influenced by how individuals think about and incorporate gender role attitudes. In this sense, we hypothesize that expression of emotions (traditional femininity) decreases the infertility-related quality of life and that instrumentality (as a part of traditional masculinity) has a positive influence on many domains in quality of life.

3. MATERIALS AND METHODS

3.1. STUDY POPULATIONS AND SETTINGS

For all the three studies, the following inclusion criteria were laid down for the participants: (i) meet the diagnosis of infertility stated by the International Committee for Monitoring Assisted Reproductive Technology (ICMART) and World Health Organization (WHO) [11]: being a member of a couple who had failed to reach pregnancy in a time period of one year or more while having regular, unprotected sexual intercourse; (ii) have sufficient knowledge in Hungarian (or in German language according to the place of data collection) to be able to complete the questionnaire set.

For the study I, 53 participants attending fertility consultation were recruited at the Fertility Unit of Department of Obstetrics and Gynaecology of University of Debrecen (Hungary) between April and July 2011. Patients were asked to fulfil the study package which included an information sheet, two consent forms and two questionnaire sets (each for women and men). The study was approved by the Research Ethics Committee of the University of Debrecen (DEOEC RKEB: 3327A-2011).

For the study II and III, data was collected in five Hungarian fertility clinics (Clinic of Obstetrics and Gynaecology, University of Debrecen – Debrecen; Department of Obstetrics and Gynaecology, Jóna András Teaching Hospital – Nyíregyháza; Kaáli Institute – Győr; Kaáli Institute – Budapest; Róbert Károly Private Clinic – Budapest) between February 2012 and March 2013. 126 couples waiting for their first medical consultation participated in the study. Medical assistants approached the couples, gave some information about the study and asked the couples to sign the content form and fill out the questionnaire set. Couples returned the questionnaires until the next medical consultation. The study received approval from the Scientific and Research Ethics Committee of Health Scientific Board in Hungary (ad. 247/PI/2011. ad. 7918-2/2011-EKU). For the German part of the study III, couples attending the first infertility medical consultation in one German fertility clinic (Department of Gynaecological Endocrinology and Fertility Disorders, Ruprecht-Karls University of Heidelberg) were recruited during the same time period and with the same invitation protocol as the Hungarian infertile couples. All couples attending the first fertility consultation were invited by a medical assistant to take part in the study. Participants had filled out the questionnaire set and signed the consent forms before they saw their reproductive specialist. The Ethics Committee of the Medical

Faculty of the Ruprecht-Karls University Heidelberg provided the ethical approval for the study (S-325/2010).

3.2. MEASUREMENTS

We assigned in all the three studies self-report questionnaires to measure the proposed variables. Socio-demographic characteristics were obtained by using questions about age, education level, duration of partnership, and duration of infertility in all studies. In study II and III, participants were also asked for the type of relationship and physical or mental disorder. Medical files of each couple were available for the author of the thesis and provided information about the duration of the treatment, the type of the treatment, infertility diagnosis as well as pregnancies and deliveries.

3.2.1. Questionnaires used in the study I “Exploratory analysis with psychosocial aspects in Hungarian infertile men and women”

Gender roles

Masculinity-femininity scale (MF) is one of the scales of the Minnesota Multiphasic Personality Inventory (MMPI) [175] consisting 60 items with true-false answers. It measures in a general sense how rigidly a person conforms to very stereotypical masculine or feminine roles, interests, or behaviours (e. g. ‘Liked playing “house”.’). Higher scores indicate to have more traditionally feminine attitudes. In our sample, the reliability coefficient was 0.74 for the scale.

Marital Roles subscale is a part of the Male-Female Relations Questionnaire (MFRQ-MR) [176] developed to assess specific personal attitudes about gender roles in marital/couple relationships, domestic work, and child rearing (e. g. ‘One of the wife’s jobs should be to help his husband in his work by taking the pressure off him at home.’) . The subscale consists of 10 items accompanied by a five-point scale ranging from 1 ‘not agree at all’ to 5 ‘agree absolutely’. Higher scores are related to a more ‘traditional’ attitude about gender roles. The Cronbach-alpha was very good for our sample ($\alpha = 0.89$).

Social and personal child wish motives

The Leipzig Questionnaire on Motives to have a Child (LKM-20) [177] consists of 20 items aiming at individual motives in favour or against realization of the wish for a child. Two scales of LKM assess motives for wanting a child (LKM1: Desire for emotional stabilization

and finding meaning, e. g. 'A child gives me the feeling to have a real home. '; LKM3: Desire for social recognition, e. g. 'A child is necessary for me to be acknowledged as an adult. ') and two scales assess the motives against it (LKM2: Fear of personal constraints, e. g. 'With a child of our own my partner and I do not have enough time for each other. ', LKM4: Fear of financial constraints, e. g. 'To have a child in our society means a handicap. '). Child wish motives are measured on intrapsychic (personal) and sociocultural (social) levels, and cost-benefit considerations are another dimension for measure. The questionnaire is scored on a five-point Likert-type scale ranging from 1 'does not affect me at all' to 5 'affects me greatly'. The Cronbach-alphas for the scales in our study population were 0.77, 0.54, 0.73 and 0.18, respectively. The scales LKM2 and LKM4 were deleted due to the low internal consistency (a cut-off of 0.60 was used for a minimum good internal consistency).

Subjective well-being

Beck Depression Inventory (BDI) [178, 179] is used widely to measure the intensity of depression. Depression as an outcome of experiencing involuntary childlessness is often assessed in infertile patients, as well [85]. A short-form of the inventory with 9 items was completed by the respondents. This version covers the following cognitive and affective areas: loss of interest, indecision, sleep disturbance, fatigability, hypochondria, difficulty on the job, pessimism, negligence, and feeling of failure. Each item ranged between 1 'not agree at all' to 5 'agree absolutely'. Higher scores are related with several depressive symptoms. The internal consistency of the inventory was 0.77 in our study population and the scale had normal distribution ($Z=1.68$; $p<0.01$).

Life Meaning subscale from the Brief Stress and Coping Inventory (LM) [180] examines one component of spirituality with 8 items (e. g. 'I feel my life is part of some larger plan. '). Believing in the meaning of life is measured with a 3-point Likert-type scale ranged from 0 'rarely' to 2 'often'. Higher scores indicate a more unequivocal feeling of self-coherence and a stronger spiritual commitment. Cronbach-alpha for this scale was 0.62 in our sample.

Short form of General Health Questionnaire (GHQ-12) [181, 182] consists 12 items, each one is aimed at the severity of mental problems, particular symptoms or behaviours, in the past few weeks (e. g. 'Have you recently felt constantly under strain?'). Answers are rated on a 4-point Likert-type scale ranged from 1 'never' to 4 'always' (according to the scoring of the Hungarian standardized scale). Higher scores indicate a better quality of life. The internal consistency was 0.90 in our study population and normal distribution was detected ($Z=1.59$; $p<0.05$).

Marital adjustment

Dyadic Adjustment Scale (DAS) [183] is a 32-item scale measuring the overall adjustment couples experience in their relationship. The DAS produces a global score in addition to scores of four subscales: Dyadic Consensus subscale with 13 items rated on a 6-point Likert-scale ranging from 0 'always disagree' to 5 'always agree' (aims the degree to which the couple agrees on matter of importance to the couple relationship, e. g. whether the couple agrees in 'Philosophy of life'), Dyadic Satisfaction subscale with 7 items rated on a 6-point Likert-scale ranging from 0 'all the time' to 5 'never', 1 item rated on a 5-point Likert-scale ranging from 0 'every day' to 4 'never', 1 item rated on a 7-point Likert-scale from 0 'extremely unhappy' to 6 'perfect' and 1 item rated on a 6-point Likert-scale from 0 to 5 (measure the degree and frequency to which the couple is satisfied with their relationship, e.g. 'Do you confide in your mate?'), Dyadic Cohesion subscale with 1 item rated on a 5-point Likert-scale ranging from 0 'every day' to 4 'never' and 4 items rated on a 6-point Likert-scale ranging from 0 'never' to 5 'more often (than once a day)' (the degree of closeness and shared activity experienced by the couple, e. g. 'How often do the following occur between you and your mate? Calmly discuss something'), and Affectional Expression subscale with 2 items rated on a 6-point Likert-scale ranging from 0 'always disagree' to 5 'always agree' and 2 items rated on a 2-point Likert-scale ranging from 0 'yes' to 1 'no' (the degree of demonstrations of affection and sexual relationships, e. g. whether the couple agrees in 'Demonstration of affection'). Higher scores indicate better quality of the dyadic relationship. In our study, we used only the global score of the scale whose internal consistency in our study population was really reliable (0.88).

Infertility-related stress

The Fertility Problem Inventory (FPI) [62] is a 46-item questionnaire developed to measure the level of a couple infertility-related stress. It consists five subscales identifying the following domains: social concerns (FPI1), sexual concerns (FPI2), relationship concerns (FPI3), rejection of childfree lifestyle (FPI4) and need for parenthood (FPI5). 10 items of Social concerns subscale (FPI1) asks about sensitivity to comments, reminders of infertility, feelings of social isolation, alienation from family or peers (e. g. 'I feel like friends or family are leaving us behind.'). Sexual concern subscale (FPI2) consists of 8 items about diminished sexual enjoyment or sexual self-esteem, scheduled sexual relations difficult (e.g. „Sometimes I feel so much pressure, that having sex becomes difficult.). FPI3 is a 10-item subscale relating to difficulty talking about infertility, understanding/accepting sex differences, concerns about im-

pact on relationship (e. g. ' Because of infertility, I worry that my partner and I are drifting apart.'). Rejection of childfree lifestyle subscale (FPI4) consists of 8 items about close identification with role of parent, parenthood perceived as primary or essential goal in life (e. g. reverse item: 'Not having a child (or another child) would allow me time to do other satisfying things.'). 10 statements of Need for parenthood subscale (FPI5) relate to negative view of childfree lifestyle or status quo, future satisfaction or happiness dependent on having a child (e. g. 'I have often felt that I was born to be a parent.').

Each question was scored on a six-point Likert-type scale ranging from 1 ,strongly disagree' to 6 ,strongly agree'. Higher scores indicate severe concerns related to involuntary childlessness. A global scale could be calculated from the 5 subscale reflecting the global stress caused by infertility. The internal consistency for the whole FPI in our sample was 0.83 and for the subscales 0.61, 0.54, 0.63, 0.58, 0.68, respectively. Sexual concerns and rejection of childfree lifestyle were not used in the analyses due to their low value of Cronbach's alpha (cut-off = 0.60).

3.2.2. Questionnaires used in study II "Depression and psychosocial consequences of infertility on the level of couples"

Depression

Aspects of depression were measured with the short version of Beck Depression Inventory [178, 179]. General characteristics of the inventory are described detailed above (Questionnaires used in study I). In this sample, the inventory was internally consistent (Cronbach α : 0.76) and had normal distribution ($Z=3.03$, $p<0.001$). Depression was used in the analyses as a continuous variable and as an ordinary variable. To be able to measure the characteristics and the effects of each depression-category, we added the participants to the following groups: no depression (0-9 points), mild depression (10-18 points), moderately severe depression (19-25 points), severe depression (above 26 points) [184].

Infertility-related stress

Fertility Problem Inventory (FPI) [62] is a multidimensional measure to assess infertility-related stress in five subscales. Other characteristics of the inventory are described detailed above (s. 3.2.1. Questionnaires used in the study I). In the given sample, Cronbach α -value of social concerns subscale remained under 0.60, so further analyses were performed without

this subscale. We found that all the other subscales had internal consistency (Cronbach α : 0.65-0.72) and normal distribution (all p s<0.05) in this sample.

Fertility specific quality of life

Fertility specific quality of life was measured using the internationally developed and validated FertiQoL [66]. Its Core module consists of 24 items regarding five domains: Emotional (e.g. 'Do you fluctuate between hope and despair because of fertility problems?'), Mind/Body (e.g. 'Are your attention and concentration impaired by thoughts of infertility?'), Relational (e. g. 'Have fertility problems strengthened your commitment to your partner?'), Social (e. g. 'Do you feel your family can understand what you are going through?') subscales. Each subscale contains 6 items. A Global scale can be calculated from the four subscales. Questions of the FertiQoL can be answered on a five-point Likert-type scale. Answers are ranging e. g. from 'always' to 'never' or from 'completely' to 'not at all', depending on in which frequency or in which amount the member agree with a statement. Higher scores indicate higher level of quality of life. Cronbach α of scales ranged between 0.69 and 0.89. All FertiQoL-scales had normal distribution in our sample (all p s<0.01).

3.2.3. Questionnaires used in the study III "Fertility specific quality of life in international setting"

Gender role attitudes

Personal Attribute Questionnaire (PAQ) [130, 176] (German version: GEPAQ, [185]) was used to assess personal gender roles attitudes. This is a 16-item measure with two scales to assess desirable instrumental, acting (I scale, e.g. 'not at all independent/very independent') and expressive, communicating (E scale, e.g. 'not at all understanding of others/very understanding of others') attitudes, respectively. Personality traits of women and men are not measured. Instrumental traits had been judged to be more characteristic for men (also termed traditionally masculine attitudes by the PAQ author), but socially desirable for both genders; and expressive traits had been considered to be more characteristic for women (also termed traditionally feminine attitudes by the PAQ author) [99]. The scales were internally consistent (α =0.69 and α =0.60, respectively) and had normal distribution (Z =1.59; p <0.05 and Z =1.49; p <0.05, respectively).

Fertility specific quality of life

FertiQoL [66] was assessed to measure emotional, mind/body, relational and social domains of fertility specific quality of life. The characteristics of the questionnaire are detailed described above (s. 3.2.2. Questionnaires used in study II). FertiQoL in the German sample had also good internal consistency ($\alpha=0.63-0.87$) and normal distribution (all $ps<0.05$).

The translation of the questionnaires (FPI, LKM-20, and DAS) which had been not available in Hungarian before was made by the author of the thesis and her colleagues according to international regulations [186]. In each case, the Hungarian version was an appropriate outcome of a translation –back translation procedure made by the co-authors and three independent translators (The Hungarian versions of FPI, LKM-20, and DAS are available by the author of the thesis).

3.3. STATISTICAL ANALYSIS

For statistical analysis, SPSS for Windows release 17.0 and 22.0 (Chicago, IL, USA) were used. Statistical significance was set in all cases at $p<0.05$. Firstly in all the three studies, each scale was tested for internal consistency and normality. If the value of Cronbach's alpha remained below the cut-off point of 0.60, we deleted the scale.

Study I “Exploratory analysis with psychosocial aspects in Hungarian infertile men and women”

For the statistical analysis, we used only the following scales in the statistical analysis: MF, MR, LKM1, LKM3, BDI, LM, GHQ, DAS, FPI, FPI1, FPI3, FPI5, age, duration of partnership, and duration of infertility.

Differences of parametric data between men and women in the sample were calculated by independent t-tests (BDI, LM, age, duration of partnership, and duration of infertility). Mann-Whitney tests were used in nonparametric data to find mean differences between the gender groups (MF, MR, LKM1, LKM3, GHQ, DAS, FPI, FPI1, FPI3, and FPI5). The comparison of the questionnaires with the standard scores was made by transforming our scores into z-scores according to the standard normal distribution and then one-sample t-tests were conducted with them. In the cases, when the questionnaires had not been measured on a Hungarian population before, we compared the results of our samples with a reference population of origin. By group comparisons, we computed effect sizes based on means and standard deviations or on t-

test statistics. The effect size (Cohen's *d*) was interpreted >0.2 as small, >0.5 as medium, >0.8 as strong.

In order to test which variables have an effect on global infertility-related stress and its domains, regression models were used separately for each dependent variable (FPI, FPI1, FPI3, and FPI5). Although, we did not conduct the analysis separately for men and women, only for the total sample, gender as first stepped in independent variable was used for controlling in each model. Our independent variables were gender role attitudes like femininity (MF) and traditional attitudes about marital gender roles (MR), social and emotional child wish motives (LKM3, LKM1), subjective well-being like depression (BDI), life meaning (LM) and general/mental health (GHQ), and marital adjustment (DAS) in regression analysis for global infertility-related stress (FPI), infertility-related social concerns (FPI1), infertility-related relationship concerns (FPI3), and need for parenthood (FPI5), respectively. Subsequently, gender role attitudes and child wish motives were entered in model 2 into the analysis as variables determined mainly by socialization and someone's social connections. Subjective well-being was entered in model 3 as a variable of someone's psychological status. Marital adjustment was entered in model 4 and represented how someone functions in the relationship.

Study II "Depression and psychosocial consequences of infertility on the level of couples"

Odds ratio was used to compare the prevalence of depression-categories in our sample and in the general population. Logistic regressions were performed to test demographic and personal differences of members in different depression categories. Multivariate analyses of variance were carried out to see differences in quality of life according to severity of personal and partners' depression.

T-tests were performed to detect gender differences in fertility specific quality of life. Correlations between FertiQoL-scales, depression and demographic variables were tested with Pearson-coefficients. To measure properly the relations on the level of the couples, we created a dummy variable which identified each couple divided.

Study III "Fertility specific quality of life in international setting"

T-tests were used to calculate differences between German and Hungarian participants in some continuous variables and the scales of FertiQoL and PAQ. T-Tests were performed also for gender differences. As FertiQoL has a correlation with higher level of education [101] what could also determine cross-country QoL-differences, so we carried out multivariate analysis of variance (MANOVA) to test main effect and post hoc test for education. In order

to identify interdependent correlations between gender role attitudes and quality of life, we constructed a four-fold typology of the two PAQ-scales with two-step cluster analysis, resulting in four groups (combined = high I and E scores, instrumental = high I and low E scores, expressive = high E and low I scores, and neutral = low I and E scores). In order to find differences among gender role attitude groups, multivariate analysis of covariance (MANCOVAs) were calculated with FertiQoL-scales as dependent variables, gender and education as covariates.

4. RESULTS

4.1. STUDY I “EXPLORATORY ANALYSIS WITH PSYCHOSOCIAL ASPECTS IN HUNGARIAN INFERTILE MEN AND WOMEN”

4.1.1. Sample characteristics

53 out of 180 questionnaire sets were returned (29%).

Table 5 presents the demographic characteristics of the sample according to gender. The average age of men was 33.5 years (range 25-49 years) and the average age of the women was significantly lower ($t(49)=-2.88$, $p<0.01$): 29.89 years (range 23-40 years). In the total sample, the subjects live in a marriage or in a common-law marriage (mean duration: 6.87 ± 3.23 years) and have wanted to have a child for 2.75 (± 1.54) years. In duration of marriage and wish to have a child, there was not any difference between men and women, because the most of participants were married to each other. 49.1% of the subjects had reached high educational level (>12 years), intermediate level (9-14 years) counted 49%, and only 1.9% had low educational level (<9 years). Divided by gender: 48.1% of women and 50% of men had graduated (>12 years), an intermediate level was reached by 48.1% of women and 50% of men, and 37% of women had finished only primary school.

Table 5. Sociodemographic characteristics of the pilot-study sample

	Women (N=27)		Men (N=26)		t	d
	Mean	S.D.	Mean	S.D.		
Age	29.89	4.05	33.5	4.65	-2.88*	0.83
Duration of partnership	6.67	3.28	7.08	3.24	NS	-
Duration of infertility	2.65	1.48	2.86	1.62	NS	-
Educational level	N	%	N	%		
<9 years	1	3,7	0	0		
9-11 years	4	14.8	6	23.1		
12-14 years	9	33.3	7	26.9		
15 years<	13	48.1	13	50		

df=49

SD: standard deviation

NS: not significant

* $p<0.01$

4.1.2. Gender differences

Table 6 contains the results of t-tests and U-tests on the psychometric scales between gender groups. Regarding subjective well-being, women complained about moderate symptoms of lack of general/mental health ($U=231.5$, $p<0.05$) while men had a stronger belief in meaning of life ($t=-2.57$, $p<0.05$). In the area of depression, individuals did not express any differences according to gender. Another difference was shown on the Masculinity-Femininity scale with women's higher scores as tending to be more feminine ($U=7.5$, $p<0.001$). Fertility problems indicated to have a greater effect on women than on men. Beside the global infertility-related stress (FPI) and on the domain of social concerns (FPI1), women reported a greater level of stress than men ($U=240$, $p<0.05$ and $U=240.5$, $p<0.05$, respectively). All the significant differences had an effect size from moderate to high strength (0.40-2.57).

Table 6. Gender role attitudes, child wish motives, subjective well-being, marital adjustment and fertility related stress according to genders in the pilot-study

	Women (N=27)		Men (N=26)		t-value U-value	Cohen'sd
	Mean	SD	Mean	SD		
Masculinity-femininity (MF)	36.78	4.18	26.50	3.81	U=7.5***	2.57
Marital role attitudes (MR)	28.15	8.55	27.54	8.69	NS	-
Emotional child wish motives (LKM1)	2.89	0.96	2.88	0.79	NS	-
Social child wish motives (LKM3)	0.86	0.96	1.12	0.86	NS	-
Depression (BDI)	12.33	3.46	11.54	3.64	NS	-
Life meaning (LM)	11.11	2.19	12.62	2.52	$t=-2.57^{*1}$	0.64
General/mental health (GHQ)	23.48	5.43	25.54	4.84	U=231.5*	0.40
Marital adjustment (DAS)	129.85	10.77	129.27	9.98	NS	-
Fertility problems global FPI	141.26	24.32	127.73	19.25	U=240*	0.62
Fertility problems social concerns FPI1	24.96	7.86	20.77	6.91	U=240.5*	0.57
Fertility problems relationship concerns FPI3	18.70	6.59	17.65	5.68	NS	-
Fertility problems need for parenthood FPI5	44.07	7.61	41.00	8.28	NS	-

* $p<0.05$ *** $p<0.001$

SD: standard deviation, NS: not significant

t-test (t-value) or Mann-Whitney (U-value) were performed as appropriate

¹ df=49

Attitudes towards domestic gender roles, personal and social child wish motives, marital adjustment, relational concerns of infertility and need for parenthood were similarly scored by men and women

4.1.3. Differences from reference populations

Regarding the gender roles and subjective well-being scales, infertile women had higher scores on the Masculinity-Femininity scale (MF) ($t(26)=5.69$; $p<0.001$) indicating to have more feminine attitudes, and lower scores on the General Health Questionnaire (GHQ-12) ($t(26)=-2.51$, $p<0.05$), so having lower level of general/mental health than the Hungarian reference population (Table 7). Infertile men did not show any differences compared with reference population in domains of subjective well-being. Infertile men did not show any differences compared with reference population in domains of subjective well-being. Additionally, men in our sample considered to believe deeper in meaning of life than infertile women, but moreover than Hungarian men generally did ($t(25)=2.87$, $p<0.01$). Table 7 shows the differences of our scores from reference population of origin of FPI as well as LKM and DAS.

Hungarian men scored higher on the global FPI and on its subscale 'need for parenthood' than men from the Canadian reference group ($t(25)=2.84$, $p<0.01$ and $t(25)=4.38$, $p<0.001$, respectively), the effect size is particular strong on the FPI5 (Cohen's $d = 0.85$). However, Hungarian infertile women also reported about higher need for parenthood than Canadian ones ($t(26)=5.69$, $p<0.01$). In addition, lower level was shown in Hungarian women regarding relationship concerns (FPI3) than in Canadian women ($t(26)=-2.29$, $p<0.05$). Men in our study population had higher scores on emotional wish to have a child than men in the German reference population ($t(25)=3.12$, $p<0.01$). Both in Hungarian infertile men and women, stronger marital adjustments were detected than in the US-American reference groups ($t(25)=10.46$ and $p<0.001$ and $t(26)=9.81$ $p<0.001$, respectively).

Table 7. Differences from reference populations in the pilot-study

	Women		t ¹	D	Men		t ²	d
	Mean	SD			Mean	SD		
Marital role attitudes (MR)^a	0.20	1.30	NS	-	-0.06	1.47	NS	-
Masculinity-femininity (MF)^a	0.41	0.40	5.69***	0.54	-0.06	0.40	NS	-
Depression (BDI)^a	-0.10	0.56	NS	-	-0.13	0.65	NS	-
Life meaning (LM)^a	-0.08	0.72	NS	-	0.54	0.78	2.87**	0.60
General/mental health (GHQ)^a	-0.70	1.52	-2.51*	0.54	-0.15	1.36	NS	-
Fertility problems – global (FPI)^b	0.15	0.74	NS	-	0.38	0.68	2.84**	0.55
Fertility problems – social concerns (FPI1)^b	-0.26	0.73	NS	-	-0.10	0.75	NS	-
Fertility problems – relationship concerns (FPI3)^b	-0.31	0.73	-2.29*	0.35	-0.29	0.63	NS	-
Fertility problems – need for parenthood (FPI5)^b	0.49	0.78	5.69**	0.55	0.70	0.86	4.38***	0.85
Emotional child wish motives (LKM1)^c	0.28	0.97	NS	-	0.51	0.71	3.12**	0.59
Social child wish motives (LKM3)^c	-0.10	1.05	NS	-	0.14	0.91	NS	-
Marital adjustment (DAS)^d	0.85	0.64	9.81***	1.01	0.81	0.56	10.46***	1.00

Mean and standard deviation (SD) are represented as z-transformed values.

¹ df=26 ² df=25

^a Compared with Hungarian reference population

^b Compared with Canadian reference population

^c Compared with German reference population

^d Compared with US-American reference population

*p<0.05

**p<0.01

***p<0.001

4.1.4. Predictors of fertility problems

In order to find significant predictors for infertility-related global stress according to our conceptual framework (s. 2.3.2. Specific aims of the study I), we performed multiple hierarchical linear regression analysis. Table 8 provides the regression results for global infertility-related stress in the total sample. Only gender did not have a predicting function, but having feminine attitudes was in all the models 2 ($\beta=0.49$, $p<0.05$), 3 ($\beta=0.48$, $p<0.05$), and 4 ($\beta=0.46$, $p<0.05$) a positive predictor for infertility-related stress. In Model 2, child wish motives, with both social and emotional sources, showed a positive correlation with higher stress ($\beta=0.32$, $p<0.05$)

and $\beta=0.30$, $p<0.05$, respectively), but their effects were cut out when subjective well-being variables were entered. Particularly, the negative influence of general/mental health is remarkable in Model 3 ($\beta = -0.45$, $p<0.05$). In Model 4, marital adjustment ($\beta=-0.25$, $p<0.05$) and traditional gender roles ($\beta=-.25$, $p<0.05$) decrease the presence of infertility-related stress as well. Model 4 explained the 48.5% of the infertility-related stress (and R^2 was proven to be higher when new independent variables were entered: Model 2: 27.1%, Model 3: 42.5%, Model 4: 48.5%).

Table 8. Hierarchical linear regression results for global fertility problems (FPI)

	Model 1		Model 2		Model 3		Model 4	
	β	t	β	t	β	t	β	t
Gender (male)	-	-	-	-	-	-	-	-
Gender roles								
Femininity (MF)			0.49*	2.32	0.48*	2.52	0.46*	2.54
Traditional attitudes (MR)			-	-	-	-	-0.25*	-2.06
Child wish motives								
Social motives (LKM3)			0.32*	2.13	-	-	-	-
Emotional motives (LKM1)			0.29*	2.13	-	-	-	-
Subjective well-being								
Depression (BDI)					-	-	-	-
Life meaning (LM)					-	-	-	-
General/mental health (GHQ)					-0.45*	-2.39	-0.47*	-2.67
Marital adjustment (DAS)							-0.25*	-2.37
F-value	-		4.56**		5.44***		6.01***	
Adjusted R²	0.05		0.27		0.43		0.49	

Only significant results are demonstrated

N=53

* $p<0.05$

** $p<0.01$

*** $p<0.001$

Table 9. Hierarchical linear regression results for social concerns (FPI1)

FPI1	Model 1		Model 2		Model 3		Model 4	
	β	t	β	t	β	t	β	t
Gender (male)	-	-	-	-	-	-	-	-
Gender roles								
Femininity (MF)			-	-	-	-	-	-
Traditional attitudes (MR)			-	-	-	-	-	-
Child wish motives								
Social motives (LKM3)			-	-	-	-	-	-
Emotional motives (LKM1)			-	-	-	-	-	-
Subjective well-being								
Depression (BDI)					-	-	-	-
Life meaning (LM)					-	-	-	-
General/mental health (GHQ)					-0.73**	-4.07	-0.75**	-4.31
Marital adjustment (DAS)							-	-
F-value	-		3.26*		6.41**		6.50**	
Adjusted R²	0.04		0.19		0.47		0.57	

Only significant results are demonstrated

N=53

*p<0.05

**p<0.001

For social concerns (FPI1), lower results were indicated only by general/mental health (Model 3: β =-0.73, p <0.001, Model 4: β =-0.75, p <0.001). Model 3 was responsible for 47.4% of variance, and Model 4 was responsible for 56.8% of variance of infertility-related social concerns (Table 9).

The substantive role of femininity as a positive predictor remained for relationship concerns (FPI3) as well (Model 3: β =0.50, p <0.05, Model 4: β =0.47, p <0.05). In this domain, concerns were increased by social child wish motives (Model 3: β =0.37, p <0.05, Model 4: β =0.36, p <0.05) and depression (Model 3: β =0.47, p <0.05, Model 4: β =0.39, p <0.05). Good marital adjustment entered in Model 4 had a negative effect on relational concerns (β =-0.40, p <0.01). The overall model fit was R^2 =32.4% for this subscale (Table 10)

Table 10. Hierarchical linear regression results for relational concerns (FPI3)

FPI3	Model 1		Model 2		Model 3		Model 4	
	β	t	β	t	β	t	β	t
Gender (male)	-	-	-	-	-	-	-	-
Gender roles								
Femininity (MF)			-	-	-0.50*	2.19	0.47*	2.28
Traditional attitudes (MR)			-	-	-	-	-	-
Child wish motives								
Social motives (LKM3)			-	-	0.37*	2.19	0.36*	2.43
Emotional motives (LKM1)			-	-	-	-	-	-
Subjective well-being								
Depression (BDI)					0.47*	2.32	0.39*	2.15
Life meaning (LM)					-	-	-	-
General/mental health (GHQ)					-	-	-	-
Marital adjustment (DAS)							-0.40**	-3.27
F-value	-		-		-		3.56**	
Adjusted R²	-0.01		0.11		0.16		0.32	

Only significant results are demonstrated

N=53

*p<0.05

**p<0.01

Emotional child wish motives proved to be the only positive predictor for need for parenthood (FPI5) (Model 2: $\beta=0.42$, $p<0.01$, Model 3: $\beta=0.37$, $p<0.05$, Model 4: $\beta=0.36$, $p<0.05$). The overall model fits for this domain were $R^2=20.9\%$ in Model 2, $R^2=25.7\%$ in Model 3, and $R^2=26.7\%$ in Model 4 (Table 11).

Table 11. Hierarchical linear regression results for need for parenthood (FPI5)

FPI5	Model 1		Model 2		Model 3		Model 4	
	β	t	β	t	β	t	β	t
Gender (male)	-	-	-	-	-	-	-	-
Gender roles								
Femininity (MF)			-	-	-	-	-	-
Traditional attitudes (MR)			-	-	-	-	-	-
Child wish motives								
Social motives (LKM3)			-	-	-	-	-	-
Emotional motives (LKM1)			0.42**	2.95	0.37*	2.55	0.36*	2.50
Subjective well-being								
Depression (BDI)					-	-	-	-
Life meaning (LM)					-	-	-	-
General/mental health (GHQ)					-	-	-	-
Marital adjustment (DAS)							-	-
F-value	-		3.53**		3.08**		2.94**	
Adjusted R²	0.02		0.21		0.26		0.27	

Only significant results are demonstrated

N=53

*p<0.05

**p<0.01

4.2. STUDY II “DEPRESSION AND PSYCHOSOCIAL CONSEQUENCES OF INFERTILITY ON THE LEVEL OF HUNGARIAN COUPLES”

4.2.1. Depression categories in the Hungarian infertile sample and in the general population

With using the cut-points of mild, moderately severe and severe depression [184], we created four groups of our participants: (1) no depression category with 149 individuals (59%), mild depression category with 61 members (24%), moderately severe depression category with 10 participants (4%), severe depression category with 32 individuals (13%). After participants were divided into one of the four depression categories, we measure whether the prevalence of each category in our sample differs from the prevalence of the categories in the general Hungarian population [187]. Mild depressive symptoms were more frequently in the infertile

sample compared to general population (24.2% vs. 12.8%, OR=0.43, 95% CI: 0.20-0.92, $p<0.05$) (Table 12). 2 women (0.02%) reported about diagnosed depression.

Table 12: Rate of depression categories in the Hungarian infertile sample and in the general population

	Infertile sample (%)	Hungarian population¹ (%)	OR	CI 95%
No depression	59.1	70.4	1.64	0.91-2.95
Mild depression	24.2	12.8	0.43*	0.20-0.92
Moderately severe depression	4.0	6.8	0.65	0.18-2.36
Severe depression	12.7	9.9	1.38	0.55-3.44

OR: odds ratio CI: confidence interval

¹ Data published by Hajnal et al. [187]

Moderately severe and severe depression categories contained only 10 and 32 individuals, respectively, so we united them in one category (“moderately severe/severe category”) in order to have more confident results.

4.2.2. Correlations between severity of depression and sociodemographic characteristics

Table 13 presents demographic data of participants in the three depression categories. More women than men had mild (OR: 1.97, 95% CI 1.07-3.60, $p<0.05$) and severe depressive symptoms (OR: 2.46, 95% CI 1.21-5.00, $p<0.05$), so depression was more likely in woman than in men. Mild depression symptoms were common in the earlier period of unfulfilled child wish: individuals wishing a child less than 2.5 years were more likely to have mild depression than to belong to the normal group (OR: 2.01, 95% CI 1.06-3.80). When partner did not report any depressive symptoms, participants were at lower risk to be mild depressed (OR=0.27, 95% CI 0.15-0.51, $p<0.001$), or moderately severe/severe depressed (OR=0.24, 95% CI 0.12-0.50, $p<0.001$). The likelihood to have mild depression was higher when partner was mild depressed, as well (OR: 2.86, 95% CI 1.47-5.59, $p<0.01$). When partner showed moderately severe/severe depression, individuals were twice the risk to have mild depression (OR: 2.25, 95% CI 1.01-5.02, $p<0.05$), and four times the risk to be moderately severe/severe depressed (OR: 4.18, 95% CI 1.82-9.48, $p<0.01$); so any kind of depression of the partner could be a risk factor for personal depression.

Table 13: Descriptive statistics in the total sample and in the three depression categories

	Total sample		No depression (I)		Mild depression (II)		Moderately severe/severe depression (III)		OR ¹	CI 95%	OR ²	CI 95%
	N	%	N	%	N	%	N	%				
	252	100	149	59	61	24	42	17				
Gender												
Woman	126	50	63	42	36	59	27	64	1.97*	1.07-3.60	2.46*	1.21-5.00
Men	126	50	86	58	25	41	15	36	1.00		1.00	
Education												
Primary/lower secondary	73	29	42	28	21	34	10	24	1.22	0.61-2.46	0.97	0.40-2.36
Higher secondary	78	31	46	31	15	25	17	41	0.80	0.38-1.68	1.50	0.68-3.32
University	101	40	61	41	25	41	15	36	1.00		1.00	
Age												
<33	136	54	75	51	38	62	23	55	1.63	0.89-3.00	1.19	0.60-2.38
34<	116	46	74	49	23	37	19	45	1.00		1.00	
Duration of partnership												
<7	118	47	72	48	31	51	15	36	0.91	0.50-1.64	1.68	0.83-3.42
7<	134	53	77	52	30	49	27	64	1.00		1.00	
Duration of child wish												
<2.5	148	59	81	54	43	71	24	57	2.01*	1.06-3.80	1.12	0.56-2.23
2.5<	104	41	68	46	18	29	18	43				
Partner's depression												
No	158	63	107	72	25	41	16	38	0.27***	0.15-0.51	0.24***	0.12-0.50
Mild	61	24	26	17	23	38	12	29	2.86**	1.47-5.59	1.89	0.86-4.18
Moderately severe/severe	33	13	16	11	13	21	14	33	2.25*	1.01-5.02	4.16**	1.82-9.48

OR: odds ratio CI: confidence interval

¹ comparison between the mild depression group (II) and the no depression group (I) with usage of nominal logistic regression

² comparison between the moderately severe/ severe depression group (III) and the no depression group (I) with usage of nominal logistic regression

*p<0.05 **p<0.01 ***p<0.001

(Detailed description of the sociodemographic and medical data of the sample are presented subsequently in the comparison with the German sample's characteristics in the study III, s. Table 17).

4.2.3. Relations between depression and infertility-related concerns on levels of the person and the couple

Women in different depression categories reported significantly different scores in sexual concerns ($F(2)=8.17, p<0.001$) and in relational concerns ($F(2)=12.60, p<0.001$) (Table 14): more concerns were recorded in women with moderately depression than in women with mild depression or without depression. Females' relational concerns correlated with partner's depression ($F(2)=12.25, p<0.001$): women scored a significantly higher level on relational concerns scale, if the partner had mild or moderately severe/severe depression.

For men, absence of depression made a significant effect, because men with mild or moderately severe/severe depression had more sexual ($F(2)=11.19, p<0.001$) and relational concerns ($F(2)=12.05, p<0.001$), than men without depression (Table 15). Occurrence of partner's depression also made a difference for men in relational concerns ($F(2)=6.50, p<0.01$): if female partner did not show any depressive symptoms, men reported fewer relational concerns. If female partner showed mild depression, men scored higher on sexual concerns scale ($F(2)=3.29, p<0.05$), compared to the case when women belonged to the no depression category.

Table 14: Female infertility-related concerns in comparison with their own and their partner's depression

	Female depression						F (df=2)	Group comparison
	No depression (I) (N=63)		Mild depression (II) (N=36)		Moderately severe/severe depression (III) (N=27)			
	Mean	SD	Mean	SD	Mean	SD		
Female								
Sexual concerns	14.94	6.12	16.39	4.70	20.30	6.18	8.17***	I<III***, II<III*
Relational concerns	17.97	6.26	21.22	7.79	26.07	7.82	12.60***	I<III***, II<III*
Rejection of childfree lifestyle	34.65	7.32	34.94	8.01	35.00	6.39	NS	-
Need for parenthood	43.76	6.41	44.72	8.13	42.44	7.44	NS	-
	Male depression						F (df=2)	Group comparison
	No depression (I) (N=86)		Mild depression (II) (N=25)		Moderately severe/severe depression (III) (N=15)			
	Mean	SD	Mean	SD	Mean	SD		
Female								
Sexual concerns	15.82	6.42	17.24	4.86	18.88	5.67	NS	-
Relational concerns	18.45	6.65	24.35	6.18	26.06	10.16	12.47***	I<II**, I<III***
Rejection of childfree lifestyle	35.11	7.68	34.42	7.68	33.88	7.46	NS	-
Need for parenthood	43.42	7.27	45.73	5.44	42.31	8.58	NS	-

SD: standard deviation

NS: not significant

*p<0.05

**p<0.01

***p<0.001

Table 15: Male infertility-related concerns in comparison with their own and their partner's depression

	Male depression						F (df=2)	Group comparison
	No depression		Mild depression		Moderately severe/severe depression			
	(I) (N=86)		(II) (N=25)		(III) (N=15)			
Male	Mean	SD	Mean	SD	Mean	SD		
Sexual concerns	12.98	5.26	17.60	5.58	19.00	8.36	11.19***	I<II**, I<III**
Relational concerns	18.06	6.92	22.65	5.13	27.13	11.12	12.05***	I<II*, I<III***
Rejection of childfree lifestyle	33.51	7.70	32.80	6.31	34.87	9.24	NS	-
Need for parenthood	39.20	8.31	43.36	7.04	41.33	9.77	NS	-
	Female depression							
	No depression		Mild depression		Moderately severe/severe depression			
	(I) (N=63)		(II) (N=36)		(III) (N=27)		F (df=2)	Group comparison
Male	Mean	SD	Mean	SD	Mean	SD		
Sexual concerns	13.23	5.31	16.37	7.29	15.59	6.13	3.29*	I<II*
Relational concerns	17.91	7.25	21.37	8.14	23.41	7.54	6.50**	I<II*, I<III**
Rejection of childfree lifestyle	33.97	7.40	32.20	8.95	34.22	6.09	NS	-
Need for parenthood	40.08	7.79	42.20	9.88	38.26	7.23	NS	-

SD: standard deviation

NS: not significant

*p<0.05

**p<0.01

***p<0.001

4.2.4. Relations between depression and fertility specific quality of life on levels of the person and the couple

Domains of infertility specific quality of life and depression had negative correlations for both women and men (all $p < 0.01$) (Table 16). Higher depression in men had a weak correlation with lower female emotional quality of life. Women's higher depression correlated with lower levels of emotional, mind/body and social quality of life in men. Among demographic variables, only duration of child wish showed a negative correlation with male quality of life: being infertile for longer correlated with lower emotional, mind/body and relation QoL in men.

Table 16: Female and male fertility specific quality of life correlated¹ with their own and their partner's depression and duration of child wish

Female	Female depression	Male depression	
FertiQoL Emotional	-0.45***	-0.18*	
FertiQoL Mind/body	-0.53***	-0.08	
FertiQoL Relational	-0.25**	-0.16	
FertiQoL Social	-0.38***	-0.12	
Male	Male depression	Female depression	Duration of child wish
FertiQoL Emotional	-0.44***	-0.21*	-0.22*
FertiQoL Mind/body	-0.41***	-0.19*	-0.20*
FertiQoL Relational	-0.53***	-0.11	-0.21*
FertiQoL Social	-0.40***	-0.21*	-0.14

¹ controlled for each couple

* $p < 0.05$

** $p < 0.01$

*** $p < 0.001$

4.3. STUDY III “FERTILITY SPECIFIC QUALITY OF LIFE IN INTERNATIONAL SETTING”

4.3.1. Study population

288 participants (response rate 81%) in Germany and 252 participants (response rate 43%) in Hungary completed the questionnaire set, thus the initial database was composed of data of 540 participants (270 couples). Some German members who agreed to participate in our study

did not fill out either FertiQoL or PAQ, therefore 498 participants (249 couples) were left for final analysis.

Comparing the two study populations regarding age, education level, type of relationship, type of diagnosis, duration of partnership, and duration of child wish, we found that German couples were older (women: $t(247)=3.52$, $p<0.01$; men: $t(246)=4.73$, $p<0.001$) and lived for longer in a partnership ($t(496)=2.76$, $p<0.01$) (Table 17). More Hungarian participants had a higher secondary education (women: OR=2.71, CI 95%=1.45-5.07, $p<0.001$; men: OR=2.45, CI 95%=1.32-4.55, $p<0.01$) and less primary or lower secondary education (women: OR=0.22, CI 95%=0.12-0.40, $p<0.001$; men: OR=0.53, CI 95%=0.32-0.88, $p<0.05$). Hungarian women also had a significant higher education than German women (women: OR=1.79, CI 95%=1.08-2.97, $p<0.05$).

4.3.2. Differences between countries and genders

Hungarian women and men scored higher on QoL-scales than German women and men (women: FertiQoL emotional: $t(244)=-3.94$, $p<0.001$; FertiQoL mind/body: $t(247)=-2.05$, $p<0.05$; FertiQoL relational: $t(244)=-1.99$, $p<0.05$; FertiQoL social: $t(247)=-3.69$, $p<0.001$; men: FertiQoL emotional: $t(247)=-3.89$, $p<0.001$; FertiQoL mind/body: $t(247)=-5.26$, $p<0.001$; FertiQoL relational: $t(246)=-4.58$, $p<0.001$; FertiQoL social: $t(247)=-8.47$, $p<0.001$). Therefore Hungarians seem to feel less burdens of infertility on their emotional, mind/body status and their partnership and other social relations (Table 18). Hungarian women reported about more expressive attitudes than German women ($t(247)=-5.12$, $p<0.001$). Gender differences in the German group were detected only on Emotional ($t(242)=-6.45$, $p<0.001$) and Mind/Body scales ($t(238)=-4.82$, $p<0.001$). Hungarian women scored lower than men on all FertiQoL subscales except Relational scale (FertiQoL emotional: $t(250)=-6.71$, $p<0.001$; FertiQoL mind/body: $t(250)=-7.48$, $p<0.001$; FertiQoL social: $t(250)=-4.46$, $p<0.001$). Gender differences were detected on PAQ-scales as expected: women showed more expressive attitudes, and men showed more instrumental attitudes (Germans: Instrumental: $t(239)=-3.72$, $p<0.001$; Expressive: $t(242)=2.84$, $p<0.01$; Hungarians: Instrumental: $t(250)=-3.96$, $p<0.001$; Expressive: $t(249)=5.42$, $p<0.001$).

Table 17. Socio-demographic and medical characteristics of subjects with comparison between German and Hungarian groups

	German subjects (N=246)		Hungarian subjects (N=252)		OR	95% CI
	N	%	N	%		
Education – women	123	100	126	100		
Primary/lower secondary	60	48.8	22	17.5	0.22***	0.12-0.40
Higher secondary	18	14.6	40	31.7	2.71***	1.45-5.07
University	45	36.6	64	50.8	1.79*	1.08-2.97
Education – men	123	100	126	100		
Primary/lower secondary	65	52.8	47	37.3	0.53*	0.32-0.88
Higher secondary	19	15.4	39	31.0	2.45**	1.32-4.55
University	39	31.7	40	31.7	NS	-
Type of relationship						
Marriage	196	80	188	74.6	NS	-
Cohabitation	50	20	64	25.4	NS	-
Children						
Wife’s child	14	5.8	16	6.3	NS	-
Child together	14	5.8	14	5.6	NS	-
Husband’s child	20	8.3	4	1.6	NS	-
Diagnosis						
Unexplained/no data	50	25	110	43.7	3.25***	2.16-4.87
Female only	74	30.8	80	31.7	NS	-
Male only	64	26.7	52	20.6	NS	-
Mixed factor	42	17.5	10	4.0	0.19***	0.09-0.37
	Mean	SD	Mean	SD	T	df
Age – women	34.4	4.6	32.3	4.9	-3.58**	247
Age – men	37.9	6.3	34.5	5.0	-4.73***	246
Duration of relationship	8.40	4.97	7.32	3.66	-2.76**	496
Duration of child wish	2.82	2.11	2.71	1.92	NS	-

NS: not significant

*p<0.05

**p<0.01

***p<0.001

Table 18. Cross-country and gender differences in FertiQoL-, PAQ-scores

	FertiQoL Emotional		FertiQoL Mind/Body		FertiQoL Relational		FertiQoL Social		PAQ Instrumental		PAQ Expressive	
	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men
Country	M±SD	M±SD	M±SD	M±SD	M±SD	M±SD	M±SD	M±SD	M±SD	M±SD	M±SD	M±SD
Germany N=246	60.5±17.6	74.4±16.1 *** ^a	72.2±16.2	81.5±13.8 *** ^a	80.2±11.6	77.8±13.4	73.0±17.2	74.2±13.9	19.3±4.3	21.2±3.9* ** ^a	22.8±3.2	21.6±3.5* * ^a
Hungary N=252	69.0±16.3 *** ^a	81.4±12.8 *** ^{b,c}	76.5±16.7 * ^a	89.7±10.9 *** ^{b,c}	83.3±13.4 * ^a	85.4±12.8 *** ^b	80.3±13.8 *** ^a	86.9±9.4* ** ^{b,c}	19.8±4.4	22.0±4.6* ** ^c	25.1±4.0* *** ^a	22.3±4.3* ** ^c

M: mean, SD: standard deviation

*p<0.05 **p<0.01 ***p<0.001

^a differed from German women

^b differed from German men

^c differed from Hungarian women

We found differences in quality of life in connection with education level only for women. Post hoc tests showed that women in the higher secondary education group reported better QoL-scores in each domain than did women with primary or lower secondary education (all $p < 0.05$). Regarding emotional and social domains, female participants with university degree also scored higher than female members of the primary or lower secondary education group (all $p < 0.05$) (Table 19). Therefore multiple covariance analyses were conducted to test the effect of education (as covariate) in the group of women on cross-country FertiQoL-differences. The results confirmed the results of independent T-tests with QoL-differences between German and Hungarian women (s. Table 18.): FertiQoL emotional: ($F(1)=12.12$, $p < 0.01$); FertiQoL mind/body: $F(1)=2.80$, $p < 0.05$; FertiQoL Relational: $F(1)=3.09$, $p < 0.05$; FertiQoL Social: $F(1)=9.84$, $p < 0.01$).

Table 19. Differences in FertiQoL- and PAQ-scores according to education with multi-variate analysis of variance

FertiQoL	Education ¹	Mean	SD	F ²	PES ³	Group comparison
Emotional	primary/lower secondary (P) ⁴	69.43	19.70	8.08***	0.06	P<HS***, P<U*
	higher secondary (HS) ⁵	75.46	15.49			
	university (U) ⁶	70.34	16.62			
Mind/Body	primary/lower secondary (P)	78.89	16.49	3.18*	0.03	P<HS*
	higher secondary (HS)	82.73	15.87			
	university (U)	79.64	15.19			
Relational	primary/lower secondary (P)	80.77	12.10	5.21**	0.04	P<HS**
	higher secondary (HS)	84.29	12.88			
	university (U)	80.83	13.87			
Social	primary/lower secondary (P)	77.10	16.28	4.51**	0.04	P<HS*, P<U*
	higher secondary (HS)	80.59	13.37			
	university (U)	78.93	14.01			
PAQ						
Instrumental	primary/lower secondary (P)	20.50	4.54	NS	-	-
	higher secondary (HS)	20.73	4.11			
	university (U)	20.37	4.33			
Expressive	primary/lower secondary (P)	22.75	4.00	NS	-	-
	higher secondary (HS)	22.90	3.90			
	university (U)	22.99	3.94			

NS: not significant

* $p < 0.05$

** $p < 0.01$

*** $p < 0.001$

¹ only women in the total sample

² $df=1$

³ partial eta square calculated by MANOVA

⁴ $N=84$

⁵ $N=59$

⁶ $N=110$

4.3.3. Differences in gender role attitudes

We performed correlations between the dimensions of the two questionnaires to filter possible tendencies for high scoring in every scale. PAQ-scales correlated with FertiQoL-scales only in certain cases significantly (Table 20), so we excluded the high intercorrelations between the scales and we created four distinct PAQ-categories: „combined”, „instrumental”, „expressive” and „neutral”. As stated before, the category “combined” comprises high scores on both scales (instrumental and expressive), category “instrumental” means high scores on the instrumental scale only, category “expressive” means high scores on the expressive scale only and the category “neutral” comprises low scores on both scales (instrumental and expressive).

Table 20. Correlations between FertiQoL and PAQ dimensions in the German and Hungarian groups

	FertiQoL Emotional	FertiQoL Mind/body	FertiQoL Relational	FertiQoL Social	PAQ Instrumental	PAQ Expressive
FertiQoL Emotional	-	0.76***	0.11	0.55***	0.36***	-0.02
FertiQoL Mind/body	0.76***	-	0.25***	0.51***	0.32***	0.02
FertiQoL Relational	0.41***	0.37***	-	0.33***	0.21**	0.21**
FertiQoL Social	0.67***	0.60***	0.47**	-	0.25***	0.14*
PAQ Instrumental	0.25***	0.22***	0.17*	0.15*	-	0.04
PAQ Expressive	-0.05	-0.12	0.10	0.02	0.02	-

Pearson coefficients are reported.

Correlation coefficients in the Hungarian group (N=252) are presented below the diagonal, correlation coefficients in the German group (N=246) are presented above the diagonal.

***p<0.001

**p<0.01

*p<0.05

Participants in the neutral and expressive group tended to show poorer quality of life than subjects with combined attitudes in the German group (Figure 5). These differences were especially accentuated on the FertiQoL Emotional (F(3)=3.80, p<0.05, post hoc: neutral<combined, p<0.05, expressive<combined, p<0.05), Mind/Body (F(3)=5.52, p<0.01, post hoc: neutral<combined, p<0.01, expressive<combined, p<0.05) and Social scales (F(3)=4.37, p<0.01, post hoc: neutral<combined, p<0.01, expressive<combined, p<0.05). Individuals with

neutral attitudes reported additionally a lower level of mind/body quality of life than members of the instrumental group ($F(3)=5.52, p<0.01$, post hoc: neutral<instrumental, $p<0.05$). In the relational domain, participants with neutral scored lower than individuals in all three other groups ($F(3)=8.20, p<0.001$, post hoc: neutral<combined, $p<0.01$, neutral<expressive, $p<0.01$, neutral<instrumental, $p<0.001$).

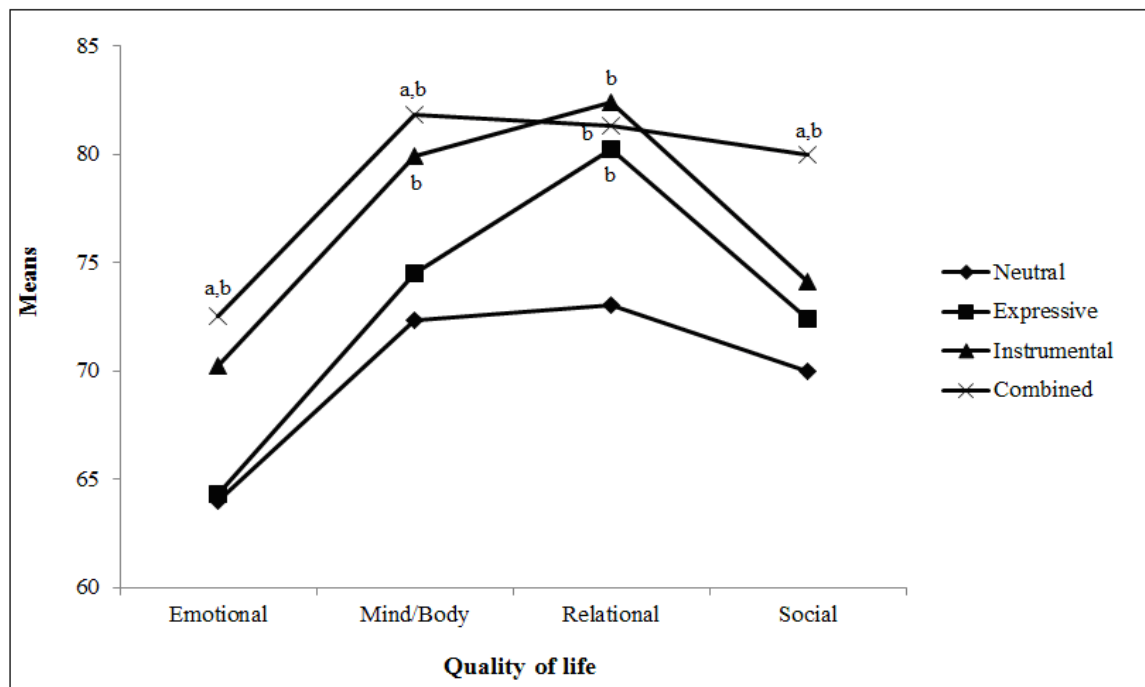


Figure 5. FertiQoL-scores and gender role attitude categories in the group of German men and women

FertiQoL mean scores were adjusted to gender and education

^a significantly differed from expressive group at least at level $p<0.05$

^b significantly differed from neutral group at least at level $p<0.05$

$N_{neutral}=61$

$N_{expressive}=61$

$N_{instrumental}=63$

$N_{combined}=53$

It was remarkable that Hungarian individuals in the expressive category seemed to be on the lowest level of quality of life compared with the combined group (Figure 6). On all four QoL-scales, belonging to the combined group was associated with the highest scores concerning the Hungarian sample (FertiQoL emotional: $F(3)=2.35, p<0.05$, post hoc: expressive<combined, $p<0.05$; FertiQoL mind/body: $F(3)=2.27, p<0.05$, post hoc: expressive<combined, $p<0.05$; FertiQoL relational: $F(3)=3.98, p<0.01$, post hoc: expressive<combined, instrumental<combined, $p<0.05$; FertiQoL social: $F(3)=3.57, p<0.05$, post hoc: neutral<combined, expressive<combined, instrumental<combined, $p<0.05$). Even par-

ticipants with instrumental and neutral attitudes reported about lower relational and social quality of life than members of the combined cluster.

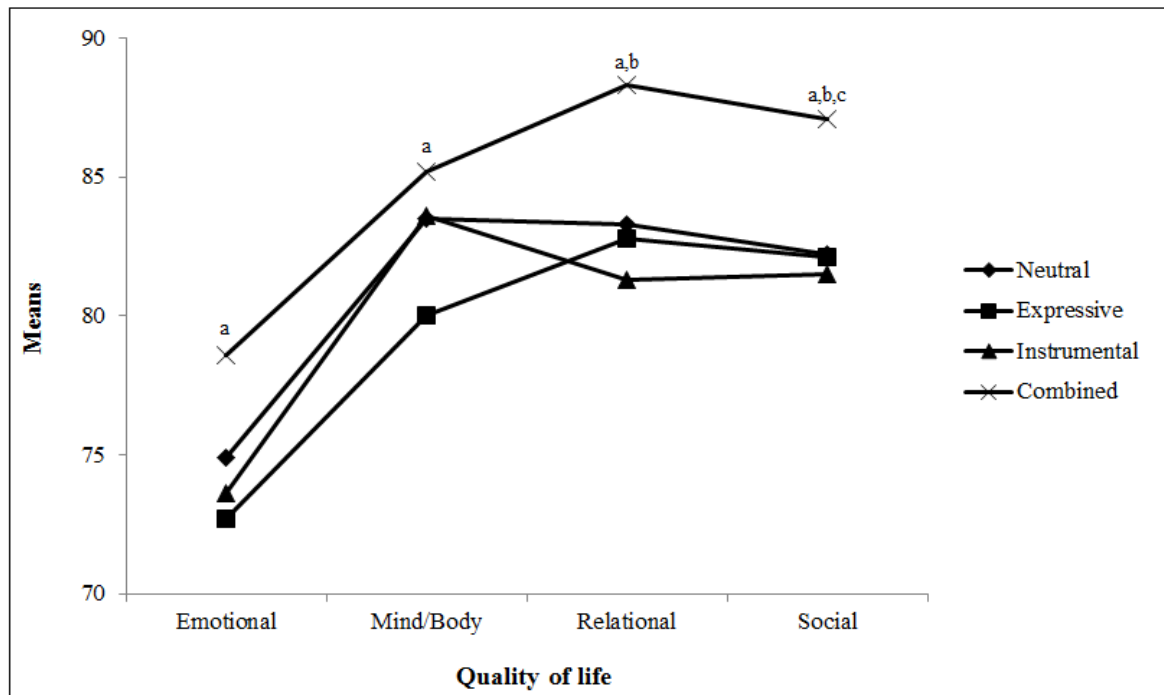


Figure 6. FertiQoL-scores and gender role attitude categories in the group of Hungarian men and women

FertiQoL mean scores were adjusted to gender and education

^a significantly differed from expressive group at level $p < 0.05$

^b significantly differed from instrumental group at level $p < 0.05$

^c significantly differed from neutral group at level $p < 0.05$

$N_{\text{neutral}}=48$

$N_{\text{expressive}}=69$

$N_{\text{instrumental}}=54$

$N_{\text{combined}}=81$

5. DISCUSSION

5.1. STUDY I “EXPLORATORY ANALYSIS WITH PSYCHOSOCIAL ASPECTS IN HUNGARIAN INFERTILE MEN AND WOMEN”

Our preliminary study is essential because the total fertility rate decreased in Hungary in the last few years and stood in the lowest-low area with its value of 1.24 in 2011, so financial supporting of assisted reproductive techniques is also again and again discussed in the sphere of media and policies [4]. To provide a more effective support for couples with involuntary childlessness, there is a need to understand their psychosocial status. Previously, there was a lack of psychosocial investigation with infertile Hungarian people. Another advantage of the study is in documenting the psychosocial aspects in experiencing involuntary childlessness both in women and men.

Infertility-related stress

In line with our expectation, women are affected by infertility-related strain in a more explicit way than men because unmet fertility desires create a greater frustration in women than in men [62, 188-190]. Social concerns, such as frustration mentioning other's children are more typical among women [138]. Surprisingly, Hungarian men showed several fertility problems and emphasized more clearly their need for fatherhood than men in the Canadian reference group did. In this aspect, we can suspect cultural differences in the value of a child. Engagement to wish to have a child could indicate more studies comparing societies with different approach of pronatalism. It is a further question if Hungarian men's views and experiences regarding infertility are really closer to the views and experiences of women or they tended to answer questionnaires in line with social expectations [77].

Gender role identification and attitudes

Femininity is strongly connected with fewer aspects of infertility-related stress. In addition, purely high femininity correlates for both men and women with poorer health status [191]. In case of women, a previous study reported that they felt themselves less feminine as a consequence of infertility [138], so in reverse if they show several feminine attitudes or feel themselves frustrated in their gender roles, it can occur an increased stress-level in their psychological status [76, 192]. In our study, women with unwanted childlessness showed more femi-

ninity than the reference population which could be a compensatory to prove being a really women although they have not been to be able to get pregnant already. Fertility problems were predicted by having a general feminine attitude, but surprisingly, thinking about domestic gender roles in a traditional way provides a lower possibility to experience infertility-related stress. Indeed, these results are paradoxical at the first sight. However, we controlled the measure for gender there is still a need for further analysis of comparing male and female groups. Some authors have already found that feminine or less masculine women have felt a greater degree of anxiety or distress [138, 140, 193] and at the same time it have been proven that fitting the most traditional societal role expectation provides for men a protection against psychiatric disorders [194]. We have to mention that the used questionnaire (MFRQ-MR) contains statements concerning gender roles not only in child rearing, but also in couple relationship. In this sense, following some rules of together-living of couples could give a frame to people's lives and give a source for facing the crisis of infertility. Couples with involuntary childlessness tend to renew the divided gender roles and the strengthened masculinity for men provides a great protection against the infertility-related stress [188].

Child wish motives

Strong parental wishes can be the base of infertility-related stress, principally for the discrepancy of the unfulfilled need for parenthood [48, 185]. Social and emotional child wish motives could be the predictors of infertility-caused concerns, but their effects should be interpreted in light of other personal factors, e.g. general health status. If men are engaged to want to have a child and speak about fertility problem, it reduces the problems in the marital relationship [113]. As expected, men with involuntary childlessness who reported a kind of great level of emotional engagement for having a child, show a greater level of infertility-caused stress [188]: Hungarian men compared with Canadian reference population experience infertility generally more stressful and have a stronger need for parenthood. The need for more children than they born actually and the high value of family in Hungary have already reported in an epidemiological survey by Kopp and Skrabski [164].

Subjective well-being

We did not find any differences between women in the Hungarian reference population and involuntary childless women in the level of depression. Some other studies have showed the same results [138, 140]. Expressed anxiety and mood changes could belong only to the infertility-related areas of one's life while experiencing infertility could be divided of other, e.g.

environmental, parts of life which give some satisfaction to people facing involuntary childlessness [85, 93].

Regarding subjective well-being, women complained about moderate symptoms of lack of general/mental health, but in the area of depression, satisfaction with marital life, child wish motives, or attitudes towards domestic gender roles, individuals did not express differences according to gender. Infertile men did not show any differences when compared with reference population in domains of subjective wellbeing which can connect to other areas of their life out of fertility problems. In addition, men in our sample considered to believe deeper in meaning of life than infertile women, but moreover than Hungarian men generally did. Life meaning is a coping strategy that could give men facing involuntary childlessness a source for being able to bear the burdens of the reproductive problems [77, 180]. In this study, we did not observe the coping strategies within the couples, but the optimistic coping on the half of the men can indicate a greater distress in women whose aspects are presented among our results as well [59, 103].

Marital adjustment

Good marital adjustment of Hungarian infertile men and women verifies earlier results [190, 195], but it is in contrast with other findings [45, 138, 192, 193]. A long and deep relationship can protect the couples against the burdens of infertility, particularly against the burdens of relationship concerns as our results showed.

5.2. STUDY II “DEPRESSION AND PSYCHOSOCIAL CONSEQUENCES OF INFERTILITY ON THE LEVEL OF COUPLES”

Depressive symptomatology in a Hungarian infertile sample

Prevalence of severity categories of depression was as frequent in the infertile study sample as in the general Hungarian population. Only mild depression seemed to be more prevalent in the sample of infertile individuals. This result is in line with recent findings that depression is common in infertile population but it does not meet the criteria of clinical depression in several cases [85, 87].

Interrelations between severity of depression and infertility-related distress – on the personal level

Severity of depression showed gender differences [73, 170], and depression was severe if the partner reported depression [196], but we did not find any correlation between severity of depression and other demographic or personal data.

Recent studies agreed that severe depression caused a general increase in all domain of fertility problem concerns [62, 68, 90, 91]. These relations were proven in our study only on two scales, namely sexual and relational concerns. In women, only moderately severe/severe depression correlated with higher level of distress. At the same time, only occurrence of male depression – regardless of the severity of depression – was related with more fertility concerns. This result adds a complement to a recent finding that severe depressive symptoms – regardless of gender – increase personal and marital distress [170].

Interrelations in severity of depression and infertility-related distress – on the relational level

There was a relationship between partners' depression: so if the man or woman had depression, the partner was likely also depressed in the same extent. We found an unambiguous correlation in relational concerns: both female and male depression increases partner's infertility-related distress in the relational field. Previous studies confirmed that infertility affects the couple relationship in a different way than the other parts of life [101, 197].

Male sexual concerns were associated with partner's depression, in contrast, female sexual concerns were not influenced by partner's depression. A body of literature concluded that men seemed to be very sensitive for marital effects. Men are twice as likely to develop severe depression if they get low emotional support, low appreciation and high excessive demands from the partner [52]. Should a woman perceive social support from her male partner and her family, it is associated not only with her lower stress-level, but with man's lower distress [60]. Male marital and sexual satisfaction and sexual self-esteem are raised, when the relationship lasts for longer and woman rates the quality of the relationship and especially the quality of the sexual relationship for good [198]. Nevertheless, anxiety has a stronger correlation with infertility-related sexual concerns in men than in women [189]. For men, anxiety is directly connected with sexual performance; a female partner with depressive symptoms might strengthen this connection, so men tend to feel negative effects of infertility on their sexual life.

Child wish aspects

We can summarize that both one's own and the partner's depression level have a correlation with sexual and relational concerns, but do not have with rejection of childfree lifestyle and

need for parenthood. Authors of Fertility Problem Inventory have already found that these two latter scales which refer to child wish motives are judged differently than the scales which are connected to psychosocial consequences of infertility [62]. In the retest of the inventory [199], scales representing importance of parenthood (rejection of childfree lifestyle and need for parenthood) correlated with each other stronger than with the scales connected to quality of life (social, sexual, relational concerns). In the Greek validation of the inventory, spousal and social concerns had stronger correlations with depression, anxiety and other negative mood states, than the parenthood-related scales [90].

There was a tendency that mild depressive symptoms were associated with need for parenthood in Hungarian infertile men. In our pilot-study, we have already highlighted that need for parenthood is more important to the Hungarian men compared with Canadian and German samples (s. 4. RESULTS: 4.1.2. Differences from the reference populations). Additionally, a social study confirmed that the fulfilment of the parental role was an important life goal not only for Hungarian women, but also for Hungarian men [162]. Several systematic reviews pointed out that involuntary childlessness could be as stressful for the man as for the woman, especially in pronatalist societies [47, 200].

Relations between depression and fertility specific quality of life on the personal level

We found that a long-term unwanted childlessness resulted in worse quality of life for men. Similar association between fertility specific QoL and duration of infertility was detected only in groups of women before [201]. However, women's fertility specific QoL did correlate neither with duration of child wish [101, 197], nor with other demographic variables in our study. Men's higher level of depression had a moderately strong association with lower QoL in each dimension. Similar strong correlation in case of women was revealed only in emotional and mind/body quality of life. As discussed above, women's emotional quality of life was poorer than their QoL in other dimensions. Their QoL in mind/body area seems to be lower than relational and social QoL as well. Emotional and mind/body dimensions of Fer-tiQoL focus on personal reactions to infertility, while relational and social QoL rate the person's social relations. So women might experience in different ways how infertility influences their personal emotional and cognitive well-being and how it influences their social life. A recent study also pointed out that women in an infertile sample had a quite worse general psychological quality of life, while their general social quality of life was normal [85]. The same study found a reverse result in infertile men: they had worse social QoL and better psychological QoL than women.

Relations between depression and fertility specific quality of life on the relational level

Relational dimension of FertiQoL seemed to be a unique domain of quality of life. Firstly, we did not find any gender differences in this field [101, 197]. Secondly, female depression had a weak correlation with personal relational quality of life [197], and did not have any relation to partner's relational QoL.

One of our most important results is that female depression correlated with lower levels of men's emotional, mind/body and social fertility specific quality of life. Our results, considering conclusions of recent studies, tend to show that severe depression of women decreases the level of quality of life in men [85, 125, 170]. We can assume that female depression decreases the quality of life of the couple (so the QoL of the man), while male depression does not have any effect on couple's quality of life. Other studies summarize if women don't use positive coping strategies (e. g. seeking social support, positive reframing), it increases both personal and partners' infertility specific concerns [59]. At the same time, if men show optimistic expressions or reframe positively a problem, it rather increases depression and distress in women [59, 103]. We have acknowledge the results in the literature of psychosocial aspects in infertility that men are twice at the risk to have severe depression if they don't get enough emotional support and appreciation [52]. We can consider additionally another background factor behind the correlation of female depression and male lower QoL, namely the cognitive misconception of men in way they tend to see their wife more depressed than women feel themselves [77].

5.3. STUDY III “FERTILITY SPECIFIC QUALITY OF LIFE IN INTERNATIONAL SETTING”

German-Hungarian differences

German couples were older aged and had their relationship for a longer time than their Hungarian counterparts, while the length of child wish did not show any cross-country difference. There has been a difference in the age at first childbirth between Hungarian and German women for decades, although postponement of parenthood is presented in both countries [202]. Several couples with higher levels of education were found in the study (41.3% in Hungarian, 34.2% in German group). It does not correspond to the representation of persons with university degree in the general population of both countries [203, 204]. This share is in line with recent results that high education is positively associated with lifetime fertility intentions in women in Europe [149, 162]. However, the increasing number of women and men

with non-academic educational level in our study – compared with reports of recent studies in German and Hungarian samples of involuntary childless couples (s. 4. RESULTS: 4.1.1. Sample characteristics) [93, 205, 206] – is indeed impressive because it suggests that information about fertility treatments is more widely available and more individuals with lower education, supposedly with less financial sources, can afford to start an assisted reproduction treatment. Our hypothesis that Hungarian couples have a poorer quality of life because of a stronger identification with traditional gender roles did not tend to be proven. However, Hungarian participants have more self-reported expressive attitudes than German ones. This difference was significant for both men and women so our hypothesis that a more traditional gender role model is established among Hungarians was partly confirmed. Surprisingly, Hungarian couples rated quality of life regarding infertility-related domains higher than their German counterparts. In the interpretation of these results, we consider that factors from other parts of life could enhance the quality of life that was not accurately considered in our study design. In cultures where traditional values have a stronger impact on one's life, extended and strong kinship relations normalize unfulfilled social roles [207]. Generally, the presence of an appreciative social environment, including supportive medical staff leads to better psychological well-being [52, 208]. Moreover, perceived social support decreases the infertility-specific stress in personal and relational level [209]. On the other hand, the importance of social expectations may play a role in higher quality of life than expected in the case of Hungarian respondents [77].

We have to acknowledge as another background factor that health insurance covers assisted reproductive treatments in different extent in the two countries, although reproductive medicine provides the same services. Disparities in reproductive health care may have another impact on experiencing infertility. In Hungary, National Health Insurance Fund (OEP) reimburses the fertility diagnostic procedure, five times the IVF-cycle, six times the insemination treatment and medications up to 70% [27, 30]. In Germany, health insurance companies cover the costs of diagnosis up to 100%, although, the costs of treatment and medication only up to 50 % [210]. Disparities in reproductive health care may have another impact on infertility specific quality of life. Couples seeking fertility treatment in Germany seem to place a great value on becoming parent through assisted reproductive technology because they decide to bear the high payment required by ART [211].

Hofstede [135] classified both Hungary and Germany as masculine societies in which men are expected to be assertive and to focus on material success while women are expected to be modest, tender and to concern with quality of life. In these cultural settings, traditional “mas-

culinity” and “femininity” are encouraged. From this perspective, there is not a huge difference between Germany and Hungary. It is also important to mention that gender role expectations may have changed even recently. A Hungarian sociological study [162] found that individuals shared not only either a modern or a traditional point of view about gender roles, but the majority of the population agreed with mixed gender role attitudes. At the same time, West-German men scored in a recent study affective advantages of having children higher than it was expected [212]. Another interpretation could be that the high educational status of Hungarian women (compared to German women) could indirectly increase QoL of the couple because a potential satisfying work situation might offer an alternative life goal if ART should fail.

Gender and educational differences

We accentuated the cross-country differences in our study, although some differences between genders and educational groups can be also described on the basis of our results. Men had better quality of life regarding emotional, mind/body and social domains, as well as in recent studies [45, 61, 77, 100, 101, 103]. Only relationship specific quality of life was as high for women as for men, what might indicate that our study members belong to the group of infertile couples whose relationship was strengthened by challenges of involuntary childlessness [114, 118, 213]. We have to consider that the study was conducted before the treatment although gender differences can change or turn to non-significant during and after the treatment [43, 200, 214].

The higher level of education could enhance quality of life experiencing in infertility [101, 215] Our results confirmed partly the finding that the poorest level of education decreased quality of life [213] and only in groups of women.

Relationships between gender role attitudes and infertility specific quality of life

The most important finding of the present study is the connection between gender role attitudes and infertility specific quality of life. Our second hypothesis that expressive attitudes are associated with poorer quality of life and instrumental attitudes correlate with better quality of life was not confirmed. We conducted the analysis with gender role attitude groups in a more complex way using a four-fold classification of gender role attitudes.

Combined attitudes (that means having incorporated both expressive and instrumental attitudes) tend to have a strong correlation with good quality of life in all areas affected by infertility in both Germany and Hungary. The central finding of our study is that flexibility in the

gender role attitudes (combined attitudes) might act as a buffer against infertility-related stress for both members of the couple. Similar results have not been found yet in infertile subjects [138, 140], but higher level in mental health was proven to be supported by combined role attitudes in general populations [129, 216-218]

Subjects with expressive role attitudes tend to be the sensitive for psychosocial consequences of infertility. This type of gender role categories is connected with low QoL in Hungarian couples in all domains. In the Hungarian group, our hypothesis was supported completely in that expressive attitudes were associated with expression of negative emotions and other burdens evoked by involuntary childlessness. This result is notable because at this point we can find a complex and strong link between burdens of infertility and sensitivity of subjects with expressive attitudes that may be determined through strong cultural values of expressivity of emotions and handling problems regarding transition to parenthood.

However, German participants with neutral gender role attitudes report also about lower levels of quality of life than members of instrumental and combined cluster. Regarding German individuals who attribute themselves neither expressive nor instrumental role attitudes may have more problems to create a confident identity. Neutral gender role attitudes correlate with greater anxiety and distress in such a gender role specific topic like infertility [50, 140].

5.4. CONCLUSIONS

A main strength of the thesis is that it broadens the literature of infertility with psychosocial approach in Central and Eastern Europe. Only a few recent studies investigated relevant topics in this geographic area, for instance couples' general experiences of infertility in a traditional milieu, infertile women's gender role attitudes, sexual adjustment and feelings of stigmatization in this region [188, 213, 219, 220]. In addition, there is an expressed need in the literature for investigating infertility-specific psychosocial aspects in different sociocultural contexts [200].

We used disease-specific questionnaires (FPI, FertiQoL) in order to get a picture of the infertile couples' experiences covering all substantive problems. As FertiQoL was developed internationally, it was a proper measurement to detect cross-country differences, too.

Sample sizes of study II and III were sufficient high and data was collected in five Hungarian fertility centres in order to make the sample quite representative. These studies involved couple-based samples.

This pilot study offers a bright approach in investigating several psychosocial factors firstly in a Hungarian sample as our conceptual framework due to biopsychosocial model in infertility contained infertility-related stress, gender role-related aspects, child wish motives, personal well-being and marital satisfaction. Instead of the small sample size, we have found convincing results which ensure good basis for further and brighter investigations.

The strength of the study II is that it adds new information about psychological reactions of Hungarian couples to infertility: we measured infertility-related stress and quality of life, and their connections to depression. Associations were detected both on personal level and on couple level. It is an important issue that infertility affects rather couples than individuals.

To the best of our knowledge, the study III is the first investigation measuring self-reported gender role attributes in the field of infertility conducted in two different countries. Using a couple-based and cross-country study design, this study gives a differentiated picture of interrelations between gender role attitudes and infertility related quality of life. This study adds new information to the literature focusing on the close relations between gender roles and infertility.

5.5. MAIN STATEMENTS

Infertility-related stress is principally related to femininity, traditional gender-role attitudes, quality of life and marital satisfaction.

- Need for parenthood is an important issue for Hungarian women and men. Men's socially determined child wish motives are stronger compared to Canadian and German groups, respectively; and more depressive symptoms tend to be present in Hungarian infertile men with greater need for parenthood.
- Gender differences were detected on many domains of fertility specific quality of life and infertility-related distress.
- For women, only severe depressive symptoms were associated with higher stress regarding infertility, while for men, both mild and severe depression occurred in more infertility-related problems.
- Female depression was stronger of importance in the couple relationship, because it correlated with men's infertility-related sexual concerns and men's lower quality of life almost in each fertility specific dimension.

- Hungarian infertile population is younger aged, has better infertility-related quality of life than German infertile population (Further investigations regarding cross-country differences in fertility specific quality of life are still needed).
- In infertile women, low education is connected with poor quality of life.
- In the Hungarian group, combined gender role attitudes (use of both expressive communicating and instrumental acting attitudes) are associated with higher levels of fertility specific quality of life compared with other gender role attitudes.

5.6. LIMITATIONS AND SUGGESTIONS FOR FURTHER RESEARCH

By interpreting the results of all the studies, we have also to consider some design limitations. The data collection of the preliminary study (study I) was planned for a short time period and, in contrast to our expectations, the participation rate was low. Men with higher level of stress might have filled out the questionnaires. In a larger sample, our results could be verified or other correlations would be found among the factors. Psychosocial reactions to infertility should have been compared in sight of the origin of infertility which process was missed in this study because of the sample size.

Response rate of the Hungarian sample in study II was still low which could be responsible for bias in results. Probably, we could get a more proper view of depression prevalence in our sample compared with general population, if we would have used only age- and education-matched data for the comparison. Responsibility of our results would have been increased by using more measurement for obtaining depression-related data. Because of low internal consistency, social concerns scale fell out. On this scale, we might have got some similar findings as in the pilot-study (s. 4. RESULTS: 4.1. Study I), because experiencing infertility is influenced by social support from family and friends [60], and by social stigma [68]. Changes in relational quality of life should be measured in its complexity, in more different study settings and with other controlled variables.

In the study III, the number of participants is altogether satisfactory (N=540), although the response rate of Hungarian participants was low. This fact means that a significant part of people facing infertility is not open to speak about their infertile status. We may only suppose that our participants represent infertile members who can “accept” infertility and disclose their fertility difficulties, moreover, do not suffer in a great extent from infertility. On the other hand, the non-responding individuals may have more problems to cope with infertility, but seclusion and secrecy to distant relationships could make them adjust easier to involuntary

childlessness [209]. Whereas the data of German couples were collected only in one fertility centre which can lead to contra selected results. In order to get more representative results, it would be desirable to expand the study and involve additional fertility clinics. We focused mainly on gender related attributes, so other, perhaps important variables such as personality traits, general well-being, or self-coherence were not taken into account. We did not calculate with medical diagnosis, either because the rate of unexplained infertility and no data about the cause was too high in the sample what could have resulted in biased differences.

Our studies involved only clinical samples and that means that our results could be relevant only for involuntary childless couples seeking reproductive medical services. This selection leads to have no information about unwanted childless couples who don't require medical treatments (approximately 50% of the infertile population) [10]. Several studies working with clinical infertile sample are criticized to represent mainly Caucasian, high qualified individuals from the middle-class of developed societies [49, 71]. Whether a couple attends a reproductive clinic could be influenced by many factors, e.g. whether they are informed about the availability of the ARTs, whether they considered childlessness as a problem, whether they can afford the high-cost treatments, whether they raise ethical/religious convictions against ART, or whether they are engaged for ART. At the same time, only some studies in the literature were conducted with non-clinical samples, these were either qualitative studies e.g. [161] or parts of a broader panel-study [152, 221]. Studies involving non-clinical infertile samples are encouraged to be made with reconsideration of the medical definition of infertility itself (motivation for parenthood, duration of child wish and failing to conceive). Self-definition as infertile could be a useful variable in these cases. As non-clinical infertile population is difficult to be recruited, so called piggy back studies could be a good solution as recommended by Greil [71], where fertility-related questions are nested in great epidemiological studies.

Inclusion criteria of study II and III was for the involuntary childless couples to coming first to the fertility clinic where the studies were conducted. On the one hand, we wanted to control and exclude as possible the influence of treatments which are connected to increased fertility-related distress. But on the other hand, the timing of data collection (first medical consultation) raises some concerns leading to other bias of the results, e.g. couples may come to the first appointment with hopefulness believing in the success of medical support and assisted reproductive technologies (hopeful period of the emotional roller coaster experienced throughout the process of infertility [41], or insecurity feeling because of the unfamiliar situation and unknown treatments may arise anxiety in couples indicating to meet the social desirability during the participation of the study (this tendency may be more common in men and

so could be a contribution to male better psychological reactions at the beginning of the treatment [71]. At the same time, a study conducted with individuals at the time of entering the reproductive health care may be a good basis for longitudinal investigations in which changes in gender differences and in interrelations between the partner's psychological responses could be revealed during the time of the treatments.

All of the studies were cross-sectional. This study design does not allow to state robust conclusions and causal relations, only correlations between the variables can be stated. For this reason, it is recommended to plan further follow-up studies over infertility treatments addressing the following questions:

1. How individuals' self-identification as infertile does contribute to the interrelation between infertility specific quality of life or infertility-related stress and other psychosocial aspects e.g. gender role attitudes, depression and child wish motives.
2. Does any change occur in gender role attitudes, depression and child wish motives over the time of infertility [151, 222] .

It is recommended for further Hungarian infertility research to focus on investigation regarding infertility prevalence and epidemiology, as well. As it is described in the Introduction section, documentation of infertility pregnancies and their outcomes are archived by two different centres (KSH, OEP) so representative follow-up studies could fill the lack of psychosocial consequences in infertility pregnancies and child rearing.

5.7. IMPLICATIONS FOR THE PRACTICE

Medical staff should give patients more information about links between gender associated attitudes and experiencing difficulties of becoming a parent. In psychosocial infertility counselling for individuals or for couples, professionals could accent the topic of gender roles and encourage flexibility in living them, developing a kind of combined strategy to cope with the burden of infertility. The strategy of combined expressive and instrumental attitudes was proven to act as a buffer against infertility-related stress for both members of the couple in two European countries and therefore it can be recommended to infertile couples in infertility counselling.

Our findings regarding cross-country differences give new implications in planning international or national guidelines for psychological counselling with infertile individuals or couples. In Hungary, the professional protocol for assisted reproduction does not include a section for psychosocial counselling. When special characteristics for Hungarian couples attend-

ing fertility clinics will be contained in the preparation of a national psychosocial guideline, it enables to devise a more tailored support system for people seeking psychosocial services. European Society of Human Reproduction and Embryology (ESHRE) Special Interest Group „Psychology and Counselling” published in 1999 the international guidelines for counselling psychological problems during infertility and infertility treatment. The guidelines recommend psychological counselling (psychoeducation, support counselling and therapeutic counselling) before, during and after medical treatment determining special cases when it is urgently needed [223]. Since the Hungarian protocol about infertility care and assisted reproduction does not contain guidelines for psychosocial care of infertile patients and consequently, psychosocial services are not reimbursed by OEP [224], involuntary childless women and men do not seek psychological support at all, or only in some cases. Upcoming protocols should follow the existing practical guidelines and include evidence from interventional studies. Researchers agree that psychological consultation could lead to better psychological well-being of the infertile individuals in specific cases [225-228]. Scientific reviews summarize that psychological support for groups tend to be the most successful method compared with online, individual and couple consultation. Group interventions focusing on infertility-related information and coping skills (e.g. mind-body program, relaxation) have taken the greatest effect on participants’ psychological adjustment to infertility. Short-term psychological consultation and psychotherapy working with cognitive-behavioural therapy elements can reduce stress and help dealing with negative emotions [225, 227, 228].

Investigations of quality of life and psychological well-being make a good base for providing psychosocial care for infertile patients. Our results could be useful in the practical work as well. Our results confirmed gender differences in experiencing infertility that means that involuntary childlessness is a greater psychological burden for women than for men, and women express their negative feelings concerning infertility in a more articulated form than men. Counsellors should take an accent on and explore gender differences in reactions to infertility, especially if the members of the infertile couple come together to the psychosocial counselling or therapy. Although, men report about better quality of life parameters than women, psychosocial care should be offered for them, as well, because partners’ responses to infertility connect and react to each other. Our results showed that depressive mood of the woman can influence negatively the quality of life of the man.

We don’t have any reliable results about sexual responses of couples in dealing infertility, although we chose the Fertility Problem Inventory to use because it measures the sexual concerns as well. Sexuality is a crucial area in infertile couples’ life because it could become a

principally goal-orientated activity towards procreation rather than a mutual pleasure [20, 37]. As sexuality is an important part of one's self-esteem and a major component of a harmonic couple relationship, we suggest counsellors to take always time to explore couple's sexual satisfaction and changes in their sexual life since wishing to have a child.

Depression is a most common symptom experienced by infertile individuals. In the study II, the great proportion of the sample reported about the absence of depression or only some symptoms, we have to mention that 47 participants (17%) had moderately severe or severe depression. This rate is in line with recent results [52, 87]. In these cases, more severe depression should be screened at first medical consultation yet, because depression at the beginning of fertility treatment is a strong predictor for depression after treatment [87].

Our results add important information for reproductive medical care because they present the depressive symptomatology in patients starting their infertility treatment, and how depression impacts on one's own and the partner's distress. In our sample, 0.02% of the women reported diagnosed depression. This rate is much lower than the data of a Danish representative population-based study where 2.6% of infertile women had a diagnosis of depression [83]. The huge discrepancy between the two results could be explained that we used self-reporting questions regarding physical and mental disorders. Above all, we have to consider that depression in many individuals engaging infertility treatments is not diagnosed and treated [72]. More severe depression should be screened at first medical consultation yet, because depression at the beginning of fertility treatment is a strong predictor for depression after treatment [87, 89, 229, 230] and could raise depression in the partner, as well [124]. In the practice, depression of ART-patients could be optimized by reproductive staff through proper communication, respect to the patient, information provision, continuity of care and involving the patient into the decision making process [231].

6. SUMMARY

Infertility is a worldwide public health problem affecting the 10% of the population of reproductive age in developed countries including Hungary. A couple is defined as infertile if they can archive pregnancy after at least a one-year period of regular, unprotected sexual intercourse. To better understand and provide a good professional service to patients with infertility, it is recommended to have proper knowledge about how couples adjust psychologically to infertility.

In our research work, we investigated infertility-related stress and fertility specific quality of life by measuring gender differences, possible characteristics in the Hungarian sample. We analyzed effects of severity of depression on infertility specific aspects on the level of the person and the couple. Relations between gender role attitudes and fertility specific quality of life were measured in an international setting.

Infertility-related stress is principally connected femininity, traditional gender-role attitudes, quality of life and marital satisfaction. Need for parenthood is an important issue for Hungarian women and men. Men's socially determined child wish motives are stronger compared to Canadian and German groups, respectively; and more depressive symptoms tend to be present in Hungarian infertile men with greater need for parenthood. Women reported greater burden in many domains of fertility specific quality of life and infertility-related concerns. For women, only severe depressive symptoms were associated with higher stress regarding infertility, while for men, both mild and severe depression lead to more infertility-related problems. Female depression was stronger of importance in the couple relationship, because it increased men's sexual concerns and correlated with men's lower quality of life almost in each fertility specific dimension. Hungarian infertile population is younger aged, has better infertility-related quality of life than German infertile population. In women, low education is connected with poor quality of life. In the Hungarian group, using of both "expressive" communicating (also known as traditionally feminine) and instrumental acting attitudes (also known as traditionally masculine) is associated with higher levels of quality of life compared with using other gender role attitudes.

Evidence was found in characteristic psychological consequences of infertility. In psychosocial infertility counselling for individuals or for couples, professionals could accent the topics gender differences in experiencing infertility, impact of female's reactions on the level of the relationship, effects of gender role attitudes of adjustment to infertility. Our findings give new implications in planning national guidelines for psychological counselling with infertile individuals or couples in Hungary.

ÖSSZEFOGLALÁS

A meddőség világ szinten jelen lévő népegészségügyi probléma, mely a fejlett országok, így Magyarország felnőtt lakosságának 10%-át érinti. Egy pár akkor tekintünk meddőnek, ha legalább egy évnyi, rendszeres, védekezés nélküli szexuális élet mellett nem következik be a fogamzás.

Kutatómunkánkban a meddőséggel összefüggő distresszt és a meddőséghez kapcsolódó életminőséget vizsgáltuk, nemi különbségek és magyar mintában megjelenő jellegzetességek mentén. Megvizsgáltuk a depresszió súlyosságának hatását a meddőséggel összefüggő pszichés változókkal kapcsolatban az egyének és a párok szintjén. Nemzetközi összehasonlításban mértük fel a nemi szerep-beállítódások és a meddőséghez kapcsolódó életminőség összefüggéseit.

A meddőségi stresszt elsősorban a nőiesség, a hagyományos nemi szerep-beállítódások, az életminőség és párkapcsolati elégedettség határozzák meg. A szülővé válás fontos igény a magyar nők és férfiak számára. Kanadai és német csoportokkal összevetve, a magyar férfiak társas gyermekvállalási motívumai erősebbek, és szülővé válás igénye összefüggést mutat a depresszív tünetek megjelenésével. A meddőségre adott pszichés válaszokban a nők nagyobb megterhelésről számoltak be.

A nőknél a súlyos depresszió hatása erősebb a meddőséggel összefüggő distresszre nézve, mint az enyhébb tüneteké, a férfiaknál maga a depressziós tünetek megjelenése is több distresszt eredményez. A nők depressziója a párkapcsolat szintjén nagyobb hatással bír, mivel a férfi szexuális aggodalmainak növekedésével és életminőségének csökkenésével áll kapcsolatban. A magyar meddő populáció átlagosan fiatalabb, mint a német és jobb, meddőséggel összefüggő életminőségi mutatókkal rendelkezik. Magyar mintában a mind az érzelem kifejező (tradicionalisan női) mind a tevékeny (tradicionalisan férfi) nemi szerep-beállítódások használata jobb életminőséggel jár, mintha az egyén csak az egyik, vagy másik nemi szerep-beállítódást használná vagy egyiket sem.

Vizsgálatainkban a meddőség jellegzetes pszichés következményeit tártuk fel magyar mintán. Már az orvosi személyzet is adhat információkat az érintetteknek a nem kívánt gyermektelenség pszichológiai következményeiről. Eredményeink alapján javasoljuk, hogy a meddőségi pszichológiai konzultáció fő témái a meddőségre adott eltérő nemi válaszok, a női reakciók párkapcsolatra gyakorolt hatásai és a nemi szerep-beállítódások a meddőséghez való alkalmazkodásra gyakorolt hatásai legyenek. Eredményeink hozzájárulnak a meddő személyek és párok segítségét biztosító meddőségi pszichológiai konzultációk szakmai protokolljának megfelelő összeállításához.

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7.2. LIST OF PUBLICATIONS



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PUBLICATIONS



Register number: DEENKÉTK/395/2014.
Item number:
Subject: Ph.D. List of Publications

Candidate: Réka Eszter Cserepes
Neptun ID: JI4B4Z
Doctoral School: Doctoral School of Health Sciences
MTMT ID: 10032814

List of publications related to the dissertation

1. **Cserepes, R.**, Bugán, A., Kőrösi, T., Tóth, B., Rösner, S., Strowitzki, T., Wischmann, T.: Infertility specific quality of life and gender role attitudes in German and Hungarian involuntary childless couples =Infertilitätsbezogene Lebensqualität und persönliche Geschlechtsrollenverhaltens infertiler Paare in Deutschland und in Ungarn. *Geburtshilfe Frauenheilkd.* 74 (11), 1009-1015, 2014.
IF:0.962 (2013)
2. **Cserepes, R.E.**, Kollár, J., Sápy, T., Wischmann, T., Bugán, A.: Effects of gender roles, child wish motives, subjective well-being, and marital adjustment on infertility-related stress: A preliminary study with a Hungarian sample of involuntary childless men and women. *Arch. Gynecol. Obstet.* 288 (4), 925-932, 2013.
DOI: <http://dx.doi.org/10.1007/s00404-013-2835-7>
IF:1.279





List of other publications

3. **Cserepes R.E.**, Bugán A.: A depressziós tünetegyüttes hatásai magyar meddő pároknál =Impacts of depressive symptomatology in Hungarian infertile couples.
Psychiatr. Hung. "közlésre elfogadva", 2014.
4. **Cserepes R.E.**, Kőrösi T., Bugán A.: A meddőséggel összefüggő életminőség jellemzői magyar pároknál.
Orv. Hetil. 155 (20), 783-788, 2014.
DOI: <http://dx.doi.org/10.1556/OH.2014.29867>
5. **Cserepes R.E.**: A reprodukciós zavar okozta stressz a párkapcsolatokban.
In: Tavasz Szél 2012: konferenciakötet. Szerk.: Fülöp P, Doktoranduszok Országos Szövetsége, Budapest, 288-294, 2012.
6. **Cserepes R.E.**, Pék G.: Az özvegység hatása a nőiség megélésére és a szubjektív jóllétre középkorú és idős asszonyok csoportjaiban.
Magyar Gerontol. 1 (3), 24-34, 2009.
7. **Cserepes R.E.**, Pék G.: Családi állapota: özvegy: Az özvegyasszonyok életében fellépő változások pszichológiai áttekintése, különös tekintettel a nemi szerep-módosulásokra.
Kharon. 13 (4), 41-51, 2009.
8. **Cserepes R.E.**: Átélni és túlélni: Az özvegység viselése idős asszonyok körében.
Juvenelia. 2, 82-92, 2008.

Total IF of journals (all publications): 2,241

Total IF of journals (publications related to the dissertation): 2,241

The Candidate's publication data submitted to the iDEa Tudóstér have been validated by DEENK on the basis of Web of Science, Scopus and Journal Citation Report (Impact Factor) databases.

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8. KEYWORDS

infertility
psychology
psychosocial
quality of life
distress
couple
gender role attitudes
depression
international

TÁRGYSZAVAK

meddőség
pszichológia
pszichoszociális
életminőség
distressz
pár
nemi szerep beállítódás
depresszió
nemzetközi

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10. ANNEX: PUBLICATIONS RELATED TO THE THESIS