

Carla Sofia Marques Rodrigues Gameiro

The relational ecology of the transition to parenthood in couples that conceived spontaneously or through Assisted Reproductive Technologies

Faculdade de Psicologia e Ciências da Educação
Universidade de Coimbra
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Title

The relational ecology of the transition to parenthood in couples that conceived spontaneously
or through Assisted Reproductive Technologies

Author

Carla Sofia Marques Rodrigues Gameiro

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*Why do you wish to know?
What will you do with your knowledge?*

Alison Smithson

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Abbreviations

ART – Assisted Reproductive Technologies

ESHRE – European Society of Human Reproduction and Embryology

ICSI - Intracytoplasmic sperm injection

IVF – In vitro fertilization

PSRM – Portuguese Society for Reproductive Medicine

SC – Spontaneous conception

WHO – World Health Organization

Abstract

Background. Infertility is a reproductive health problem defined by the World Health Organization as the inability of a couple to achieve conception or to bring a pregnancy to term after a year or more of regular, unprotected intercourse (WHO, 1992), that affects 9% of the population worldwide (Boivin, Bunting, Collins, & Nygren, 2007). Due to the strain of assisted reproductive technology (ART) treatments infertile couples have to undergo in order to pursue a much desired parenthood (Klonoff-Cohen, Chu, Natarajan, & Sieber, 2001) and to the increased obstetrical risks and medical complications associated with pregnancy following successful ART (Basso & Baird, 2003), it has been suggested that couples that conceive through ART may experience increased adjustment difficulties during their transition to parenthood (Colpin, 2002; Klock & Greenfeld, 2000). The present dissertation focused on the relational contexts of the transition to parenthood in couples that conceived spontaneously or through ART. At the theoretical level, we addressed the lack of a reference framework capable of integrating empirical findings by proposing a developmental ecological approach to parenting after infertility and assisted reproduction. At the empirical level, we investigated how a different and harder pathway to parenthood, that is, one that implies undergoing assisted reproduction treatments, impacts on the parents' psychosocial adjustment, on their socioemotional investment in their child and on their social relationships during their transition to parenthood.

Method. This was a longitudinal prospective study that followed 39 couples that conceived through ART and 34 couples that conceived spontaneously from their last pregnancy trimester (twenty-fourth pregnancy week), through birth and until their child was four months old. To investigate parents' psychosocial adjustment, as indicators of individual adjustment we assessed parents' subjective perception of pregnancy and parenthood (*single items developed for this study*), psychological distress (*Brief Symptom Inventory*) and quality of life (*WHOQOL - bref*) and at the relational level we considered satisfaction with the marital relationship (*ENRICH Marital Inventory*) and parenting stress (*Parenting Stress Index*). To investigate parents' socioemotional investment in their child we used the *Parental Investment in the Child* scale. Finally, to assess the parents' social relationships (structural and functional social network characteristics) across their transition to parenthood we used the *Convoy Model*. Socio-demographic, clinical, obstetrical and perinatal data was collected directly from the parents and from their medical records.

Results. Several relevant findings were reported. The transition to parenthood and parenting context of Portuguese men and women that conceived through ART or spontaneously proved to be similar: they showed similar adjustment levels and changes across the transition to parenthood, they presented a similar social context (i.e. similar structural and functional network changes across the transition to parenthood and similar associations between social network support and adjustment to parenthood and parental care) and they did not show differences in the investment they make in their child. However, some differences were also found: (1) parents that conceived through ART (especially women) perceived their pregnancy as being of higher risk and more demanding, but also more rewarding than parents that con-

ceived spontaneously; (2) fathers that conceived through ART considered themselves to be more competent fathers than those that conceived spontaneously; (3) parents that conceived through ART reported a decrease in their psychological well-being from pregnancy to the postpartum period that was not reported by parents that conceived spontaneously; (4) women that conceived through ART perceived higher levels of emotional and instrumental support from their less intimate nuclear family members and less from their friends than mothers that conceived spontaneously; and (5) compared to men that conceived spontaneously, men that conceived through ART perceived more support from less intimate than from more intimate nuclear family members. For both parents that conceived spontaneously or through ART, the transition to parenthood was characterized by (1) stability in (the inexistence of) psychological distress from pregnancy to the postpartum; (2) a decrease in their marital relationship from pregnancy to the postpartum; (3) several gender based differences in the overall levels and changes in their quality of life from pregnancy to the postpartum; (4) low levels of parenting stress four months after the partum; (5) a strong social nesting movement that consisted in drawing towards them their nuclear family members and that proved to be similar for both men and women; (6) significant associations between perceived network support in pregnancy and parental well-being and their socioemotional investment in their child four months after the partum, that varied as a function of the parents' gender, of the type of relationship involved and of the type of perceived support; and (7) a high resemblance between maternal and paternal investment in the child, four months after the partum, these being influenced by how satisfied parents were with their marital relationship and by the amount of support they perceived from their social network members.

Conclusions. Our results add to the field state-of-the-art by providing innovative evidence that all parents, regardless of the method of conception used to achieve pregnancy, seem to exhibit a social nesting movement in which their nuclear family members play a central role; that parents that conceive spontaneously or through ART do not differentiate in the investment they make in their child; and that parental investment is, to a large degree, a couple shared feature. Results also contribute to an already vast empirical literature that describes the transition to parenthood as a demanding period during which both members of the couple experience significant changes (at the individual, dyadic and social levels) and that shows that there are more similarities than differences in the way parents that conceive spontaneously or through ART live this transition period. However, they add to this literature by showing that these similarities do not only exist at the individual and dyadic level, but also at a broader social level. The main clinical implication deriving from the results presented is that healthcare professionals should be available to assist all couples in their efforts to adapt to the changes associated to the transition to parenthood (Cowan & Cowan, 1995), taking into consideration the different ways men and women experience this life transition. However, sensitivity is required in addressing the unique experience of the transition to parenthood of parents that conceive through ART and the subtle ways in which adjustment may differ for these families.

Resumo

Introdução. A infertilidade é um problema da saúde reprodutiva definida pela Organização Mundial de Saúde como a incapacidade de conceber um filho ou de levar uma gravidez a termo após um ano de relacionamento sexual sem utilização de contraceptivos (WHO, 1992), que afecta 9% da população a nível mundial (Boivin et al., 2007). Devido ao desgaste inerente aos tratamentos de Reprodução Medicamente Assistida (RMA) que os casais inférteis têm de realizar para alcançar uma parentalidade muito desejada (Klonoff-Cohen et al., 2001) e aos riscos obstétricos e complicações médicas associadas a uma gravidez alcançada através destes tratamentos (Basso & Baird, 2003), tem sido sugerido que os casais que concebem através de RMA poderão experimentar dificuldades de ajustamento acrescidas durante a transição para a parentalidade (Colpin, 2002; Klock & Greenfeld, 2000). A presente dissertação pretendeu investigar os contextos relacionais da transição para a parentalidade de casais que conceberam espontaneamente ou através de RMA. Ao nível teórico, a falta de um quadro de referência capaz de integrar os resultados empíricos desta área do conhecimento foi abordada, tendo sido proposta uma perspectiva desenvolvimental e ecológica da parentalidade após uma experiência de infertilidade e RMA. Ao nível da investigação empírica, estudámos o impacto de uma experiência de infertilidade e RMA no ajustamento psicossocial dos casais, no investimento socioemocional que estes fazem na sua criança e nas suas relações interpessoais durante a sua transição para a parentalidade.

Metodologia. Foi implementado um estudo longitudinal prospectivo que seguiu 39 casais que conceberam por RMA e 34 casais com uma concepção espontânea (CE) desde o último trimestre de gravidez (vigésima quarta semana) ao longo do parto e até a criança ter quatro meses de idade. Para investigar o ajustamento psicossocial dos pais, como indicadores de ajustamento individual avaliamos a percepção subjectiva da gravidez e parentalidade (*itens singulares desenvolvidos para este estudo*), a sintomatologia psicopatológica (*Inventário de Sintomas Psicopatológicos*) e a qualidade de vida (*WHOQOL-bref*) e no plano relacional considerámos a satisfação com a relação conjugal (*ENRICH*) e o stress parental (*Índice de Stress Parental*). Para avaliar o investimento socioemocional dos pais na sua criança usámos a *Escala de Investimento Parental na Criança*. Finalmente, para avaliar as relações interpessoais dos pais (características estruturais e funcionais da rede social) usámos o *Convoy Model*. A informação sociodemográfica, clínica, obstétrica e perinatal foi obtida através de contacto directo com os pais e da consulta dos seus processos clínicos.

Resultados. Vários resultados relevantes foram encontrados. A transição para a parentalidade e o contexto parental dos homens e mulheres Portugueses que conceberam através de RMA e espontaneamente são similares: os dois grupos de pais mostraram níveis de ajustamento e mudanças similares ao longo da transição para a parentalidade, apresentaram um contexto social semelhante (i.e. mudanças semelhantes nas características estruturais e sociais da rede social e associações semelhantes entre apoio social percebido e stress parental e investimento parental na criança) e não apresentaram diferenças em relação ao investimento parental que fazem na sua criança. No entanto, algumas diferenças foram também encontradas: (1) os pais que conceberam através de RMA (em particular as mulheres) perceberam a sua gravidez

como sendo de maior risco e mais exigente, mas também mais recompensadora do que os pais com uma CE; (2) os homens que conceberam através de RMA consideraram-se pais mais competentes do que os homens que conceberam espontaneamente; (3) os pais que conceberam através de RMA apresentaram um decréscimo na sua qualidade de vida psicológica da gravidez para o pós-parto que os pais com uma CE não apresentaram; (4) as mulheres que conceberam através de RMA perceberam mais apoio emocional e instrumental da sua família nuclear e menos dos seus amigos do que as mulheres que conceberam espontaneamente; (5) comparativamente aos homens com uma CE, os homens que conceberam através de RMA perceberam maior apoio dos membros menos íntimos do que dos membros mais íntimos da sua família nuclear. Para ambos os pais que conceberam através de RMA ou espontaneamente a transição para a parentalidade caracterizou-se por: (1) estabilidade na (ausência de) sintomatologia psicopatológica; (2) um decréscimo na satisfação com a relação conjugal da gravidez para o pós-parto; (3) várias diferenças de género no que respeita aos níveis globais e mudanças na qualidade de vida da gravidez para o pós-parto; (4) baixos níveis de stress parental quatro meses após o parto; (5) um forte movimento de aproximação em relação aos membros da sua família nuclear que se mostrou similar para homens e mulheres; (6) associações significativas entre o apoio social percebido da rede social durante a gravidez e o stress e o investimento parental na criança quatro meses após o parto, que variaram em função do género do pai, do tipo de relação mantida com a pessoa que prestava apoio e do tipo de apoio percebido; e (7) uma interdependência elevada entre o investimento maternal e paternal na criança, que mostraram estar associados com a satisfação com a relação conjugal e com o apoio social percebido da rede social.

Conclusões. Os resultados do presente estudo contribuem de forma inovadora para o estado-da-arte na medida em que demonstram pela primeira vez que, independentemente do método de concepção utilizado, durante a transição para a parentalidade todos os pais fazem um forte movimento de aproximação em relação aos membros da sua família nuclear; que os pais que concebem espontaneamente ou através de RMA não apresentam diferenças no investimento parental que fazem na sua criança; e que este investimento é, em larga medida, uma característica partilhada pelo casal. Os resultados encontrados também contribuem para a vasta literatura existente que descreve a transição para a parentalidade como um período exigente durante o qual ambos os membros do casal experienciam várias mudanças (ao nível individual, diádico e social) e que mostra que existem mais semelhanças do que diferenças na forma como os pais que concebem espontaneamente ou através de RMA experienciam esta transição. No entanto, acrescentam a esta mesma literatura ao demonstrar que estas semelhanças se verificam não apenas ao nível individual e diádico mas também ao nível social. A principal implicação clínica do presente estudo é que os profissionais de saúde devem estar disponíveis para auxiliar todos os pais a adaptarem-se às mudanças inerentes à transição para a parentalidade (Cowan & Cowan, 1995), tendo em atenção a forma diferente como homens e mulheres experienciam esta transição. No entanto, é necessário que estes profissionais sejam também sensíveis ao modo particular como os pais que concebem através de RMA vivem este período, atendendo à forma subtil como o ajustamento destas famílias pode variar.

Foreword

Since the birth of Louise Brown in 1978, thousands of children have been born all over the world as a result of in vitro fertilization. The development of this and other more recent assisted reproductive techniques is making it possible for more and more infertile couples to have a biological child of their own.

Infertile couples who become pregnant are not the same people they were when they first set out on their journey to become parents. Their outlook on life and their perception of what their future will be has probably changed quite a bit. They imagined conceiving spontaneously, perhaps having a few children, and instead they had to do intrusive and demanding treatments so that physicians could technically conceive their children. But they did manage to achieve pregnancy and their dream for parenthood finally came true.

For the past three decades, studies have been carried out to investigate how this different and harder pathway to parenthood may impact on parents, on parenting and on the psychosocial development of young children conceived by assisted reproduction.

The main goal of the present doctoral dissertation was to study the transition to parenthood of couples that conceived spontaneously or through Assisted Reproductive Technologies (in vitro fertilization, IVF, and intracytoplasmic sperm injection, ICSI, using the couples' own gamete). In order to accomplish this research goal, we implemented a longitudinal study¹,

¹ The "Transition to parenthood in families that resorted to Assisted Reproductive Technologies: parents' personal adjustment, marital relation and parents-infant relationship" re-

following 34 couples that conceived spontaneously and 39 couples that conceived through ART from their last pregnancy trimester (twenty-fourth week) and later collecting data at birth and four months after the partum².

With this thesis we hope to contribute to scientific knowledge in this research field in three different ways:

First, at the conceptual and theoretical level, we address the lack of a theoretical framework capable of integrating empirical findings by proposing a developmental ecological approach to parenting after infertility and assisted reproduction. Based on this theoretical model, we critically review the existing literature and offer suggestions for future research in the field.

Secondly, guided by this developmental and ecological framework we add to the current state-of-the-art of this scientific field by implementing four empirical studies that address our own research questions.

In the first study, we focus on parents' individual and relational adjustment during the transition to parenthood. Although there is a moderate body of research about the social and psychological aspects of pregnancy and early parenting after ART, some findings are still inconclusive and contradictory (Hammarberg, Fisher, & Wynter, 2008). Based on a longitudinal prospective design and on the assessment of several outcome measures, we hope to provide a more comprehensive view of the specificities of this life cycle transition when conception is achieved through ART.

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² Transition to parenthood is often associated to the birth of the first child (Goldberg, 1988) with subsequent births presenting different adjustment challenges and trajectories (Gameiro, Moura-Ramos, & Canavarro, 2009). Coherently, in our empirical research all parents recruited were primiparous. As to eliminate the confounding effects of multiple pregnancy gestations (e.g. increased rates of prematurity and low birth weight and added threat to maternal physical health, ESHRE Capri Workshop Group, 2000; Pinborg, Loft, & Andersen, 2004; Sheard, Cox, Oates, Ndukwe, & Glazebrook, 2007; Smithers et al., 2003), we also limited our research to singleton pregnancies.

In the second and third studies we address an issue that, to our knowledge, has never been researched in this field, the social relationships of parents that conceived through ART. More precisely, we first provide a longitudinal in-depth analysis of the changes in the social network and support of parents that conceived spontaneously or through ART across their transition to parenthood. We then proceed to examine the relations between perceived social support from network members and these parents' adjustment and the quality of care they provide to their child.

The question of whether previously infertile parents invest more in their children than parents that conceive spontaneously has been continuously discussed but was never properly addressed in research. In the last study, we investigate the differences and influencing factors of the parental investment that parents that conceived spontaneously or through ART make on their child.

Finally, we provide, for the first time, information on these phenomena among Portuguese men and women, and therefore hope to improve knowledge about our specific cultural and social reality.

Three main principles guide our present work:

1. *Parenting does not happen in a vacuum.*

Many researchers have advocated the need to examine the social ecologies in which parents are embedded (Belsky, 1984; Bronfenbrenner, 1979; Bronfenbrenner & Morris, 1998; Cowan, Cowan, Herring, & Miller, 1991) and in the present work we adopt an ecological perspective of parenting. This reflects at the conceptual level, as we make use of these theoretical principles to integrate present knowledge in the field and to make suggestions for future research, and at the empirical level, as we try to widen present field research from the dyadic relational level to investigate other more distal environmental variables (sometimes conceptualized as outcome variables and others as influential variables) and the way they interplay to influence parenting.

2. *An emphasis on relational contexts.*

Close relationships play a central role in shaping the quality of peo-

ple's development along their lives (Ainsworth, Blehar, Waters, & Wall, 1978; Bowlby, 1969, 1973, 1980). In the present work we pay special attention to the close relational contexts involved in parenting. These are, besides the parents-child relationship, the marital relationship and the parents' social network. Not surprisingly, as it represented a major breakthrough for the understanding of intimate relationships across the lifespan, we adopt attachment theory as our theoretical framework of reference.

Hence, to investigate issues related to the parents' social network and perceived support we use the Convoy Model, developed by Kahn and Antonucci (1980), that represents an extension of the attachment framework to include other social intimate relationships across the lifespan. Accordingly, when we research parental investment in the child, we base our work on Bradley's conceptualization (Bradley, Whiteside-Mansell, & Brisby, 1997), grounded on the research of the adult side of the attachment relationship, that is, of the caregiver and the caregiving system.

3. *The understanding of non-normative development contributes to the understanding of normative development and vice-versa.*

There are numerous points in development where the direction of a developmental pathway may be altered (Pickles & Hill, 2006). In the case of infertile couples this happens when they first try to conceive and researchers have been exploring in what ways, to what degree and until when does this pathway differ from that of couples that conceive spontaneously. Notwithstanding, regardless of the method of conception, to a certain degree all parents-to-be face the same developmental challenges. In the present study two groups of parents are considered: those that conceived spontaneously and those that conceived through ART. However, the group of parents that conceived spontaneously was not included only for comparative purposes. They are also object of this research work and, based on the interpretation and discussion of how these two groups of parents behave in similar and different ways, conclusions are drawn that refer to all parents, independently of the path that led them to parenthood.

This dissertation has not the standard format of a Portuguese PhD dissertation. Instead of the usual introduction, methods, results and discussion sections, it presents an introduction followed by a group of four empirical studies and ends with a discussion, intended to articulate results from the different studies presented.

We chose this format in order to value a publication format, which is, in our view, the most effective and direct way for the promotion of scientific discussion. As such, the empirical studies presented were written in such a way that they could be able to stand alone as publications. Nonetheless, we consider that the presented empirical findings have an added value when they are integrated and discussed within the theoretical principles previously proposed.

As such, this dissertation has three distinctive parts. Part I corresponds to the theoretical conceptualization and literature review that sets the base for the empirical studies presented and is divided in three chapters.

Chapter one, named *Infertility and Assisted Reproductive Technologies*, consists of a brief introduction to the main infertility and ART related issues, followed by a review of the social and psychological effects of an infertility and ART experience on individuals and couples, as it is expected that these experiences will have repercussions on these individuals' transition to parenthood. Finally, the specificities of the infertility and ART experience of Portuguese individuals and couples are also addressed.

In chapter two, named *The Relational Ecology of Parenting*, we argue about the need to adopt a developmental ecological view of parenting and describe the theoretical models that we adopted as our theoretical framework. We then narrow our focus to two specific topics that are the centre of three of our empirical studies, social networks and support and parental socioemotional investment in the child. Finally, we present a contextual process-based view of the transition to parenthood period, reviewing the main empirical findings regarding this specific life transition.

In chapter three, named *The Ecology of the Transition to Parenthood after Successful Assisted Reproduction*, we propose a developmental ecological

theoretical model of the transition to parenthood after successful assisted reproduction and, in order to do so, we review most of the research regarding parenting after assisted reproduction.

Part II of this dissertation corresponds to the empirical studies.

The main goal of study I, named *Psychosocial Adjustment during the Transition to Parenthood of Portuguese Men and Women that Conceived Spontaneously or through Assisted Reproductive Technologies*, was to examine the adjustment of these men and women across the transition to parenthood, more specifically from the last pregnancy trimester (24th pregnancy week) to the fourth month after the partum.

In study II, named *Social Nesting: Changes in Social Network and Support across the Transition to Parenthood in Couples that Conceived Spontaneously or through Assisted Reproductive Technologies*³, we examined changes across the transition to parenthood in the social networks and support of men and women that conceived through ART, in comparison with men and women with a spontaneous conception.

In study III, named *Social Network Support and Parenting Stress and Investment in the Child of Mothers and Fathers that Conceived Spontaneously and through Assisted Reproductive Technologies : A Prospective Controlled Study*, we investigated the relationships between perceived support from the social network and parental adjustment and care during the transition to parenthood in parents that conceived spontaneously or through ART.

Finally, in study IV, named *Parental Investment in the Child in Couples that Conceived Spontaneously or through Assisted Reproductive Technologies*, we investigated how parental investment in the child varies as a function of gender, method of conception and other individual and contextual factors. Also, we investigated how gender and method of conception interact with these individual and contextual factors to influence parental investment in

³This study was written between January and March 2009, during a period of collaborative research at the School of Psychology, Cardiff University, under the scientific orientation of Dr. Jacky Boivin.

the child.

In Part III of this dissertation we synthesise and discuss our empirical findings in the light of the proposed developmental ecological model of parenting after ART. We finish by focusing on the theoretical, research and clinical implications of the findings presented.

Part I

Theoretical Conceptualization and Literature Review

Chapter 1

Infertility and Assisted Reproductive Technologies

The present chapter intends to introduce some of the main topics that concern infertility and assisted reproduction. It is structured in four different sections.

In the first section we address the clinical definition of infertility, differentiating between primary and secondary infertility and addressing its causes and underlying factors. We then proceed to present a brief overview of the different psychological perspectives of infertility, grouped under the *Psychogenic Infertility Model*, in which demonstrable psychopathology is thought to play an etiological role in infertility, and the *Psychological Sequelae Model*, in which psychological factors are considered the result of infertility and subsequent therapies.

In section two we focus on Assisted Reproductive Technologies (ART). We describe the different ART treatments paying special attention to In Vitro Fertilization (IVF) and Intracytoplasmic Sperm Injection (ICSI). Finally, we address these techniques' success rates and consumer demand worldwide.

In section three we attend to the psychosocial aspects of infertility and ART. Namely, we first address the individual and marital adjustment of infertile couples and then we focus on gender and social issues that relate to the infertility and ART experience.

Finally, in the fourth and last section of this chapter we attend to the infertility and ART reality in Portugal.

1. Infertility

1.1. Definition, etiology and prevalence of infertility

Infertility is a reproductive health problem defined by the World Health Organization (WHO) as the inability of a couple to achieve conception or to bring a pregnancy to term after a year or more of regular, unprotected intercourse (WHO, 1992).

This time interval was chosen because of the observation that approximately 25% of couples will conceive within the first month, 60% within 6 months and 80% within 12 months of unprotected sex intercourse (Olsen, 1990). Because of the profound impact age has on fertility, when the woman is over thirty-five years of age the period considered to make a diagnosis of infertility is only of six months (McShane, 1997).

Primary infertility is defined as the inability to conceive by a couple who has never conceived and affects about 30% of infertile couples, while secondary infertility refers to the failure to conceive by a couple who had previously conceived and affects about 70% of infertile couples (Keye, 1999). Although many couples may be able to conceive they still consider themselves to be infertile if, due to miscarriage, they are unable to deliver a living child.

There seems to be a perception that as more and more women in Western countries pursue higher education and enter the workforce, they tend to delay parenthood and infertility tends to reach epidemic levels (Heffner, 2004). However, survey data on women from the United States suggest that infertility rates have not increased but even slightly decreased (CDC, 2005).

According to the WHO (1992), approximately 8±10% of couples worldwide experience some form of fertility problem, with wide differences from

region to region. More recent estimates on the prevalence of infertility, based on all population surveys of current infertility published since 1990 (a total of 25) and sampling 172,413 women, showed that the prevalence of current infertility is about 9%. This means that throughout the world about 72.4 million women are currently infertile. Although current prevalence for less developed countries was based on only three reports that sampled around 13,000 women, estimates also showed that, contrary to the WHO claim, the prevalence rates in more and less developed countries are remarkably similar (Boivin et al., 2007).

The causes of infertility can be divided into three broad categories, female factor (about 40%), male factor (about 40%) and a combination of male and female factors, usually denominated as mixed infertility (about 10%, \AFA, 2009 #628}.

The major causes for female infertility include failure to ovulate, obstruction or damage of the fallopian tubes and the surrounding structures of the pelvic peritoneum (mostly due to sexually transmitted diseases, pelvic surgery and endometriosis), defects in the shape of the uterine cavity that may interfere with the implantation of the embryo and immunological barriers to fertilization or implantation. The major cause for male infertility is failure to deliver adequate number of healthy sperm to the fallopian tubes, which mostly results either from the incapacity of the male to produce healthy sperm or from low concentration or mobility of produced spermatozooids in the sperm. Poor timing or technique of intercourse or a combination of these previously cited factors may also occur, accounting for mixed infertility (McShane, 1997).

Additionally, between ten to fifteen percent of couples are diagnosed as having unexplained or idiopathic infertility (Stovall & Guzick, 1993), which means that in these cases the cause for infertility cannot be identified.

It is important to note that, although in the vast majority of cases the cause for infertility can be identified in one of the members of the couple, infertility should be conceptualized as a problem of the couple instead of an individual problem and, indeed, in the health care system the patient is the couple (Keye, 1999).

Challenges to fertility may arise from different factors at different contextual levels. Sexually transmitted infections, such as chlamydia, are responsible for a significant percentage of infertility (McShane, 1997); reproductive tract infections are frequently the cause for secondary infertility (Daar & Merali, 2002); exposure to potentially toxic substances in the diet or environment (e.g. contact with toxic chemical products) are suspected causes for declining human sperm quality in industrialized countries (Swan, Elkin, & Fenster, 2000); lifestyle factors such as tobacco smoking and obesity, which cause chronic disease and disability later in life, can also cause fertility impairment during the reproductive years (Augood, Duckitt, & Templeton, 1998; Hassan & Killick, 2004; Homan, Davies, & Norman, 2007; Pasquali, Patton, & Gambineri, 2007); and some diseases' treatments, such as chemotherapy and radiation for cancer and highly active antiretroviral used in the treatment of HIV infected individuals, are also known for having negative effects on fertility (Kim, 2006; Waters, Gilling-Smith, & Boag, 2007).

Another important factor contributing to infertility is the delay of child-bearing. While the Media have increased public awareness about infertility in Western countries, there are practical reasons for couples to delay parenthood that may impact on their fertility status. Most commonly, the need for relational and economical stability before having a child, the pursuit of higher education and/or a professional career and the access to modern and highly effective contraception methods, which allow couples to control their fertility (Hardy & Makuch, 2002).

The paradox is that couples also harbour the hopeful notion that modern medicine will have a solution, should they encounter a fertility problem later in life as a result of their choices (Lampic, Svanberg, Karlström, & Tydén, 2006). However, the effectiveness of ART also depends on age, and conception rates start declining when the woman is over thirty years old (Templeton, Morris, & Parrslow, 1996). A recent study revealed that ART make up for only half of the births lost by postponing an attempt to become pregnant from 30 to 35 years of age and less than 30% of the births lost by postponing it from 35 to 40 years of age (Leridon, 2004). The authors of the study advise women over 35 to “be impatient” (p.1553) since their chances

for a rapid (within 12 months) spontaneous conception are still significant, but in case of failure, ART will not fully compensate for the age delay.

In general these data suggest the need for prevention and education among young adults who desire to have children in their future. A public health strategy focusing on primary prevention could reduce the prevalence of infertility, improve health and quality of life, and avoid the costs of infertility treatment (Macaluso et al., in press).

1.2. Psychological models of infertility

At a time when up to 50% of infertility problems could not be medically diagnosed or treated, many cases of infertility were explained through an emotional rather than a biological cause. The *Psychogenic Infertility Model* (also referred to as the *Psychosomatic Medicine Approach*), in which demonstrable psychopathology is thought to play an etiological role in infertility, was introduced in the 1930s and reached its height of popularity during the 1950s and 1960s (Burns & Covington, 1999).

Psychoanalytic theory based on Freud's theory of personality provided the basis for the Psychogenic Model, proposing that infertility is caused by unresolved oedipal issues, conflicted sexual identity and defences against the conflictual relationship between self and parents (Rubenstein, 1951; cit. Burns & Covington, 1999).

This model fell into disfavour partly as a result of the development of new diagnosis techniques (e.g. laparoscopy) and ART, which allowed for the identification of the biological causes for infertility and its treatment. More importantly though, several reviewers of this literature concluded that it contained no consistent indications of any relevant psychological differences between couples with and without an identified organic cause for infertility (e.g. van Balen, 2002; Wischmann, 2003) that could be pointed as the cause(s) for infertility.

Additionally, conceptual and methodological issues of the psychosomatic research studies were also criticized, such as the confusion between unexplained infertility (i.e. idiopathic infertility) and psychogenic infertility, considered to be caused solely by psychological factors (Crosignani,

Collins, Cooke, Diczfalusy, & Rubin, 1993), the failure to use systematic measures and control groups (Greil, 1997) and the use of observations drawn from individual cases or small numbers of patients (Wischmann, 2003).

Newer formulations of the Psychogenic Infertility Model typically emphasize taxing environmental factors, that is, instead of targeting causative factors within the person, infertility is attributed to physiological reactions to environmental challenges (Stanton & Dunkel-Schetter, 1991).

Studies focusing on this subject investigated if psychosocial factors associated with infertility had an influence on the outcomes of infertility treatments. Results provided evidence that psychosocial factors may, at least partly, influence the outcome of an IVF treatment. More specifically, prospective studies showed that ineffective coping strategies, anxiety and/or depression, infertility related stress and diverse biological indicators of stress were associated with a lower pregnancy rate after an IVF-procedure (Boivin & Schmidt, 2005; Demyttenaere, Nijs, Evers-Kiebooms, & Koninckx, 1992; Gallinelli et al., 2001; Thiering, Beaurepaire, Jones, Saunders, & Tennant, 1993).

Within a different approach, a significant number of studies focusing on the psychological aspects associated with infertility showed that infertile women tend to report above-average depression and anxiety levels, as well as a higher number of physical complaints (although these deviations were in most cases not clinically significant, e.g. Eugster & Vingerhoets, 1999; Greil, 1997). As unsuccessful treatments raise women's levels of negative emotions and because these negative emotions disappear when women achieve pregnancy (Verhaak et al., 2007), it seems plausible to interpret these findings as a consequence of an infertility medical diagnosis, therapy, or both (Wischmann, 2003).

Thus, these facts support the *Psychological Sequelae Model*, also called the *Psychological Consequences Model*, in which psychological factors are considered to be the result of infertility and subsequent therapies.

The *Psychological Sequelae Model* developed in the late 1970s with the generalization of the idea that infertility was an emotionally difficult experi-

ence with an impact on all aspects of an individual's and couple's life (Mening, 1980; cit. Burns & Covington, 1999). This model integrates different theoretical perspectives (e.g. cognitive-behavioural theory, family systems theory, developmental and crisis theory) and encompasses a broad view of the interrelationships between individuals, couples, families, society and reproductive medicine (Burns & Covington, 1999).

Based on the overviews made by Burns and Covington(1999) and Stanton and Dunkel-Schetter (1991), in Table 1.1 we provide a summary of the different theoretical approaches to infertility integrated in the *Psychological Sequelae Model*.

These theoretical perspectives should not be regarded as mutually exclusive. Indeed, although differently conceptualized, they all emphasize the deleterious impact of the experience on infertility at the individual and familial level. Most of them also highlight that although infertility may originate a period of emotional disequilibrium, individuals and families have the potential to overcome it and achieve equal or better adjustment levels.

These perspectives have also increased the understanding of individual and couple differences in the way they cope with infertility and of the psychological mechanisms associated to higher resilience in this context. As such they have provided valuable information for research and therapeutic intervention (Burns & Covington, 1999).

The underlying assumption of the *Psychological Sequelae Model*, that is, that infertility is an emotional challenging experience that impacts on all aspects of an individual and couple's life, is also the one adopted in the context of this dissertation.

Table 1.1. Infertility according to different theoretical perspectives

Ego and Self Psychology Theory

The trauma of infertility negatively impacts an individual's sense of self-cohesion leading to anxiety, fragmentation and more archaic forms of self-organization. Within this perspective, infertile men and women's perceptions of stigma encompass a self-perception of loss, role failure and diminished self-esteem, resulting from the failure to fulfil cultural and social norms. Thus, infertility increases feelings of inferiority, differentness and spoiled identity (Miall, 1985).

Development and Crisis Theory

The inability to procreate creates a blockage to the fulfilment of the Erickson's (1950) adult tasks of intimacy and generativity, emphasizing both psychological tasks and social expectations that are impossible for the couple to achieve. As such, infertility precipitates a life crisis, in that it is considered an insolvable problem that threatens important life goals, taxes personal resources and may arouse unresolved problems from the past. Therefore, infertility originates a period of emotional disequilibrium with the potential for either future maladjustment or positive growth (Menning, 1980; cit. Stanton & Dunkel-Schetter, 1991).

Grief and Loss Theory

Psychopathology emerges as a result of experiencing multiple losses with infertility, namely the loss of potential children, the loss of pregnancy, the loss of a life goal, the loss of control over one's body and the loss of belief in the fairness of life, health and well-being. Through the experience and expression of emotions involved in the grieving process, the infertile couple may move towards an acceptance of their childless state or engage in the exploration of alternative solutions (Menning, 1980; cit. Stanton & Dunkel-Schetter, 1991).

Cognitive-Behavioral Theory

Based on the Stress and Coping perspective (Lazarus & Folkman, 1984), infertility is perceived as a stressor by those for whom parenthood is a central life goal. Involving different features that are beyond individuals' control and entailing negative consequences and unknown and unpredictable outcomes, this form of life stress influences psychological reactions and has implications for adjustment. This perspective is helpful to the understanding of infertility because it provides a framework to the study of (a) the conditions under which infertility is likely to be perceived as stressful, (b) factors most likely to facilitate or impede adjustment in infertile couples or individuals, and (c) what constitutes successful psychological adjustment to infertility (Dunkel-Schetter & Lobel, 1991; Stanton & Dunkel-Schetter, 1991).

Family Systems Theory

The application of this theory to infertility focuses on the impact of infertility on marriage, the couple, their families of origin, or the individual within the context of these relationship systems. Because infertility represents the inability to proceed through family life stages in a predictable and socially conforming way, it originates uncertain roles, confused life tasks and blurred boundaries between the two members of the couple and between them and their relatives. Infertility is also seen as an intergenerational family developmental crisis preventing other family members beyond the couple (e.g. parents, siblings) from proceeding with their own life cycle stages (Mathews & Mathews, 1986).

2. Assisted Reproductive Technologies

Assisted Reproductive Technologies⁴ (ART) concern a variety of cutting edge techniques designed to assist individuals or couples in their effort to conceive a child or, as the WHO (1992) states it “the aim of medically assisted conception is to overcome the barriers preventing spermatozoa from encountering oocytes in infertile couples” (p.7).

Initially used only as a last resort following failure of conventional infertility treatments such as ovarian stimulation, ART are progressively more being employed as a first line therapy. This increasing demand for assisted reproduction seems to result both from the recognition of the limits of conventional therapy and from the increase of successful treatment rates associated to ART (Keye, 1999).

Depending on the precise nature of the fertility problem, various reproductive technologies are available to help couples achieve a pregnancy, such as in vitro fertilization, intrauterine insemination, gamete intrafallopian transfer and intracytoplasmic sperm injection⁵ (Eugster & Vingerhoets, 1999).

Intrauterine insemination (IUI) is the simplest and less intrusive technique consisting in the transference of sperm through a little hose through the cervix and the uterus into the woman’s fallopian tubes, where insemination usually occurs. With gamete intrafallopian transfer (GIFT) both oocytes and sperm are placed into the fallopian tube, mimicking the natural situation at the time of fertilization. Both techniques imply that the woman has at least one functioning fallopian tube and within the norm male sperm

⁴ Throughout the present dissertation the following terms can be used when referring to Assisted Reproductive Technologies: assisted reproduction, assisted conception, advanced reproductive technologies, assisted reproduction treatments, assisted reproductive techniques, medically assisted conception and medically assisted reproduction.

⁵ Although both the couples’ own or donated gametes can be used in ART, issues involving third party reproduction will not be discussed as they are considered out of the scope of the present work.

parameters.

In vitro fertilization (IVF) is historically the first ART (in 1978 Robert Edwards and Patrick Steptoe announced the birth of the first baby conceived outside the human body, Steptoe & Edwards, 1978; cit. WHO, 1992) and is still the most commonly ART used. This technique consists in the retrieval of one or more oocytes from the woman, their insemination with previously collected and prepared sperm and placement of the resulting embryos in the uterus. This procedure consists of the following four phases: (1) hormone stimulation: stimulation of the ovaries with the help of medication in the form of pills or injections in order to maximize oocyte production, (2) oocyte retrieval: through a minor surgical procedure the female germ cells are retrieved, (3) fertilization: oocytes are inseminated with previously collected and prepared semen under laboratory conditions, after which it is necessary to wait up to five days in order to see whether or not embryos are formed, and (4) embryo transfer: the embryos are transferred through a little hose through the cervix into the uterus, where implantation is expected to occur (McShane, 1997). One has to wait to see whether or not the embryos become implanted in the wall of the uterus. Therefore, only about two weeks after the embryo transfer do couples find out if they achieved conception. Apparently, this is the most distressing phase of the process for both men and women (Boivin et al., 1998).

Although initially the IVF-treatment was applied only to women with blocked ovaries, nowadays other fertility problems are also treated with IVF, such as infertility resulting from endometriosis, from woman's antibodies against sperm, from bad sperm quality or unexplained infertility (McShane, 1997).

Intracytoplasmic sperm injection (ICSI) consists in the injection of a single spermatozoid into the woman's oocyte to create a fertilized egg or embryo. The procedure is globally equal to IFV, including the previous described four phases, but fertilization occurs with medical intervention through the injection of the spermatozoid into the egg. This technique has been the most significant advance in the treatment of male-factor infertility because it allows for men who produce none or few healthy spermatozoids or immotile sperm to father a child (Keye, 1999).

At the end of the fertilization phase couples may have more than the number of embryos they wish to transfer (usually couples have to decide between the transfer of one to three embryos, although these numbers may vary across countries and clinics). In that case they may decide to cryopreserve the exceeding embryos, which allows them to use them in later treatment cycles without having to go through the first three phases of the treatment (hormone stimulation, oocyte retrieval and fertilization).

Due to the currently widespread utilization of these techniques, when trying to decide whether or not to initiate ART treatments two factors are taken into special account, being considered even more important than the cause for infertility: the duration of infertility and time remaining for conception (Jansen, 1994).

Success rates from these techniques are still low. In the year 2000, the worldwide delivery rate for an IVF treatment cycle with fresh embryos was of 18.6% (varying from 9.9% in Saudi Arabia, Middle East, to 35.1% in Egypt, also in the Middle East) and of an ICSI treatment cycle with fresh embryos was of 20.4% (varying from 7.7% in Peru, Latin America, to 34.0% in the Iceland, Europe and Chile, Latin America, Adamson et al., 2006). More recent data from the European Society of Human Reproduction and Embryology (ESHRE) regarding the year 2005 showed that in Europe the cumulative delivery rates with fresh and frozen cycles varied between 15.7% (in Bulgaria) and 33.7% (in Iceland, Andersen et al., 2009). Currently about half of the infertile couples that undergo infertility treatments achieve parenthood (Leridon, 2004).

Although these new reproductive technologies offer hope to infertile couples, there are also associated risks, such as ovarian hyperstimulation syndrome (which can occur when ovaries react too strongly to the hormone stimulation, leading to the simultaneous maturation of a large number of follicle in the ovaries and causing symptoms such as abdominal bloating and nausea, diarrhoea, slight weight gain and shortness of breath), whose long term effects on the female reproductive system are still not known for certain. Increased probability for the occurrence of multiple gestations is relatively higher due to the use of ovulation-stimulation drugs and the transfer of multiple embryos (Leiblum, 1997). Most couples are pleased

with this hypothesis, however higher order multiple gestation pregnancy is associated with increased risk of pregnancy loss, premature delivery, infant abnormalities, pregnancy-induced hypertension, haemorrhage and other significant maternal complications (ESHRE Capri Workshop Group, 2000; Pinborg, Loft, & Andersen, 2004; Sheard et al., 2007; Smithers et al., 2003).

The associated indirect treatment stresses are also considerable. The potential effects of hormonal treatments (that affect the pituitary axis) on mood and cognition, the constant injections, collection of blood samples and monitoring by medical personnel, the necessity to do sperm collections through masturbation or testicular biopsies, the high financial costs of treatment, the absences from work with possible disruption of the professional life, the scheduling of intercourse and the always-present possibility of disappointment are some of the definite costs of infertility treatment (Downey, 1993; Eugster & Vingerhoets, 1999).

Although ART are being increasingly used worldwide (Vayena, Rowe, & Griffin, 2002), recent data have shown that the demand for infertility treatment both in more and less developed countries is unexpectedly low, with only about half of the people who experienced fertility problems deciding to seek any infertility medical care (i.e. having any contact with medical professionals for fertility problems) and less than 25% actually receiving any specialist infertility treatment (Boivin et al., 2007).

If the demand for infertility services is similar across countries, treatment availability is likely to be markedly different, varying according to the allocation of healthcare resources and country-specific health care regulations (Boivin et al., 2007). Data from the World Collaborative Report on In Vitro Fertilization 2000 (Adamson et al., 2006) showed that during the year 2000 the number of IVF and ICSI cycles initiated in 50 countries worldwide varied from 29, in Guatemala, Latin America, to 52.276 in Germany, Europe, and 74.501 in the United States, North America. Data from the ESHRE also showed that during the year 2005 the number of IVF and ICSI initiated in European countries varied from 68, in Lithuania, to 55.526, in France (Andersen et al., 2009).

3. The psychosocial aspects of infertility and assisted reproduction⁶

3.1. Individual and marital⁷ adjustment to infertility and assisted reproduction treatments

In a technical report about advances in medically assisted conception the WHO initiated a section on the psychosocial aspects of infertility with the following statement (WHO, 1992, p.13):

The discovery of infertility can provoke a complex psychosocial crisis in either or both members of an infertile couple that may take several years to resolve. The crisis involves an interaction between the physical conditions predisposing to infertility, the medical interventions addressing it, social assumptions about parenthood, the reactions of others, and individual psychological characteristics.

Indeed, trying to characterize the nature of the infertility experience, the field descriptive literature⁸ presents it as devastating, especially for women. Among the dominant themes that arise from this literature are (Greil, 1997): (a) infertility as a central focus for identity, especially for women; (b) feelings of loss of control and attempts to regain control; (c) feelings of defectiveness and reduced competence, especially for women; (d) statuslessness and ambiguity; (e) stress on marital and sexual relations at the same time there is a counter-tendency for infertility to strengthen the couple's relationship; (f) feelings of alienation from the "fertile world"; (g) a

⁶ When addressing the psychosocial aspects of infertility, it is quite difficult to separate these from the psychosocial consequences of ART treatments. This has to do with the heavy reliance on clinical samples in this research field and hence no clear delimitation will be made between the two.

⁷ In addressing the marital or partner relationship between two members of a couple, for simplifying purposes the term marital relationship will be used, regardless of the couple's civil status (married or co-habiting).

⁸ Note that this literature adopts the Psychological Sequelae Model of infertility (cf. this Chapter, section 1.2).

sense of social stigma; (h) difficulty dealing with infertility at the level of meaning; (i) immersion in the treatment process; (j) stressful nature of the treatment process itself; and (k) strained relationships with healthcare providers.

When couples first enter a fertility clinic they have often experienced repeated ups and downs every month, with hopes for a pregnancy followed by disappointment when menstruation occurs. Once a diagnosis of infertility is made, couples have to deal with the decision to pursue ART treatments. As previously stated, these can be emotional and physically very demanding for both the woman and her partner. Also, infertile couples may need to make significant adjustments to their lifestyle, since fertility treatments usually imply constant visits to healthcare centres, compromising other aspects of life such as career choices, hobbies and the maintenance of social relationships (Cousineau & Domar, 2007).

Parallel to the literature that tries to describe the infertility experience, several studies have been conducted in order to test the hypothesis that infertility causes psychological distress, that is, to test the *Psychological Sequelae Model*.

Dunkel-Schetter and Lobel (1991) reviewed 25 empirical research studies focusing on the psychological effects of infertility published between 1963 and 1988. These studies varied in their research design and quality, as well as on sample size (from 20 to 300) and most of them included only women. Also, samples were usually composed of individuals in treatment, often in IVF treatment and typically just beginning treatment.

These studies were categorized into four different groups on the bases of two design features, that is, including or not a control group and using or not standard assessment measures. Thus, only 7 articles fulfilled these two features, 11 used standard measures but did not include a control group, 5 considered a control group but did not use standard measures and 2 did not fulfil any of these features.

The authors of the review concluded that empirical evidence did not clearly indicate that infertility is associated with negative effects. More specifically, this review indicated that the majority of people with infertility do

not experience clinically significant emotional reactions, loss of self-esteem or adverse marital and sexual consequences.

In a later review Greil (1997) critically analysed studies of the experience of infertility published since 1980. These studies generally employed two different strategies: the use of standardized assessment measures, comparing infertile individuals with the normalised values of the general population, and the use of control groups of presumed fertile individuals for comparative purposes.

The majority of reviewed studies that employed standardized measures of anxiety have either shown that infertile couples differ moderately from norms overall or that they differ on at least some subscales. Studies using standardized measures of depression were split evenly between those that found that infertile participants experienced moderately higher depressive scores than the general population and those that found no differences. Depression was not generally found to be clinically significant. Studies using measures of self-esteem are also split relatively evenly between those that found no differences and those that showed that infertile participants scored lower on these measures. Studies using standardized measures of marital satisfaction in general showed that infertile couples were highly satisfied with their marital relationship. Considering the sexual relationship, few differences were found between infertile and presumed fertile subjects.

The final conclusion was that there seemed to be some evidence for the existence of differences on measures of depression, anxiety and self-esteem between these two groups of individuals. Nonetheless, although individuals experiencing infertility seem to be distressed when compared to presumed fertile individuals, this distress is not clinically significant.

Greil considered that this body of empirical evidence had produced "equivocal results" (p.1679) and that this fact was in part related to methodological shortcomings. Specifically, he enumerated (1) the overemphasis on women with detriment of the men or the couple; (2) the small sample sizes of many studies; (3) the heavy reliance on self-report questionnaires, which seems to be specially problematic with infertile couples due to the possible pressure these couples may feel to appear adjusted so that they are

not denied medical assistance; (4) the use of non representative samples, usually made up of white individuals with medium to high income levels who are undergoing infertility treatment and neglecting infertile individuals who have not received treatments; (5) the neglect of national and cultural variations; (6) the questionable choices of control groups; (7) the use of non specific infertility related measures that would allow for a more precise characterization of the infertility experience; and (8) the fact that these studies usually did not take into account that the effects of infertility vary over time and that in examining the psychological consequences of infertility, at least two temporal variables need to be considered: duration of infertility and duration of treatment.

Greil also addressed what he considered to be the conceptual shortcomings of this literature. He considered that there had been little effort at theory development and little attempt to integrate data on the psychosocial impact of infertility with general social psychological theory. He added that this literature presented a medical model of the psychosocial impact of infertility, in that “attention is diverted from the social conditions which shape the experience of infertility to individuals regarded in relative social isolation and to the individual traits which may enhance or impede their ability to cope” (Greil, 1997, p. 1693).

In a more recent review, Eugster and Vingerhoets (1999) analysed the psychological research implemented within the context of IVF: before, during and after both successful and unsuccessful IVF treatment. Their review suggested that there is consensus regarding both the general well-being of couples when entering an IVF treatment and about the phase which is experienced as more stressful, namely waiting for the outcome of treatment. Regarding the experience of anxiety during the IVF treatment, contradictory results were found, with some studies reporting a decrease of anxiety as the treatment proceeded (e.g. Connolly et al., 1993) and others an increase (Harlow, Fahy, Talbot, Wardle, & Hull, 1996).

Because results concerning the positive adjustment of infertile couples at the beginning of treatment were opposite to researchers’ expectations (i.e., that infertility is associated with increased distress levels), researchers drew several hypotheses to explain these results. The self-selection effect

hypothesis stated that only psychologically well adjusted couples would seek medical treatment in their efforts to achieve pregnancy. Another possible explanation was that because these couples usually experience long years of infertility before they seek medical help, they were able to develop adaptive coping strategies to deal with their infertility. Finally, it was also hypothesized that for infertile couples the starting phase of IVF treatment represents a regain of control over their parenthood projects and so it is characterized by increased optimism and unrealistically high expectations of success (Beaurepaire, Jones, Thiering, Saunders, & Tennant, 1994; Edelmann, Connolly, & Bartlett, 1994; Eugster & Vingerhoets, 1999).

Verhaak (2007) also provided a systematic overview of how women adjust emotionally before, during and after IVF treatments. While it was also concluded that the pregnancy test proved to be the most stressful stage of the IVF cycle, conclusions concerning adjustment levels at the start and during treatment were slightly different. Before starting treatment in general IVF patients did not differ from norm groups with respect to depression levels. However, results on state anxiety were contradictory, with some studies revealing no differences (e.g. Fekkes et al., 2003) and others showing elevated anxiety levels in the IVF patients (e.g. Salvatore et al., 2001). Excluding the period just prior to the pregnancy test, distress levels did not appear to show remarkable changes across treatment. This review also indicated that unsuccessful treatments tend to evoke an increase of depressive symptoms that does not decrease shortly after treatment.

Although unsuccessful IVF/ICSI also seems to be associated with decreased satisfaction in the marital and sexual relationship (Verhaak, 2003), studies have also indicated that the infertility experience can strengthen marriage and improve couples' mutual connection, that is, infertility can cause marital benefit (Daniluk, 2001; Schmidt, Holstein, Christensen, & Boivin, 2005b).

In summary, empirical research on the psychosocial impact of infertility suggests that although individuals dealing with infertility may experience increased distress, this distress is most of the times not clinically significant. Moreover, infertility may even cause marital benefit.

3.2. Gender issues

In a recent study where intentions concerning childbearing and attitudes towards parenthood were investigated, although women and men reported similar personal intentions for childbirth, women regarded having a child as being significantly more important than did men and they stated that they were more likely to pursue IVF treatment or adoption in the case of infertility (Lampic et al., 2006).

If women regard parenthood as a more essential part of life than men, it is not surprising that infertility has a stronger impact on them. For many women who assumed they would some day have a child of their own, an infertility diagnosis can challenge her core female identity, originating feelings of self devaluation (Beaurepaire et al., 1994; Cousineau & Domar, 2007) and depression (Sbaragli et al., 2008).

Coherently to their expressed intentions, women are usually the ones who take the initiative to seek medical assistance when the couple is unable to conceive (Hardy & Makuch, 2002) and they seem to show marked difficulty in deciding for treatment termination in the case of successive unsuccessful treatments (Ulbrich, Tremagliocoyle, & Llabre, 1990). It is common for women to feel so guilty due to their failure to achieve motherhood (Vieyra, Tennen, Affleck, Allen, & McCann, 1990) that, as a compensatory strategy, they may become over involved in achieving conception, placing on hold professional goals, life pursuits and social relationships (Cousineau & Domar, 2007).

Studies show that women employ several strategies to deal with their medical issues, such as mobilizing social support, gathering relevant information and positively reframing the situation. Simultaneously, they are more likely to avoid children, pregnant women and other reminders of the “fertile world” (Greil, 1997; Jordan & Revenson, 1999).

At fertility centres women are usually the identified patient regardless of which spouse carries the reproductive impairment. This means that it is often the women who are the subject of treatments and their secondary effects, having to undergo most of the invasive procedures and being daily monitored. Therefore, some authors claim that women carry the burden of

infertility (Cousineau & Domar, 2007) and this fact may explain the increased anxiety levels they report during treatment, when compared to men (e.g. Beaurepaire et al., 1994; Edelman, Connolly, & Bartlett, 1994).

These facts suggest that fatherhood is a less significant role in men's lives and maybe that's why they are not as affected by involuntary childlessness as women and why they invest less in the pursuit of parenthood through ART (Hardy & Makuch, 2002). However, some researchers claim that scientific research itself undervalues the possible impact of infertility on men by focusing exclusively on women (Cousineau & Domar, 2007).

Indeed, several studies have shown that men are also significantly affected by the infertility experience (e.g. Fekkes et al., 2003; Peronace, Boivin, & Schmidt, 2007). Although men seem more capable than their spouses of accepting a childless lifestyle (Wright, Bissonnette, & Duchesne, 1991), when faced with a diagnosis of infertility men report feeling neglected, lonely and disassociated from the fertility treatment process (Malik & Coulson, 2008). Increasing suffering levels are also reported by men as they face successive unsuccessful treatments (Peronace, Boivin, & Schmidt, 2007).

When confronted with fertility problems men tend to engage in distancing or avoiding, focusing on their professional career and withdrawing from their social networks (Jordan & Revenson, 1999; Peronace, Boivin, & Schmidt, 2007). They also exhibit a somewhat passive posture regarding the pursuit of medical assistance (Webb & Daniluk, 1999).

Some authors suggest that, due to social expectations associated with the traditional male role, men tend to suppress their emotions in an effort to support their wives (Berg & Wilson, 1991; Malik & Coulson, 2008) and that this tendency may reflect in the under-reporting of actual levels of infertility related distress among men (Greil, 1997).

The fact that gender roles and identities apparently contribute to the shaping of the infertility experience lends further support to the notion that infertility, rather than a simply physical condition, is best understood as a socially constructed process (Greil, 1997) (Hardy & Makuch, 2002).

3.3. The social context of infertility and assisted reproduction

The vast majority of people express the desire to have children at some point in their lives (Lampic et al., 2006). Indeed, fertility and parenthood are part of a fundamental life project of all men and women in which both family and society pose great expectations (Cousineau & Domar, 2007).

The value of children is so strongly defined by societies that the understanding of men and women's infertility experience cannot be dissociated from the social, historical, economical, political and cultural contexts within which they are immersed (Hardy & Makuch, 2002).

Nowadays, infertility is still a stigmatization condition, even in more developed countries. It is not well understood by the public and many myths still exist about it, such as the belief that high degrees of femininity and masculinity are associated with being more fertile. Furthermore, there is a veil of secrecy surrounding it. Because infertility is so closely connected to sexual behaviour, many individuals don't feel comfortable discussing it as they fear negative social reactions such as jokes and unwanted comments and advice. Indeed, information that a couple is unable to conceive is considered very private and embarrassing (Dunkel-Schetter & Stanton, 1991).

Several recent studies have shown that both infertile men and women commonly perceive some form of stigma, neglect or moral judgment from their family members, friends, health professionals or other significant persons (Ellison & Hall, 2003; Malik & Coulson, 2008; Redshaw, Hockley, & Davidson, 2007; Slade, O'Neill, Simpson, & Lashen, 2007). Coherently, infertility-related unsupportive responses perceived from family members, friends and other people associate positively with depressive symptoms and overall psychological distress (Mindes, Kathllen, Kliever, & James, 2003; Sejbæk, 2008). Studies have also shown that distress in the social domain increases and perceived social support decreases when a pregnancy is not achieved within 12 months of treatment (Peronace, Boivin, & Schmidt, 2007; Schmidt, Holstein, Christensen, & Boivin, 2005a), indicating that the fertility condition threatens couples' social well-being.

Slade and colleagues (2007) proposed to test a model suggesting that high infertility related stigma consciousness is associated with lower dis-

closure to others, and this in turn leads to lower social support and higher distress. Although the positive association between stigma consciousness and lower disclosure was only found for men, stigma consciousness was related to lower social support for both genders. Moreover, disclosure did not link to higher support but did prove to be related to higher generic stress for women. It is difficult to draw definitive conclusions from this study due to its cross-sectional nature, but it clearly indicates that stigma and disclosure patterns are potentially important factors in responses to infertility.

Even so, other research studies also showed that both women and men discuss their fertility problems with their family, friends or other people who also suffer from fertility problems. When couples confide about their infertility, they are generally satisfied with perceived reactions and support (Abbey, Andrews, & Halman, 1991; Peronace, Boivin, & Schmidt, 2007; van Balen, Trimbos-Kempere, & Verdurmen, 1996). However, van Balen et al. (1996) suggested that this is only so because couples choose very carefully who they tell and the way they disclose their fertility problems.

When couples do get support, it associates positively with the individuals' psychological well-being and their marital relationship quality (Amir, Horesh, & Lin-Stein, 1999; Slade et al., 2007; Verhaak, Smeenk, van Minnen, Kremer, & Kraaimaat, 2005).

Unfortunately, ART treatments often are time consuming and require many clinic visits, interfering with the couples' routine and diminishing opportunities for contact with friends and acquaintances that could function as support providers (Fekkes et al., 2003). Couples themselves may avoid maintaining relationships with friends that have children because these are emotionally demanding, especially for women (Greil, 1997; Jordan & Revenson, 1999).

In conclusion, even in Western countries the social context of infertility does not seem to favour infertile couples. Associated stigma and the constraints of ART treatments may contribute for these couples' further isolation from the "fertile world", creating barriers to the maintenance of supportive relationships that could buffer the negative impact of infertility.

4. Infertility and Assisted Reproductive Technologies in Portugal

Very little is known about the prevalence of infertility in Portugal, and current national estimates can only be based on worldwide estimates. The PSRM estimates that about 500 thousand Portuguese individuals suffer from infertility and that every year about 10 thousand new couples have reproductive problems (SPMR, 2009).

The access and workings of assisted reproduction have only recently been legislated in Portugal (Law n° 32/2006, July 2006). According to the present legislation, only married or cohabiting (for two years or longer) heterosexual couples with a diagnosis of infertility or suffering from a genetically or sexually transmitted disease are allowed to undergo ART (mostly AI, IVF and ICSI) in order to conceive.

Although gamete donation is contemplated in the law, due to infrastructure limitations, this is not a current practice in Portugal and most couples have to go to neighbouring countries in order to obtain donated sperm or oocytes. The Portuguese law protects the donor's right to anonymity. Surrogacy, that is, when a woman bears a child for another woman, is presently not considered a valid juridical contract.

Present legislation also contemplates the right for embryo cryopreservation over a maximum period of three years, at the end of which couples may choose to use them or to donate them to another infertile couple. By default, these exceeding embryos may be used for scientific research.

Within the Portuguese public healthcare system, an IVF or ICSI treatment cycle costs around 1.000€, approximately twice the national minimum monthly salary (450€, Law n° 246/2008, December 2008). The Portuguese Government has only very recently started to provide financial assistance to families undergoing ART (from the 1st of July of 2009), but insurance companies do not yet offer financial coverage to such treatments.

Data from the ESHRE (Andersen et al., 2009) showed that in the year 2005 a total of 20 fertility clinics existed in Portugal (from these only 18 clinics collaborated in this report, which corresponded to a participation rate of 90%) and that during that year a total of 3.741 IVF and ICSI treat-

ments were initiated in Portugal. From these, 1.181 were IVF cycles with fresh embryos, with a delivery rate of 23.6% that corresponded to 279 deliveries, and 2.054 were ICSI cycles with fresh embryos, with a delivery rate of 21.8% that corresponded to 448 deliveries. In what concerns the use of frozen embryos, 395 cycles were done with a delivery efficacy of 14.9% that corresponded to 59 deliveries. These data show that the most used assisted reproductive technique in Portugal is the ICSI, which is consistent with the increasing use of ICSI all over Europe. Pregnancy rates are somewhat below the European medium rates (26.9% for IVF, 28.5% for ICSI and 19.0% with the use of frozen embryos).

Data from the ESHRE (Andersen et al., 2009) also showed that most women that undergo ART have between 30 and 34 years of age, followed by women between 35 and 39, as is also the tendency in most European countries.

According to the PSRM, in 2006 there were a total of 24 institutions specialized in ART in Portugal. Seven in Oporto, one in Braga, three in Coimbra, one in Viseu, eleven in Lisbon and, finally, one in Azores (Ponta Delgada). It should be noted that at the time there weren't any such institutions in the south of the country and that most of these institutions were in urban centres (Remoaldo & Machado, 2008).

Researchers from the human and social sciences field in Portugal claim that the social and cultural factors related to reproductive health have been neglected, both by the Ministry of Health and by the health professionals in general (Remoaldo & Machado, 2008). Several studies have shown that in Portugal, mainly in the north region of the country, a strong association between marriage and (immediate) procreation and many erroneous beliefs about infertility are still prevalent that contribute to the imputation of culpability to the couple in the case of infertility, but especially to women (Joaquim, 1983; Nunes, 1997; Remoaldo, 2001). Results from a very recent study suggest that the most common reason for wanting a child relates with the cultural beliefs that associate women, femininity and marriage to reproduction. Also, data from this study suggest that there is still a strong familial and social pressure for procreation and that infertile couples feel isolated in their suffering, mainly due to infertility related social stigma (Remoaldo

& Machado, 2008).

A study that aimed at understanding how Portuguese people perceived ART showed that 58.9% of the participants considered that these techniques are an 'acceptable' resource for infertile couples to try to conceive, while 19.3% considered that these techniques are 'not acceptable' for conception. When the question was asked of whether women could use donated sperm to conceive in the case of male infertility, 39.5% of the respondents answered positively while 36.8% answered negatively. Finally, this study also showed that those individuals that exhibited greater acceptance of ART were young adults (between 18 and 29 years old), tended to be higher educated, to have reduced or no religious practice and to exhibit great confidence in scientific progress (Garcia, 2001).

In summary, although the use of ART is common, there seems to be considerable social stigma associated with infertility issues and the use of these techniques by infertile couples, especially from older, less educated and more religious people.

Empirical research on the psychosocial issues related to infertility and ART are still scarce in Portugal. In particular, to our knowledge, there are no empirical research studies focusing on the transition to parenthood of previously infertile Portuguese men and women. Therefore, we have no indication if their experience is similar to the ones of men and women from other European or Western countries or if it is deeply marked by social and cultural specificities.

Chapter 2

The Relational Ecology of Parenting

The present chapter presents the underlying theoretical framework adopted in this dissertation. It is structured in four different sections.

In the first section, we focus on the relational ecology of parenting. We advocate the need to adopt a contextual process-based view of parenting and describe those theoretical models that, in our view, best accomplished this endeavour. We then focus on the parent-child relationship as it is conceptualized in attachment theory. In fact, most of the theoretical and conceptual basis of our research work has its roots in the attachment framework.

In the second section we focus on social network and support, as this was one of our research topics (cf. empirical study two and three). After elaborating on conceptual issues surrounding social network and support literature, we present the Convoy Model, developed by Kahn and Antonucci (1980), because it is the conceptual framework adopted in our empirical studies.

In the third section we focus on parental socioemotional investment in the child. Located at the representational level, parental investment refers to the degree to which parents commit to their parental role, and is expected to shape the parenting process (Maccoby & Martin, 1983; cit. Greenberger & Goldberg, 1989; Bradley, Whiteside-Mansell, & Brisby, 1997). Based on Bradley's (1997) work, also described in this section, parental investment in the child constitutes also an independent research topic addressed in our work (cf. empirical study four).

Finally, in the fourth section, we focus on the transition to parenthood period. Developmental ecological approaches emphasize the importance of focusing on life transition periods, as these constitute windows of opportunity for developmental change (Bronfenbrenner, 1986). After a first moment in which we consider the conceptualization of (mal)adaptation as an ongoing transactional process, we focus on the particularities of (mal)adaptation during the transition to parenthood, as this specific life-transition moment constituted our main research topic.

1. The relational ecology of parenting

1.1. A developmental ecological perspective of parenting

Parenting does not occur in a vacuum but within a broader context (Belsky, Robins, & Gamble, 1984; Booth & Booth, 1996; Bronfenbrenner, 1979). Researchers have been advocating the need to examine the different ecologies in which families are embedded in order to fully understand the processes and outcomes of parenting. However, deriving from Bronfenbrenner's (1979; 1986; 1998), Belsky's (1984) and Luster and Okagaki's (1993) work, the adoption of an ecological perspective of parenting is still relatively recent and the comprehension of how different contextual variables may influence parental behaviour is a developing research field (Kotchick & Forehand, 2002).

Bronfenbrenner's (1979) articulation of nested levels in the ecology of human development marked a great stride forward in conceptualizing contexts. The micro-, meso-, exo-, and macrosystems that are part of his *Ecological Model of Human Development*, later on renamed as *Bioecological Model* (Bronfenbrenner & Morris, 1998), alert for the important and vastly different sources of contextual influences on human development.

The underlying premise of this model, adopted in the presented work, is that to fully understand human development one must value the occurring reciprocal interactions between a developing individual and the also continuously unfolding, dynamic and ever changing different contexts in which he or she is embedded across his or her life cycle.

According to Bronfenbrenner, the *microsystem* corresponds to the familial context, the principal context in which human development takes place. The *exosystem* includes other environments external to the individual but

that affect the family members and the manner in which they exert their influence on the individual's development. Examples of exosystems are the parents' world of work and their circle of friends and acquaintances, that is, the parents' social network. The *mesosystem* refers to the processes operating in different settings, that is, the influences operating in both directions between the different settings in which human development occurs (e.g. events at home can affect a child's progress in school and vice versa). Finally, the *macrosystem* refers to the social, ideological and cultural setting (Bronfenbrenner, 1986).

Later on, and to strengthen the importance of the dynamic contextual interactions that occur across time, that is, to confer his ecological model with developmental validity, Bronfenbrenner added a fifth system to his model, the *chronosystem*. This system takes into account changes that occur across time, not only within the person but also in the environment, allowing for the analysis of the transactional interplay between these two processes (Bronfenbrenner, 1986).

Research models that value this developmental perspective usually focus around a normative (e.g. school entry, marriage, transition to parenthood, retirement) or non-normative (e.g. death or severe illness in the family, divorce, moving) life transition, since such transitions occur through the life span and often are a window of opportunity for developmental change. More advanced models also take into account the cumulative effects of an entire sequence of developmental transition that occurred over an extended period of the person's life. In summary, these research models focus on "the impact of personal and historical life events on family process and on their developmental outcomes" (Bronfenbrenner, 1986).

Implied in this view is the need to find out how causal processes operate over time through direct and indirect chain effects and questioning how these effects are carried forward and how they influence the way individuals deal with later situations and circumstances. These processes are viewed as motors of human development, thus defined as stability and change in the bio-psychological characteristics of human beings as they continually transact with the environment (Rutter & Sroufe, 2000).

Despite advances that have occurred, the full incorporation of a contex-

tual focus into empirical research has proven to be a challenging enterprise (Richters, 1997). To date, researchers interested in context tend to examine contextual influences at one (or perhaps two) level of analysis, most of the time driven by theoretical perspectives that inevitably direct attention to some contexts more than others (Cicchetti & Aber, 1998).

Applied to parenting, this contextualistic view implies charting changes in parenting dimensions and in their evolving and dynamic relations to the larger network of systemic (e.g. family, ecological) and child variables (Cummings, Davies, & Campbell, 2000).

Applying Bronfenbrenner's ecological framework, Belsky (1984) tried to do this by offering a social-contextual approach to the *determinants of parenting*, that is, to the analysis of the factors that make "parents parent the way they do" (p. 83).

Belsky argued that parenting is directly influenced by (1) the parent's developmental history and personal psychological resources (ontogenic development); (2) the child's characteristics; and (3) contextual sources of stress and support.

Among the parents' characteristics, Belsky highlighted the importance of their own developmental history (e.g. early emotional experiences with their own caregivers) and their personality. Among the child's characteristics higher importance has been given to health status, gender, age and temperament. Additionally, Belsky identified four different contextual sources of stress and support: (1) the marital relationship, (2) the social network, (3) work context, and (4) formal social resources (cf. Belsky, 1984; Belsky & Jaffee, 2006).

While the first two sets of factors are located, according to Bronfenbrenners' perspective, in the microsystem, the third and fourth refer to forces emanating from the broader context in which the parent-child relationship is embedded, that is, the exo- and macrosystems (Belsky & Jaffee, 2006). The analysis of how these different factors interact across time influencing parents' individual personalities and general psychological well-being and, thereby, determining parental functioning and subsequent child development, links to the meso- and chronosystems.

All these factors contribute to promote or compromise *competent parenting*, defined as those parenting practices that allow the child to acquire the required skills to competently deal with the different contexts in which he will live through infancy, adolescence and adulthood (Belsky, Robins, & Gamble, 1984; cit. Pereira, 2008). Additionally, the model assumes not only that parenting is multiply determined but also that parents also influence the broader context in which parent-child relations exist and that this influence feeds back into the parenting system.

Belsky's *Social-Contextual Model of the Determinants of Parenting* is still a reference in the field literature, with other models expanding from it to include other determinants (e.g. Doherty, Kouneski, & Erickson, 1998) or exploring specific built-in determinants, such as social support (e.g. Simons & Johnson, 1996).

1.2. Theory of Attachment

In Volume 2 of *Attachment*, John Bowlby (1973, p. 364) alleged that the development of the individual “turns at each and every stage of the journey on an interaction between the organism it has developed up to that moment and the environment in which it then finds himself”.

Bowlby and Mary Ainsworth's (Ainsworth et al., 1978; Bowlby, 1969; 1973; 1980) *Theory of Attachment* focuses mainly on the nature of the parent-child relationship and is clearly embedded with the ecological and developmental assumptions mentioned above. Indeed, Bowlby's theorising contained clear and specific prepositions regarding the role of early experience in development, the importance of ongoing context and the processual nature of development that in many ways can be considered the precursors of modern ecological developmental models (Sroufe, Carlson, Levy, & Egeland, 1999).

Attachment theory underscores the central role of relationships in human development from the cradle to the grave. Beginning in infancy and developing through the individual's life course, attachment relationships who afford emotional support and protection are intimately tied to general adjustment and mental health (Bretherton & Munholland, 1999).

One of the most fundamental aspects of attachment theory is the focus on the biological bases of attachment. The theory postulates that infants and caregivers are bound together through evolutionary preparedness to engage in interactions that promote the survival of the infant and thus of the species as a whole (Levitt, 2005). Bowlby (1969) argued that infants are predisposed to seek their parents in times of distress, and that they manage to achieve proximity by exhibiting a set of attachment behaviours organized into an “attachment behavioural system”. Thus, central to the concept of the attachment behavioural system is that of the organization of a variety of attachment behaviours within the individual in response to internal and external cues of danger (Cassidy, 1999). This system was designed to help compensate the child’s natural tendency to explore the environment, in the recognition that exploration sometimes leads to danger.

Beyond fulfilling a biological function, the attachment relationship plays an important role in the individual’s development. Attachment bonds constitute the setting in which early experiences are lived, shaping the individual’s behavioural and emotional organization. It is that organization the individual brings forward to future developmental phases that frames subsequent transactions with the environment (Sroufe et al., 1999).

In the context of close relationships, this means that the attachment relationship provides a prototype for future relationships throughout life, especially for intimate love relationships and parenting (Sroufe et al., 1999).

Indeed, a significant part of the implemented research focusing on adult relationships has adopted the attachment theoretical framework, arguing that the underlying process in these relationships (i.e. the constant reliance on a secure relationship, also denoted as *secure base*, that provides comfort in the face of stress and thus promotes exploration of the world) is the same as in infancy (Ainsworth, 1991). Within this research field, the Convoy Model, developed by Kahn and Antonucci (1980) constitutes perhaps one of the most successful expansions of the attachment framework to conceptualize other types of intimate relationships formed across the life span.

According to Bowlby (1969; 1973; 1980), the child’s early emotional experiences with the caregiver are thought to be organized into cognitive-

affective internal working models that, once established, guide expectations regarding both existing and new relationships (Levitt, 2005). In other words, interacting with the caregiver, the child develops a sense of basic security that implies (1) a perception of the self as worthy of love and attention and as capable of evoking other's availability and sensitivity in order to meet his or her needs, and (2) a perception of others as responsive and accessible to provide support and protection. However, when emotional experiences with the caregiver are negative, multiple and dissonant internal working models may develop, originating emotional suffering and compromising positive future development (Bowlby, 1973).

Hence, the attachment relationship in infancy is both a precursor and a prototype for future relationships. This means that, for optimal development, some primary attachment relationship must be formed within the first year of life⁹, constituting the basis for future development that, nevertheless, remains flexible. Recent studies emphasise the plasticity of the human organism in face of adversity (Soares, 2007) and the importance of later experiences, either enriching or depriving, that also affect the individual and thus contribute to stability or change in the developmental sequence (Kahn & Antonucci, 1980).

This fact calls attention to the importance of the caregiver role and the caregiving system as complementary and reciprocal to the infant's attachment system. In the final pages of the second edition of *Attachment*, Bowlby (1982) called for the study of caregiving as a behavioural system in its own right, but this challenge was only more recently undertaken by

⁹ Individual differences may be identified regarding the child's attachment relationship to his or her caregiver that are related to the caregiver's *sensitivity* in the provision of care, that is, that are related to the caregiver's capacity to see, assess and interpret the child's signs and communications and, based on that information, to answer in a consistent and adequate way (Ainsworth et al., 1978). Mary Ainsworth (1978) developed an assessment procedure, the Strange Situation, and a classification system to capture these individual differences. This work translated in the identification of the attachment patterns A (insecure-avoidant), B (secure) and C (insecure-anxious), to which later on Main and Solomon (1990) added a fourth D (disorganized) pattern.

Solomon and George (Solomon & George, 1996).

The notions that caregiving reflects an organized behavioural system, linked developmentally to attachment, but still distinct from it, entailed a shift in perspective in theory and research. Historically, the field of child development was not interested in trying to describe or understand parents as developing adults. Solomon and George argued that that shift was necessary to understand how parents, past experiences, family and cultural contexts and the child work together to influence the quality of parent-child relationships (Solomon & George, 1996).

Solomon and George stated that the ultimate or evolutionary function of the caregiving system is protection of the young, that is, to keep the child close to the caregiver under conditions of threat or danger (Solomon & George, 1996). As such, although this system also implies maintaining proximity to the child, it is not for the purpose of the parents' own felt security. Rather, the parental bond seems to revolve around a desire to protect, the tendency to affiliate, and a sense of the parent's own identity (Bradley, Whiteside-Mansell, & Brisby, 1997).

Parallel to the notion of internal working models, parents' have a caregiving representational system that has its roots developmentally in the construction of working models (of the self and others) in the context of attachment relationships during childhood, but is, under normal conditions, a distinct model of relationships with its own developmental trajectory and function (Solomon & George, 1996). In a more specific way, parental working models influence parents' adjustment to the parental role (Steele, Steele, & Model, 1991) and guide their caregiving attitudes and behaviours, influencing the emotional environment of filial relationships from the moment parents decide to have children across their entire shared life cycles (Goldberg, 1983).

It should be noted that the caregiving system is only one of several motivational systems within the parents (Stevenson-Hinde, 1994). Although a very powerful and compelling one, it is not the only role parents strive to fulfil and, as such, parents must strike a balance between their need to protect and nurture the child and their need to pursue other goals. This balance is likely to reflect current cultural and family contexts, including the

support given to parents in their roles as parents and the demands made by others upon them, the requirements of a particular child, their own child and adult attachment experiences, and their experiences as caregivers (Solomon & George, 1996).

According to Levitt (2005), Bowlby's attachment theory made a significant contribution to the study of close relationships by making a strong case for an ethological and evolutionary view of social bonding, by developing a classification system that has proven to have some predictive utility, and by focusing on the importance of cognitive representations as arbiters of continuity and change in social relationships. To this list we could add (1) by highlighting the importance of real life experience as setting the basis for relationship "negotiations" as opposed to a more psychodynamic view that highlighted the role of internal conflicts or desires, (2) by describing relational processes that are passive of generalization across developmental stages and types of intimate relationships (e.g. social network), and (3) by offering the adequate theoretical framework to understand the mechanisms underlying intergenerational relational phenomenon (e.g. parental investment in their children).

2. Social networks and social support

Research on social relationships has attracted much attention in the area of public and mental health. It is well documented that people with strong social relationships have a lower morbidity, mortality and a better possibility of recovery or survival after illness (Cassel, 196; Cobb, 1976; Cohen & Syme, 1985).

Despite the enormous interest in social support, its conceptualization still lacks a strong consensus. The main concepts used in this literature field are social support and social network. However the literature includes numerous related concepts, such as social relationships, social integration, social participation and social anchorage, often used indistinctively. All these concepts address, at least to some level, the structural and functional characteristics of social support, or even the way it is perceived by individuals (Antonucci, 1985), but they lack the necessary conceptual articulation. Consequently, research in the area is divided into many different tenden-

cies that diverge at the conceptual level and as such do not allow for the integration of research results.

Trying to overcome this lack of conceptual consensus, several authors proposed a multidimensional taxonomy. In this taxonomy, social support is considered a meta-construct that includes several different concepts defined as to capture, among others, the functional (e.g. support behaviours, types of support) and structural (e.g. social network) elements of social support (e.g. House & Kahn, 1985; Vaux, 1990).

However, some authors have argued that the meta-construct to use when addressing these issues should not be social support but social network (O'Reilly, 1988; Berkman, Glass, Brissette, & Seeman, 2000) or social relationships (Due, Holstein, Lund, Modvig, & Avlund, 1999; House & Kahn, 1985). In contrast to previous theorization where the most important aspect of social networks was the support functions they provide, the common assumption claimed by these authors (independently of the term used) is that social relationships or networks have a variety of functions of which the provision of social support is but one.

Within this framework, Berkman and colleagues (2000) proposed a conceptual model of how social networks impact health. These authors claimed that it is necessary to maintain a view of social networks as lodged within those larger social and cultural contexts which shape the structure of networks. Thus, their model begins by embedding social networks in this larger social and cultural context and then moving down to describe the influences social networks have on social and interpersonal behaviour. Berkman and colleagues (2000, p. 846) argued that

networks operate at the behaviour level through four primary pathways: (1) provision of social support; (2) social influence; (3) on social engagement and attachment; and (4) access to resources and material goods. These micro-psychosocial and behavioural processes, we argue, then influence even more proximate pathways to health status including (1) direct physiological stress responses, (2) psychological states and traits including self-efficacy, self-esteem, security, (3) health-damaging behaviours such as tobacco consumption or high-risk sexual activity, health promoting behaviours such as appropriate health service utilization, medical adherence, and exercise...

We find this conceptualization appealing given that it seems to integrate Bronfenbrenner's (1979) different contextual levels, allowing for the examination, not only of how social networks influence narrower social phenomenon (meso- and microsystems) but also how these networks are modelled by larger scale social phenomenon such as cultural and social changes, economic pressures and organizational relations (macro- and mesosystems). Also, it maintains a clear distinction between structural and functional characteristics of social networks, locates social support at the micro-process level and differentiates it from other processes that are many times used indistinctively (e.g. attachment, relational strain). Nonetheless, it lacks the integration of the time dimension, that is, of a developmental perspective.

Social networks may thus be defined as the web of social relationships that surround an individual and the characteristics of those close ties (Berkman et al., 2000), or the individuals with whom one has a close family relation and/or affection, and the linkages between those individuals (Due et al., 1999), or even as the set of relations perceived by the individual to be close and important to his or her life (Kahn & Antonucci, 1980).

Note that these very similar definitions imply a differentiation between formal relationships, i.e., that exist due to one's position and roles in society, and informal relationships, i.e., the social network. Formal relationships are only included in the individuals' social network when they develop into some kind of affective bond.

Social networks are generally viewed as complex systems with multiple levels that cannot be understood as the sum of the dyadic relations between the individual and specific network members (Levitt, 2005). Network characteristics cover, among others, range or size (number of network members), density (the extent to which the members are connected to each other), boundness (the degree to which they are defined on the basis of traditional group structures such as kin, work colleagues, neighbours...) and homogeneity (the extent to which individuals are similar to each other in a network, Berkman et al., 2000).

Social support refers to level of resources provided by the network (Due et al., 1999) and is typically divided into subtypes which include emotional,

instrumental, appraisal and informational, with these last two subtypes being often difficult to disaggregate.

Emotional support refers to the availability to listen sympathetically when an individual is having problems and to provide indications of caring and acceptance and is thought to alter threat appraisals of life events, to enhance self-esteem, to reduce anxiety and/or depression and to motivate for positive coping (Wills & Shinar, 2000).

Instrumental support involves practical help when necessary, such as assisting with transportation, helping with household chores and child care, and providing tangible aid such as bringing tools or lending money. It is thought to influence health positively through the resolution of practical problems, by allowing increased time for rest and relaxation and by promoting effective coping efforts (Wills & Shinar, 2000).

Informational or appraisal support is defined as providing useful knowledge for solving problems such as advice and guidance about alternative courses of action, that is, providing help in decision-making, giving appropriate feedback or helping decide which course of action to take. Informational support increases the amount of useful information available to the individual, helps obtaining needed services and leads to more effective coping (Berkman et al., 2000; Wills & Shinar, 2000).

The described micro-processes through which the different types of social support may impact health can be grouped, according to Cohen and Wills (1985) under two possible models of influence that have been widely explored in empirical research. The *main-effect model* (or *stress-preventive model*) refers to a generalized beneficial effect of social support on well-being, independently of stress. The *buffering model* proposes that social support is related to well-being only (or primarily) for people under stress, that is, support “buffers” or protects people from the potentially pathogenic influence of stressful events.

Two possible stress-buffering mechanisms were described by Cohen and Wills (1985). First, support may intervene between a stressful event and a stress reaction by attenuating or preventing a stress appraisal response, that is, the perception that adequate support is available may rede-

fine the potential for harm posed by a situation or event. Second, adequate support may intervene between the experience of stress and the onset of the pathological outcome by reducing or eliminating the stress reaction or by directly influencing physiological processes. For instance, support may provide a solution for the problem or facilitate healthful behaviours.

Therefore, social networks may function by preventing and buffering stress. Network members may invest individuals with the material and psychological resources that foster positive development and thus prevent many stresses from occurring. This stress-preventive role of social networks functions by reducing the likelihood that individuals will experience a physical or psychological difficulty owing, for instance, to poor health, social isolation or rejection, or hopelessness. When stress does occur, social networks may buffer the impact of negative or stressful events by helping individuals to make more realistic appraisals of these events, enhancing knowledge and coping strategies, providing useful information or instrumental aid, or supporting self-esteem and perceptions of self efficacy.

Another important distinction to make concerns perceived versus received social support. While *perceived support* refers to support that is perceived to be available if needed, *received support* refers to support recently provided (Wills & Shinar, 2000).

Perceived support is the dimension of social support that has been most strongly related to psychological well-being in adults and children, both directly and/or by reducing the impact of life stress on adverse outcomes (Cohen & Wills, 1985; Sarason, Shearon, Pierce, & Sarason, 1987). This seems to be so because confidence in the availability and helpfulness of social partners is crucial for maintaining a sense that support is available and the hope that it can be of assistance even in difficulty. That is, in a sense, what it means to be in a secure attachment relationship. Perceived support is thus a subjective measure of social support, relying on how individuals appraise the reliability of their social network, and thus addresses an important feature of emotional coping for individuals under stress (Thompson, Flood, & Goodvin, 2006).

Although perceived support availability is known to be of considerable significance for health (Wills & Shinar, 2000), a more negative conse-

quence of its subjective nature is that it necessarily reflects aspects of the individual's personality, especially in the interpersonal domain (e.g. expectations, optimism, internal working models, attributional styles, Moreira, 2002) which may, dependently of research goals, constitute spurious information.

2.1. The Convoy Model

The Convoy Model offers a life course perspective of close relationships that complements other models and is unique in that it infused a life span developmental dimension into traditional social network analysis (Levitt, 2005). In their seminar paper, Kahn and Antonucci (1980) conceptualized the individual's social network as an evolving hierarchy of relations varying in perceived closeness and importance to the individual.

Consistently with a developmental contextual framework, they observed that social networks can be described not only in terms of their status at any given point in time, but also in terms of changes that take place across time and situation. The term convoy was used both to capture the protective function and the dynamic nature of the individual's social network as it moves with him or her along time and circumstances and events (Kahn & Antonucci, 1980), either helping or hindering the individual's ability to cope with life's challenges (Antonucci, Akiyama, & Takahashi, 2004).

The individual's social convoy is defined in terms of relations that are perceived to be close and important in his or her life. No specific a priori assumptions are made regarding the social convoy members' specific roles or functions in the individual's life. Instead, the only convoy membership criterion is closeness and importance to the individual.

The convoy is a person-centered network. Each convoy is a personal network of social support defined around an individual and it is conceptualized empirically as a hierarchy of three concentric circles surrounding that individual, i.e., the *convoy diagram*. Inner circle relations are those to whom the individual feels so close that life cannot be imagined without them. Persons who are less close but still important are found in the middle circle. Those who are not as close as the others but still important occupy the outermost circle of the convoy.

The convoy functions primarily to provide support, defined as “consisting of certain kinds of transactions: expressions of positive affect and affirmation, and the giving of aid and assistance” (Kahn & Antonucci, 1980, p. 274).

The social convoy is viewed as emerging developmentally from a core of attachment relationships in infancy and expanding to include other important relationships as the child enters a broader social sphere (Kahn & Antonucci, 1980). Shadowing the construct of secure attachment, supportive interchanges between social convoy members are viewed as providing a secure base for individual functioning (Antonucci & Jackson, 1987; Antonucci, Akiyama, & Takahashi, 2004).

Attachment relationships are seen as a small, relatively stable and highly influential subset of a larger social system with permeable boundaries and, in terms of the convoy, are usually located in the innermost circle. Thus, inner circle relationships are expected to be stable across time and to provide high levels of support, although it should be noticed that the relation between support provision and the convoy members’ position in the circle is not expected to be linear (Levitt, 2005). Those other less yet still-close relationships help the individual face the challenges of development more broadly (Antonucci, Akiyama, & Takahashi, 2004).

The Convoy Model offers a framework for explaining how attachments are formed, maintained, and attenuated across the life span and also how multiple attachments and internal working models are formed. It results from the recognition that the often exclusive mother-child relationship is normally expanded to include fathers, grandparents, and other relatives still in early childhood (Antonucci, Akiyama, & Takahashi, 2004).

As such, instead of an hierarchical model of attachment relationships¹⁰, the Convoy Model results from the perspective that several attachment relationships may be formed, allowing one relation to compensate for an-

¹⁰ Bowlby proposed the principle of “monotropy” to describe a strong tendency of the child to prefer a principal attachment figure for comfort and security (e.g. Cassidy, 1999)

other within the network, and that working models of attachment integrate experiences with different caregivers and that the carryover from those experiences may be domain specific (Levitt, 2005).

Thus, if fundamental expectations about us in relation to others are based on multiple relationships, the importance of mapping and learning how these relationships evolve across time and of how they influence developmental outcome is crucial. By integrating research on attachment, social networks and social support, the Convoy Model aims at contributing to this research field (Antonucci, Akiyama, & Takahashi, 2004).

Kahn and Antonucci (1980) also emphasized a life-course perspective of the convoy. The convoy is expected to change across the life-course as individuals face normative and non-normative life transitions and assume new roles that are accompanied by new expectations, demands and challenges. Each of these life transitions brings with it the potential for the individual to reconstruct his or her social convoy in order to meet his or her support needs. It is thus critically important to establish how and why these relationships change or stay the same and how they influence the successful adaptation and development of individuals across their lifetime (Levitt, 1991).

In Kahn and Antonucci's own words (Kahn & Antonucci, 1980, p. 256)

We consider the life-course perspective important to the understanding of social support for several reasons. First, people's needs and circumstances change as they move through the life course. Some roles are relinquished and others assumed; one shifts from dependent to provider and caretaker; changes in job and residence are common. Second, the form and amount of social support appropriate at a given time and place depend on such changing needs and circumstances; there is no single lifelong recipe. Third, with regard to social support, as with everything else, the past affects the future; to understand individual differences among adults, some systematic way of including their earlier experiences is needed. Finally, the interpretation of individual differences as age, period, or cohort effects must refer to different experiences during the life course.

Beyond its conceptual strengths, the Convoy Model diagram also offers some advantages to empirical research, namely (1) it allows the simultane-

ous assessment of both network structural and functional characteristics, and (2) it allows for an easy identification of all network members and does not impose a limit for the number of members included (Antonucci, 1985).

Empirical research has corroborated several of the basic assumptions of the Convoy Model. Several structural and functional differences in the convoy models of age and cultural diversified populations were found in cross-sectional (Ajrouch, Antonucci, & Janevic, 2001; Antonucci & Akiyama, 1987; Antonucci, Akiyama, & Takahashi, 2004; Levitt, 1991; Levitt, 2005) and short term longitudinal studies focusing on normative life transitions, such as graduation from high school (e.g. Levitt & Silver, 1999), the transition to parenthood (e.g. Levitt, Coffman, Guacci-Franco, & Loveless, 1994; Levitt, Weber, & Clark, 1986) and retirement (e.g. Bosse, Aldwin, Levenson, Workman-Daniels, & Ekerdt, 1990). These and other studies focusing on non-normative transitions (e.g. adolescent pregnancy, Pereira, 2001; parenthood and HIV, Pereira, 2008) have also shown that support perceived from the convoy is associated to positive psychosocial adjustment, that inner circle relationships are more stable across time and that the majority of the convoy changes occurs in the outermost circles.

3. Parental socioemotional investment in the child

Theory and research in early infant development have emphasized the importance of the creation of an early emotional bond between the child and its caregiver, that is, the formation of an attachment relationship, as one of the first developmental tasks for an infant (Keller, 2000).

Nonetheless, the child does not work alone to fulfil this task. Attachment relationships are built on repeated interactive dyadic relational experiences to which both infant and caregiver contribute. However, these contributions are asymmetric, and the infant is ultimately dependent on parental characteristics, such as sensitivity or responsiveness to the infant's cues (Ainsworth et al., 1978). Indeed, there is now a general consensus that the caregiver takes the dominant role in establishing the security of any particular attachment relationship (Meins, 1999).

Evolutionary approaches have called attention for the parents' role in

their children's development and, as Solomon and George also claimed (1996), there seems to be a growing awareness that more research needs to be done on the adult side of the attachment relationship (Bradley, Whiteside-Mansell, & Brisby, 1997).

In an evolutionary perspective, parenting results from the investment parents allocate individually and differently to each of their offspring (Clutton-Brock, 1991; cit. Keller, 2000).

Parental investment theory has primarily been put forward by Trivers (1974; cit. Keller, 2000) and has been conceptualized as representing an integral part of an individual's reproductive story and resulting from trade-offs at two different levels. First, between investments in own growth and development and reproductive efforts composed of mating effort and parental investment, and second, between one particular child and other children, that is, between current and future reproduction (Clutton-Brock, 1991; Keller, 2000; Schaefer & Manheimer, 1960; Trivers, 1974). In summary, from an evolutionary perspective, parental investment is about optimizing the reproductive success of the individual by considering the contextual, parental, and child characteristics (Keller, 2000).

Thus, parental investment in a given offspring is usually expressed in quantitative terms as more or less compared with other offspring and depends on the ecological conditions that an individual faces. Lower investment refers to less biological and/or psychological care, neglect, or even infanticide, and higher parental investment refers to relatively more biological and psychological care, which also reflects in a positive family climate (Keller, 2000).

From a sociobiological perspective, parental investment in children refers to the way in which parents, influenced by various environmental constraints and facilitators, allocate resources (e.g. attention, nourishment) to their young in order to ensure not only their reproductive success but also their access to resources (e.g. occupational, training, economic security) that would enable them to support their own reproductive and parenting ventures (Greenberger & Goldberg, 1989).

Still, further expansion on the definition of parental investment, accord-

ing to developmental psychologists, refers to the degree to which parents commit themselves to their role as a parent and to the fostering of optimal child development (Maccoby & Martin, 1983; cit. Greenberger & Goldberg, 1989).

The combination of contextual, attitudinal and behaviour indicators into a decision-making process of parental investment seems consistent with the idea that individuals develop parental working models that function as a representational system through which the caregiver organizes feelings about the self and expectations of others regarding his or her parental performance. In other words, parents' own attachment experiences are expected to be transformed and integrated into a system organized to provide protection for the child (George & Solomon, 1996). This representational system, along with contextual variables, influences the parental investment decision-making process, reflecting on parental behaviour towards the child.

Three different dimensions contribute to parental socioemotional investment in the child: (1) *acceptance of parental role*, (2) *delight* and joy in being with the child, and (3) *knowledge and sensitivity* to the child's needs (Bradley, Whiteside-Mansell, & Brisby, 1997; Bradley, 1998; Corwyn & Bradley, 1999). According to Bradley (1997, p. 79)

the quality of the parent's socioemotional investment should be manifest in the amount of joy or delight a parent experiences with a child (including the desire to spend time with the child), expressions of affection toward a child, sensitivity to the child's needs (including simple knowledge about the child) and responsiveness to those needs, the degree that parents worry about the child's welfare, acceptance of the child and of the parenting role, and consistent choices on the parent's part to act in the best interest of the child. These aspects of a parent's socioemotional investment in a child are likely to be related to one another to some degree but probably do not represent a single, unidimensional trait.

The parents' socioemotional investment in their children is likely to shape not only how the parents feel about themselves as caregivers but also the process of caregiving itself (Bradley, Whiteside-Mansell, & Brisby, 1997). It is therefore a valuable construct for the further development of

theories of parent-child relationships and for understanding the parenting process. In Belsky's (1984) conceptualization of the determinants of parenting, parental socioemotional investment would fit into the parents' characteristics, more specifically, into the parents' developmental history and personal psychological resources, but would probably be more strongly associated with parenting behaviour than more general aspects of the parents' personality (Bradley, Whiteside-Mansell, & Brisby, 1997).

Coherently with attachment research literature, those parents that invest more in parenthood and in their children are more likely to provide them with stimulation, sensitive and responsive care (Bradley, Whiteside-Mansell, & Brisby, 1997), thus increasing the children's opportunities to develop secure attachment relationships with their parents, peers and other significant persons (George & Solomon, 1996; Sroufe, 2005).

This was what Cox and colleagues (2004) observed in their two years longitudinal study focusing on the transition to parenthood period. Using an interview to assess parents' attitudes and feelings about being a parent and about their infant (i.e. delight, sensitivity, investment or commitment to the parenting relationship, and acceptance of parental role), they observed that the composite score of these four different dimensions associated positively with behavioural observations of parental positive interactions with the child and, consistently, negatively with behavioural observations of parental negative interactions with the child, for both mothers and fathers. In an earlier study with this measure with a different sample it was found that for fathers this interview variable was the best predictor of the infant-father security attachment (Cox, Owen, Henderson, & Margand, 1992a).

On their side, secure children are also more likely, later in their life course, to provide their own children with the appropriate care to the development of secure attachment relationships. As Draper and Harpending (1982) argued, early experience sets the reproductive strategy that individuals will follow in later life.

However, contextual variables also play a role in shaping developmental pathways, and Belsky, Steinberg and Draper (1991) argued that when environmental resources are scarce, a different pathway, also considered to promote reproductive success, is more likely to arise. In short, stressful

rearing environments lead to the development of insecure attachments to parents and subsequent behavioural problems, to early pubertal development and precocious sexuality in adolescence, and to unstable pair bonds and limited investment in parenthood in adulthood. If, for many scientists this developmental pathway seems problematic as it appears dysfunctional within mainstream society, from an evolutionary perspective it is equally functional. For instance, the pubertal development described earlier associates with earlier procreation (Belsky, Steinberg, & Draper, 1991). Intergenerational cycles of parental-care transmission are thus established that can only change when ecological circumstances also change.

In line with this ecological perspective, studies developed by Bradley and colleagues with parents of a 15 month old child have shown that different contextual factors associate with parent's socioemotional investment in their child and that mothers' and fathers' investment are differently determined (Bradley, Whiteside-Mansell, & Brisby, 1997; Bradley, 1998; Corwyn & Bradley, 1999).

For fathers, work strain was negatively associated with acceptance of the parental role and the quality of the marital relationship was positively associated with knowledge and sensitivity to the child's needs, while the mother's employment status (employed) and father's work strain were negatively associated with it. As many studies have shown (e.g. Doherty, Kouneski, & Erickson, 1998; Grossman, Pollack, & Golding, 1988), work seems to have a strong impact on fathering.

For mothers, being employed was positively associated with acceptance of the parental role, social support and the quality of the marital relationship were positively associated with knowledge and sensitivity to the child's needs, and finally, fathers' work strain associated positively with the mothers' delight in being with the child. This last association is consistent with data suggesting that mothers try to compensate poor fathering (Gable, Belsky, & Crnic, 1992; Grych, 2002). As with fathers, family income was not related to mothers' investment. Another important finding, consistent with a long history of research on the effects of infant temperament, was that the child's difficult temperament associated negatively with acceptance of the maternal role and was marginally associated with maternal knowledge and

sensitivity.

Cox et al. (2004) found that mothers reported higher parental investment (i.e. delight, sensitivity, investment and acceptance of being parents) than fathers but also that they did not differ in terms of patterns of change in their parental investment from three to twelve months after the partum, both reporting stability over time. They also found that parents who displayed more marital conflict tended to also express higher parental investment, especially if they also showed more marital withdrawal, and that parents reporting more depressive symptoms tended to report lower parental investment. This last association was observed across time for both mothers and fathers.

Our own studies have shown that for fathers, higher education and the child's gender (masculine) were positively associated with higher knowledge and sensitivity. For mothers, the child's temperament was associated with their acceptance of the parental role, higher education was associated with higher knowledge and sensitivity and the remembrance of negative rearing practices from their fathers (i.e. overprotection) was negatively associated with knowledge and sensitivity (Gameiro, Martinho, & Canavarro, 2008).

In summary, just as Belsky claimed for parenting in general (Belsky & Jaffee, 2006), parental investment seems to be multiply determined, with no single factor, either personal or contextual, exerting a dominant influence. Although these results apply only to infancy, maternal investment in the child proved to remain a stable construct at least until the child is three years old (Corwyn & Bradley, 2002).

4. (Mal) adaptation during the transition to parenthood: a developmental ecological perspective

The transition to parenthood is a near universal experience for individuals and families. While the actual biological experience of becoming a parent occurs in the instant the baby enters the world, the psychosocial transition to parenthood is a much more lengthy process that begins with the initial contemplation of conception, continuing through the early years of

the child's life (Glade, Bean, & Vira, 2005). In a more restricted view, the transition to parenthood is defined as the relatively brief period that goes from the beginning of a pregnancy to the first months following the child's birth (Goldberg & Michaels, 1988).

Although it is a normative event, in many households the transition to parenthood is stressful due to three interrelated causes. First, the physical events of pregnancy and delivery make the postpartum period one of physical weakness for many women. Second, the demands of a newborn baby require tremendous energy from parents if quality care is to be provided. Finally, these developmental changes modify everyday patterns of cognitive and behavioural functioning which, all by themselves, require a good deal of energy to handle (Belsky & Rovine, 1984).

Available evidence indicates that an infant's arrival requires extensive reorganization, producing a variety of conflicts and daily strains at the individual, marital and familial level, but also rewards and gratifications (Levy-Shiff, 1999). Coherently, in one study of more than 2,500 adult respondents aged between 21 and 65, the birth of the first child was evaluated as the sixth most stressful event on a list of 102 events, falling between separation from spouse and inability to acquire treatment for an illness or injury (Dohwrenwend, Krasnoff, Askenasy, & Dohwrenwend, 1978).

Due to its intrinsically temporal nature and to the fact that it constitutes an important developmental task¹¹ in the individuals' life cycle, setting the stage for subsequent future development at the familial, parental and individual level, it is our understanding that to study adjustment across the transition to parenthood one must conceptualize adaptation as an ongoing transactional process¹² instead of in terms of a set of successive momentary

¹¹ Although the transition to parenthood is commonly conceptualized as a moment of crisis (Boss, 2002), we prefer the concept of developmental task, as it corresponds to a more positive connotation of this life transition as challenging instead of threatening. Empirical research has validated this conceptualization as men and women seem to evaluate their transition to parenthood more as demanding than threatening (Levy-Shiff, 1999).

¹² This is indeed one of the assumptions of the theoretical macro-paradigma named as *Developmental Psychopathology* that aggregates the work of several researchers (e.g. Jay Belsky,

individual adjustment status.

This means that individuals are continuously (re)negotiating adjustment. There is neither one set of events that leads to good adjustment, nor one set of events that leads to various negative outcomes, but a continuous pattern of change in transaction with everyday circumstances (Cummings, Davies, & Campbell, 2000). In this sense, maladaptation does not simply appear but emerges gradually due to successive deviations from normative expectations over time (Cummings, Davies, & Campbell, 2000). As a consequence, (mal)adaptation has to be considered within a temporal dimension: previous (mal)adaptation compromises ongoing (mal)adaptive processes that in turn affect future (mal)adaptation.

This negotiation is made in relation to the surrounding environment, that is, (mal)adaptation only exists in relation to a particular environment. Outcomes reside not in the individual but in the adaptiveness of the relationship between individual and context (Sameroff & Emde, 1989). As such, individual development is a product of the continuous dynamic interactions between that individual and the experience provided by his or her context¹³

John Bowlby, Dante Cicchetti, E. Mark Cummings, Michael Rutter, Allan Sroufe, among many others. In Portugal, this framework has been embraced by L. Joyce-Moniz, Maria Cristina Canavarro, Isabel Soares, among others) and was adopted in the context of the present work. Developmental Psychopathology is an evolving scientific discipline whose predominant goal is to elucidate on the interplay between the biological, psychological, and social-contextual aspects of normal and abnormal development across the life span (Cicchetti, 2006). It is a macro-paradigm that acts as a framework for understanding developmental processes from a number of perspectives and at different levels of analysis, ranging from theories of behaviourism, attachment, family systems, evolution, ethology, and information processing (Achenbach, 1990). What characterizes Developmental Psychopathology is “a focus on the interplay between normal and atypical development, an interest in diverse domains of functioning, and an emphasis on the utilization of a developmental framework for understanding adaptation across the life course” (Cicchetti & Cohen, 1995, p.3).

¹³ This transactional perspective also implies that equal emphasis is placed on the bidirectional effects of the individual and of the environment. However, empirical research under this perspective is problematic at different levels. There are theoretical obstacles (assessing a dynamic system), logistic (developing longitudinal studies with enough time points and large

(Sameroff & Mackenzie, 2003). In Bronfenbrenner's (1986) line of thinking, (mal)adaptation emerges from multiple contextual influences (Masten & Curtis, 2000).

The concept of adaptation/competence is itself dependent of the context, in that it refers to adaptational success in relation to expectancies from a particular cultural and historical context, while maladaptation refers to the failure in meeting expectations for behaviour in society (Masten & Curtis, 2000).

Finally, (mal)adaptation is function of a complex myriad of risk and protective factors that operate over time in human development. *Risk factors*¹⁴ predispose individuals and populations to a specific negative or undesirable outcome (Cowan, Cowan, & Schulz, 1996), while *protective factors*¹⁵ increase the chance for positive adaptation by reducing the deleterious impact of risk, that is, protective factors buffer the negative impact of risk on the individual (Cummings, Davies, & Campbell, 2000).

When, in the present of risk, individuals show positive developmental outcomes, they are said to be resilient. Thus, *resilience* refers to psychological processes that allow the individual to overcome adversity and evidence adaptive developmental outcomes, being seen as a function of the protective factors and processes that direct individuals away from a risk trajectory (Soares, 2000). Given that most individuals do develop normally, resilience constitutes a central class of processes underlying human devel-

enough samples), and methodological (assessing multiple interacting domains over time in order to identify points of qualitative change, Sameroff & Mackenzie, 2003).

¹⁴ The identification of risk factors implies the use of *moderation models*. Moderation models specify the strength and/or direction between an independent variable and an outcome (Baron & Kenny, 1986; Holmbeck, 1997) and reflect the fact that the nature and degree of risk in not necessarily uniform across different conditions and people (Cummings, Davies, & Campbell, 2000).

¹⁵ Protective factors must moderate the impact of risk while having a negligible link to adaptation among people experiencing low risk. When a factor predicts greater psychological adjustment regardless of whether individuals experienced risk or not, it is designated as *compensatory factor* (Downey & Walker, 1989).

opment (Cummings, Davies, & Campbell, 2000). In other words, healthy and normal human development involves negotiating some level of stage-specific threat and demonstrating a degree of resilience in the face of challenge (Spencer et al., 2006).

This view highlights the importance of understanding *mechanisms, processes* and chains of causality (Rutter, 1988), that is, more than identifying risk and protective factors, it is important to understand why and how they lead to better or worse adjustment¹⁶.

It also implies that there is continuity between adaptation (i.e. normal development) and maladaptation (i.e. psychopathology) and their underlying mechanisms. Across his or her life cycle, an individual can evolve along a multiplicity of *developmental pathways*¹⁷, depending on the mutual influences among factors internal and external to the individual, and the interplay that occurs between those factors and previous individual development. Thus, the same general principles that guide adaptive pathways also guide the development of maladaptive pathways (Cummings, Davies, & Campbell, 2000).

In summary, according to Cicchetti (2006, p.3-4) the study of (mal)adaptation

¹⁶ At a process level of analysis, resilience refers to those dynamic processes of psychological functioning that foster greater positive (and reduce negative) outcomes in the face of relative adversity. The examination of these mechanisms implies the use of *mediation models*, that is, the test of whether a particular process mediates relations between a predictor and an outcome (Baron & Kenny, 1986). However, to examine response processes as a function of groups, another step is needed, that is, moderation and mediation models need to be integrated into the same model. In a first step, moderation models serve as a foundation for answering the mediation question of why people possessing certain characteristics or experiencing certain conditions are more (or less) vulnerable to disorder (Rutter, 1983). These integrated models have been called *moderated mediation* (James & Brett, 1984).

¹⁷ The notion that there are multiple pathways during development, including multiple avenues towards normality and abnormality is called *developmental pluralism*, that is, development involves many more possibilities toward normality or abnormality than one.

entails comprehension of and appreciation for the developmental transformations and reorganizations that occur over time; an analysis of the risk and protective factors and mechanisms operating within and outside the individual and his or her environment over the course of development; the investigation of how emergent functions, competencies, and developmental tasks modify the expression of a disorder or lead to new symptoms and difficulties; and the recognition that a particular stressor or set of stressful circumstances may eventuate in different biological and psychological difficulties, depending on when in the developmental period the stress occurs. Moreover, various difficulties will constitute different meanings for an individual depending on cultural considerations, as well as an individual's experiential history and current level of psychological and biological organization and functioning. The integration of the experience, in turn, will affect the adaptation or maladaptation that ensues.

According to a developmental perspective, the transition¹⁸ to parenthood is thus considered a specific task of the life cycle, characterized by a set of challenges whose positive resolution increases the chances of the individual to stay on an adaptive pathway or of returning to it (Cummings, Davies, & Campbell, 2000).

It should be noted that in the particular case of the transition to parenthood, its positive resolution has implications not only for the individual/parent but also for the newborn. Indeed, Canavarro (2001, p. 45) defined adjustment to parenthood as “the capacity to fulfil a set of [associated] developmental tasks, merging them in the capacity to bear and educate a child and by doing so promoting the child and his or her own positive development”. Consistently, results from several research teams revealed that mothers' and fathers' psychological adaptation and marital quality before their babies were born predicted their parenting effectiveness during the first year or two of their child's life (e.g. Belsky & Rovine, 1990; Cowan et al., 1991).

During the transition to parenthood, several changes occur in different

¹⁸ Transitions can be defined as long-term processes which result in a qualitative reorganization of both inner life and external behaviour (Cowan et al., 1991).

areas. More precisely, (1) at the individual level of each family member, (2) in the marital relationship, (3) in the parent-child relationship, (4) in the intergenerational relationships between grandparents, parents and child, (5) in the relationships between family members and external institutions (e.g. work) and stress and support sources (e.g. the social network), and (6) when other children exist, between these and the parents and the newborn (Cowan & Cowan, 2000).

From a developmental ecological point of view, in order to understand the transition to parenthood it thus seems necessary to be able to describe and understand how this complex ecology changes across time and how changes at different contextual levels impact each other, promoting or compromising present and future individual adaptive functioning¹⁹ (Canavaro, 2009). Coherently, Jomeen (2004) argued that assessing adjustment during the transition to parenthood implies a comprehensive assessment of all dimensions that contribute to individual psychological status during pregnancy, childbirth and the postnatal period.

The identification of those factors that influence adjustment during this specific life-cycle transition (i.e. risk and protective factors) and their underlying mechanisms is of crucial importance to the identification of vulnerable groups and/or individuals and, consequently, to the implementation of preventive and/or intervention measures.

4.1. Parents' individual psychological adjustment

Although transition to parenthood is associated with strong positive emotions (e.g. happiness, Jomeen, 2004; Moura-Ramos, 2006), constituting a stage when both parents are usually optimistic about the future and moti-

¹⁹ One consequence of this ecological perspective is that when risk is present in a specific contextual system, it can be attenuated by protective factors present in a different contextual system, that is, parenting is a buffered system (Belsky, 1984). Another consequence is that efforts to enhance parenting should target at more than a single source of influence, as it is invariably the cumulative impact of the multiple sources of influence considered herein that determine its course, and consequently, child development to a certain degree (Belsky & Jaffee, 2006).

vated to do the best for their baby (Minsky, Garfinkel, & Nepomnyaschy, 2005), it can also be a period of disequilibrium and reorganization for many individuals (Michaels & Goldberg, 1988).

Mothers, in particular, appear to have a more difficult adjustment across the transition to parenthood. During pregnancy women tend to express concerns about the baby's health, delivery, miscarriage in early pregnancy and their own physical appearance. As pregnancy progresses, these worries seem to decrease (Georgsson-Ohman, Grunewald, & Waldenstrom, 2003).

Also during pregnancy, women experience several impairments related to the physiological changes that occur. Physical symptoms (e.g. nausea, vomiting, fatigue) seem to impact on the physical well-being of pregnant women, an impact documented through the use of quality of life measures and that has implications on these women's family, social and occupational functioning (O'Brien & Naber, 1992; Otchet, Carey, & Adam, 1999).

Antenatal depression is also common during pregnancy and it seems that the severity and nature of depressed mood does not differ before and after childbirth (Evans, Heron, Francomb, Oke, & Golding, 2001; Rubertson, Waldenstrom, & Wickberg, 2003). Antenatal depression is associated with worse clinical outcomes during birth such as increased use of epidural analgesia, caesarean section, instrumental deliveries, and increased admission of neonates to intensive care (Chung, Lau, Yip, Chiu, & Lee, 2001).

During the postpartum period many mothers suffer from fatigue and exhaustion, as well as some level of anxiety and reduced self-esteem (Glade, Bean, & Vira, 2005). Also, after the birth women experience higher perceived stress levels than men, which may be related to the experience of higher behaviour and role reorganizations associated to the fact that they become the principal caretakers for the child (Levy-Shiff, 1999).

Many women also experience negative feelings, ranging from severe psychotic reactions (puerperal psychosis) and moderate depressive reactions (postpartum depression) to milder but very common forms of depressed mood (maternal blues, Perren, von Wyl, Bürgin, Simoni, & von Klitzing, 2005). More specifically, postpartum depression is experienced by 10% to 15% of the mothers in the months following childbirth (Cox, Holden,

& Sagovsky, 1987), and it has proven to be serious enough to interfere with their daily functioning (Campbell, Cohn, Flanagan, Popper, & Myers, 1992). Thus, depressed mood and feelings of stress are commonly considered to occur at a higher rate during the postpartum period (Perren et al., 2005).

Cowan and Cowan (1995) reported that 30% of both mothers and fathers in their study scored above the cutoff on the Center for Epidemiological Studies Depression Scale (CES-D) at 18 months postpartum and 20% of the mothers and 30% of the fathers were still above the cutoff when their children were three and an half years old. Although only a few studies on postnatal depression have included the husbands of pregnant women, these studies showed that the depressive symptoms of fathers and mothers are interrelated (Areias, Kumar, Barros, & Figueiredo, 1996; Dudley, Roy, Kelk, & Bernard, 2001; Matthey, Barnett, Ungerer, & Waters, 2000).

Depressive symptoms are related to biological, psychological, and sociopsychological factors. Two meta-analyses (Beck, 2001; O'Hara & Swain, 1996) identified several risk factors for postpartum depression, including past history of psychopathology, prenatal anxiety, low self esteem, child-care stress, difficult infant temperament, lack of social support, poor marital relationship, marital status (being single) and low socioeconomic status.

For its part, parental depression poses risk for the quality of both marital and parent-child relationships and is associated with maternal and paternal social withdrawal (Cox et al., 2004; Glade, Bean, & Vira, 2005). More specifically, depressed mothers tend to have difficulties responding contingently and sensitively to their infants, in providing optimal levels of stimulation or engaging their child's attention (e.g. Carter, Garrity-Rokous, Chazan-Cohen, Little, & Briggs-Gowan, 2001; Jameson, Gelfand, Kulcsar, & Teti, 1997). They also show less positive and more negative affect when interacting with their infants (e.g. Field, Healy, Goldstein, & Guthertz, 1990; Teti, Gelfand, & Pompa, 1990).

4.2. The marital relationship

Previously an object of study of sociology, the study of marriage by psychologists resulted from the necessity of expanding the domain of parents to include fathers. Once the father was added to more traditional studies of

mother-child relationships, the complexity of the family changed, with the need to focus not only on an additional parent-child relationship but also on the relationship between parents (Belsky, 1981; Gable, Belsky, & Crnic, 1992), a relationship that often exists prior to the arrival of children.

Currently, the notion that the quality of the marital relationships relates to the nature and/or quality of parenting is a guiding assumption in this field of research. Most models of parenting assume some kind of affective “spillover” from the marriage to the parent-child relationship. While in a negative point-of-view, anger and hostility that emerge from interactions and relations between husband and wife contaminate the way parents relate to their children, in its positive counterpart, feelings of satisfaction, pleasure and love emanating from the marital relationship promote positive parenting practices (Grych, 2002).

In a stress and coping perspective, the marital relationship may either be a source of stress, diminishing parents resources to deal with their children in a sensitive and supportive way, or a source of support, as in a good relationship the partner not only provides love and affection but also instrumental help. A supportive marital relationship may even act as a buffer, protecting parent-child relationships from stresses emanating from other sources (Belsky & Jaffee, 2006; Grych, 2002).

Consistently, a variety of studies have reported associations between marital quality, skilful parenting and child functioning that are evident across developmental periods and not restricted to studies of distressed or clinic referred children (cf. Erel & Burman, 1995; Gable, Belsky, & Crnic, 1992; Krishnakumar & Buehler, 2000). Despite this empirical data, Grych (2002) has called attention for the problem of drawing strong causal inferences since a “common factor” may be responsible for both the marital and the parental relationships, as, for instance, personality characteristics of the adult that is at the same time partner and parent. Nonetheless, Cox, Owen, Lewis and Henderson (1992b) demonstrated that links between marriage and parenting could not be fully explained by the parents’ functioning status, thereby suggesting a truly causal factor for the marriage in shaping parenting.

Empirical studies focusing on marriage also suggest that fathering may

be more susceptible to marital influence than mothering, as they gave repeated indications that marriage-parenting relations were stronger in the case of fathers than mothers (Erel & Burman, 1995; Krishnakumar & Buehler, 2000). The reason why fathers appear to be more influenced by their marital relationship is still not completely clear. Several possible explanations were drawn: (1) the fathering role may be less scripted by social conventions and thus fathers are more susceptible to influence than mothers; (2) it may not be that a poor marriage fosters problematic fathering but that some individuals simply are poor spouses and poor parents; or (3) other unknown third variable mechanisms may be involved (Gable, Belsky, & Crnic, 1992).

On the contrary, marital dissatisfaction proved to be associated with more positive mothering behaviour. If marital dissatisfaction may lead mothers to compensate their poor spousal relation by becoming more involved with their children (Belsky, Youngblade, Rovine, & Volling, 1991), their more positive parenting can also result from an attempt to compensate the child for a dissatisfying marriage, which itself undermined the father's sensitivity to the needs of the child (Gable, Belsky, & Crnic, 1992; Grych, 2002).

Another relevant finding from this study field is that parents' practises are affected by high marital conflict, with parents from conflictual marriages being more likely to evidence lax or inconsistent discipline, hostility, emotional unavailability or unresponsiveness towards their children, or other parenting deficits (Cummings, Davies, & Campbell, 2000; Erel & Burman, 1995).

During the specific period of the transition to parenthood, a general decrease in marital satisfaction and adjustment following the birth of the child has been a consistent finding. This decrease seems to be higher for mothers than fathers (Belsky & Rovine, 1990; Cowan et al., 1985; Shapiro, Gottman, & Carrère, 2000) and conflict levels have also been found to increase postnatally for most couples (Cowan & Cowan, 1987).

However, other studies note the variability in change in marital relationships after the birth, with some marriages showing declines in marital satisfaction and others showing no declines or even increases (Belsky & Rovine,

1990; Cox, Paley, Burchinal, & Payne, 1999). One of the factors behind these variations in change appears to be the marital relationship itself. Wallace and Gotlib (1990) found that the best predictor of postpartum marital adjustment was prenatal marital adjustment, and Cox et al. (1999) found that spouses who showed good problem-solving communication prior to the birth of the child showed little decline in marital satisfaction after the birth.

These marital changes may also be associated with changes in role identity and task division that commonly occur during the transition to parenthood (Glade, Bean, & Vira, 2005). Indeed, Cowan et al. (1991) have detailed how new parents in middle-class European-American families typically change attitudes and roles in accommodating to the care of an infant. Gender roles become more traditional, with women taking over more household tasks and care of the child while men increase their dedication to work.

Nyström and Öhrling (2004) conducted a literature review to describe mothers' and fathers' experiences of parenthood during the child's first year of life. While mothers seemed concerned with being satisfied and confident as a mother, felt overwhelmed and stressed with the responsibility of being the primary caregiver, struggled with the limited time available for oneself and felt fatigued and drained, men were concerned about being confident as a father and a partner, felt strained with the responsibility of living up to the new demands and being the provider for the family, and felt they were prevented from achieving closeness with their child. Thus, men and women show diverging attitudes about their sense of selves as "parents" and "workers" and it seems that the magnitude and the gendered nature of these changes have implications for the quality of the marital relationship (Glade, Bean, & Vira, 2005).

Kluwer et al. (1996) found that wives were more dissatisfied and marital conflict was higher when postnatal performance of household labour did not meet the wives expectations of gender equity. While there are many reasons for the traditionalization of household labour, nowadays this phenomenon is moderated by women's paid work. As women work outside the house increasingly more, men tend to be more involved in household work and childcare (Cowan & Cowan, 1987). Another factor that may moderate

gender division in household work and child care is the parent's own psychological involvement in the parental role. While men who are more involved psychologically in the role of parent before birth are more likely to be physically involved after birth, women who are less involved experience less stress after the birth and greater parenting and relationship satisfaction (Cowan & Cowan, 1988).

The state of the marital relationship after the birth of a child is especially important because the couple dyad becomes the attachment and socialization environment in which the child will be nurtured and taught. Thus, and as mentioned before, it is not surprising that research has demonstrated that the marital relationship associates positively with parental sensitivity, investment in the child and overall quality of parenting (e.g. Belsky et al., 1991; Cummings & Watson O'Reilly, 1997).

During the transition to parenthood, the marital relationship has also been associated with both women's and men's psychological adjustment. Adjustment outcomes are highly correlated within the couple and these depend on the quality of their relationship (Figueiredo et al., 2008).

4.3. Close relationships

Beyond the parents dyad, family members, friends, neighbours and other significant persons may provide warmth, encouragement, and assistance in parenting, increasing parenting nurturing and reducing probabilities of harsh or rejecting parenting practices (Simons & Johnson, 1996). Indeed, social networks function as an important support source that positively influences general psychosocial well-being (Cohen & Wills, 1985; Uchino, Cacioppo, & Kiecolt-Glaser, 1996) and the parents' mental health in particular and, possibly as a consequence, parental functioning (Belsky, 1984).

Social support is given and received in the context of relationships and is thus mediated by the relationships through which it is offered and the roles and responsibilities of those relationships (Thompson, Flood, & Goodvin, 2006). The association between social support, stress, and psychological well-being is complicated, however, because enhanced stress can sometimes provoke the deterioration of social support for troubled indi-

viduals. Although people often seek supportive relationships when they are stressed, it is also true that some stressors may diminish social support as they cause individuals to withdraw from others because of related circumstances, their incapacity or humiliation and feelings of vulnerability arising from those stressful events (Thompson, Flood, & Goodvin, 2006).

Belsky (1981) claimed that the marital relationship serves as the principal support system for parents. Although support from friends, relatives and neighbours has been linked to the quality of parenting, such support is likely to be secondary to that of the marital relationship. This is essentially so because individuals typically invest much more time and energy in their marriage than in other relationships and because these other relationships are not available inside the household to provide assistance with the everyday tasks and responsibilities of parenting (Simons & Johnson, 1996).

Thus, Simons and Johnson (Simons & Johnson, 1996) argue that social network support is not expected to directly influence parenting. It would be expected, however, to influence parental behaviour indirectly through its preventive and buffering impact upon the parents' emotional well-being. Although some studies provided results that were consistent with Simons and Johnson's contention (e.g. Simons, Beaman, Conger, & Chao, 1993; Simons, Lorenz, Wu, & Conger, 1993), other studies showed that support from friends and relatives could have direct main and buffer effects on parenting (Leinonen, Solantaus, & Punamäki, 2003; Taylor, Casten, & Flickinger, 1993). These may, nonetheless, still be secondary to partners' support, as indicated by other studies where both spouse and network support were considered (e.g. Crnic, Greenberg, Ragozin, Robinson, & Basham, 1983; Levitt, Weber, & Clark, 1986).

Several studies have prospectively explored structural changes in the parent's social networks across the transition to parenthood. Belsky and Rovine (1984) and McCannel (1987) examined couples' patterns of contact with their network members during pregnancy, shortly after the birth of the baby and several months later. They reported that during the postpartum period there was an increase in contact with family members and with other parents of young children. It seems that other first-time parents can be helpful during crisis and can be a source of support and encouragement

(Cowan & Cowan, 2000).

Belsky and Rovine (1984) also reported that contact with significant others who were not family of origin²⁰ declined from three to nine months after the partum and that this decline was higher for men, and McCannel (1987) reported that the mean number of network members in the mother's network declined significantly from the pregnancy period to one year post-partum.

Bost, Cox, Burchinal and Payne (2002) also examined patterns of change in couple's family and friends network and support across the transition to parenthood, that is, from pregnancy to two years after the partum. In average, parents reported more contact over time with family members following the birth of the child and then showed a gradual decrease during the twenty-four month period. The number of family members in the social network changed overtime by showing declines during the months following the child's birth and then showing little change during the remain periods. The number of friends in the husband's social network declined more over time, comparing to wives.

Taken together, these findings suggest that the networks of new parents become smaller and more homogeneous after the birth of the child. Contact with parents, other family members, and other adults, who are parents of young children, tends to increase and the number of friends in the network seems to decrease.

Simultaneously to these structural network changes, more support is requested and perceived, especially from family members (Belsky & Rovine, 1984; Power & Parke, 1984). Consistently, Levitt, Weber and Clark (1986), using the Convoy Model, showed that, for most mothers, support is provided first by the husband, secondly by the mother's own mother, and finally by one or two friends or family members who are not likely to be

²⁰ According to Belsky and Rovine (1984) "family of origin" includes an individual's parents and siblings. In the present work we chose to use the denomination "close family" to include these kinship relations, as opposed to "extended family" that includes all other kinship relations (e.g. parents-in-law, cousins, aunts and uncles).

children, parents-in-law or the mother's father.

Several other studies have also focused on the protective role of social support during the transition to parenthood and they have shown that pre-birth social support and network size related positively to diminished maternal depression, better marital relationship and sensitive maternal behaviour assessed after the partum (Collins, Dunkel-Schetter, Lobel, & Scrimshaw, 1993; Crnic et al., 1983; Crokenberg & McClusky, 1986; Cutrona, 1984; Goldstein, Diener, & Mangelsdorf, 1996; Levitt, Weber, & Clark, 1986). Nonetheless, Tietjen and Bradley (1985) failed to find an association between prebirth network support and postpartum maternal adjustment, concluding that network support was not effective in promoting better adjustment.

Studies with the Convoy Model focusing on the early postpartum period have also provided valuable information. In their cross-sectional study with mothers of thirteen months old infants, Levitt, Weber and Clark (1986) found that support from the mothers' own mother linked to well-being and that support from friends linked to marital dissatisfaction and child difficulty. The authors hypothesized that mothers may turn to friends for support when the marital relation is strained (more difficult babies are also more likely to interfere with the marital relationship). There was also a high concordance between the amount of support provided from close relationships and mothers' satisfaction with those relationships. Results obtained from another investigation indicated that both support from a close person and the degree to which maternal expectations for support from that close person were met following birth contributed to maternal postpartum affect, and that the link between support and affect was mediated by the quality of the mothers' relationship with the support provider. Maternal affect was found, in turn, to predict the mothers' attitude toward the infant (Coffman, Levitt, Deets, & Quigley, 1991).

In general, these results seem to underscore the need for further research efforts focused on the role of close attachment relationships (e.g. mother, partner, other very close relationships) in the provision of support and the maintenance of parental well-being following the birth of a child and, more generally, following major life transitions (Coffman et al., 1991;

Levitt, Weber, & Clark, 1986).

In some of these studies it was also found that different support dimensions (i.e. emotional and instrumental support) related differently to adjustment measures (Collins et al., 1993; Cutrona, 1984; Goldstein, Diener, & Mangelsdorf, 1996), supporting the idea that the protective effect of social support is dependent on its adequacy in relation to perceived stressors and that different psychological processes may contribute to link social support and adjustment (Cutrona, 1984).

Some hypotheses were raised regarding the underlying processes that link social network support to parenting. For instance, the provision of tangible-aid, such as suggestions on how to soothe a colicky baby, money or babysitting may relate to lower stress perception (Cutrona, 1984), a process that describes a direct path from social support to parenting as proposed by Simons and Johnson (1996), although they argued that network support is not expected to directly influence parenting.

Other processes discussed describe an indirect path of influence of social support, through its effect upon parents' emotional well-being (Simons & Johnson, 1996). For instance, the simple knowledge that support is available may decrease cognitions of helplessness (Cutrona, 1984), and social integration may offer higher opportunity for reassurance and reinforcement with positive effects on self-esteem and feelings of self-efficacy (Collins et al., 1993; Goldstein, Diener, & Mangelsdorf, 1996) and may increase opportunities to compare experiences and thus normalize the experience of parenthood (Cutrona, 1984),

Finally, evidence for the stress-buffering effect of social support during the transition to parenthood was weak (Collins et al., 1993; Crnic et al., 1983; Cutrona, 1984; Goldstein, Diener, & Mangelsdorf, 1996; Levitt, Weber, & Clark, 1986). Although some authors argued that their sample size was small for detecting reliable interactions (e.g. Cutrona, 1984), results are consistent with the idea that in normal situations social support should be beneficial to all new parents, that is, they are consistent with the main effect or preventive model of social support.

Chapter 3

The Ecology of the Transition to Parenthood after Successful Assisted Reproduction

Assisted reproduction is an increasingly popular choice following a diagnosis of infertility. This has inspired researchers to consider the implications of successful treatment on families, both in the short and long term (Segev & van den Akker, 2006). However, most of the empirical research done until now does not rely on a theoretical framework (van Balen, 1998).

In the present chapter we argue for the adoption of a developmental ecological perspective of parenting by researchers focusing on the transition to parenthood after successful assisted reproduction. To do so, we review most of the empirical research conducted that focused on the psychosocial aspects of parenting after assisted reproduction. Nonetheless, this chapter is not meant to be an exhaustive evaluation of the currently available literature. Rather, it is meant to provide examples of how this theoretical framework can be useful in guiding future research and in the discussion of empirical findings.

We hope that it will work as a catalyst for further discussion about the social-contextual factors that shape parenting behaviour after an infertility and ART experience.

1. A developmental ecological perspective of the transition to parenthood after successful assisted reproduction

Transition to parenthood has always been conceptualized as a normative life transition. Although this is still the case for previous infertile couples that used ART in order to conceive, this normative life transition is subsequent to a non-normative prolonged reproductive experience that is presumed to shape, at least at some level, how the transition to parenthood is lived.

As Colpin (2002, p. 645) stated it,

In the case of assisted reproduction, the transition to parenthood has a particular character. Many couples must wait a long time and undergo lengthy procedures before they finally get their much-desired baby. Children are conceived technically, outside the sexual relationship of their parents. Moreover, pregnancies obtained by IVF present risk of medical complication: compared with the general population, there is an increased risk of multiple birth, miscarriage, prematurity, and low birth weight.

Thus, if the transition to parenthood is characterised, as any life transition, by a set of challenges whose positive resolution influences future development, in the case of the transition to parenthood after ART, parents face additional challenges that consequently increase their chances to diverge from an adaptive developmental pathway. As a consequence, concerns regarding the possibility that pregnancy and parenting could be more complex psychologically after ART than when conception is spontaneous (e.g. Dunnington & Glazer, 1991; Sandelowski, Harris, & Holditch-Davis, 1990) motivated the development of research focusing on the psychosocial adjustment of families that used ART to conceive.

It has been suggested, both from theory and clinical experience, that the negative affective states developed during infertility treatment might linger on into the transition to parenthood period (Klock & Greenfeld, 2000). Consistently with this theorisation, research has shown that, during pregnancy, women who became pregnant after infertility treatments were more likely to be anxious about possible obstetrical complications during pregnancy. These anxieties were in many cases exacerbated due to previous years of successive disappointments in trying to conceive and due to the women's knowledge that this might be their only pregnancy (Bernstein, 1990; van Balen, 1998).

Furthermore, the alienation of the father from much of the fertility treatment process was supposed to put a strain in the marital relationship (Golombok, 1992) and reports of stigma associated with ART were also thought as likely to affect family functioning (Golombok et al., 1996; Hahn & DiPietro, 2001).

Consequently, concerns were raised that the use of ART to achieve pregnancy could negatively influence the attitudes of parents towards their child, and, consequently, the nature of ensuing parent-child relationships (Colpin, 2002). This was thought to happen through different mechanisms.

First, those parents who had not worked through their conflicts and feelings towards infertility could expect their child to be a cure for the psychological wounds it had caused. Contrary to these parents' expectations, the child could become a constant reminder of the negative experience and emotions parents experienced during fertility treatments (Mushin, Spensley, & Barreda-Hanson, 1985).

Second, because of the long period of waiting before achieving a pregnancy and their high investment in parenthood, these couples might develop unrealistic high expectations regarding parenthood and their child, which could result in difficulties around the issues of separation and differentiation, in the form of overprotection and infantilization of the child. In other words, mothers could be more protective and less able to allow optimal attachment and child autonomy to develop (Hammer-Burns, 1987).

Third, because conception was achieved by assisted reproduction, the

child itself could be regarded by their parents as more vulnerable, which might also result in parental overprotection (McMahon, Ungerer, Beaurepaire, Tennant, & Saunders, 1995). Associated ART stigma might exacerbate parents' feelings about their child's vulnerability, as IVF children might be seen by others as unusual or different (van Balen, 1998).

Fourth and finally, after a usually long period of infertility, parents might have difficulties adapting to the hard reality of child-rearing, as opposed to an idealized parenthood (van Balen, 1998).

Nonetheless, van Balen (1998) claimed that the infertility experience might also positively affect parenting, as previous infertile parents were expected to be highly motivated for parenthood and, as such, would also be more conscious of the importance of adequate parental care.

A very recent systematic review of the psychological and social aspects of pregnancy, childbirth and early parenting after assisted conception (Hammarberg, Fisher, & Wynter, 2008) confirmed a growing body of literature research concerned with family adjustment within this specific context. This literature has been of crucial importance in showing that little differences can be found in the parent-child relationship and psychosocial adjustment of parents and children conceived by ART, and has thus also counteracted the prejudices in public opinion about the negative consequences of fertility treatment (Colpin, 2002).

Nonetheless, most of the research done in this field has not relied on a theoretical framework. Ten years ago van Balen (1998) addressed this question, highlighting the fact that implemented studies differed in conceptual framework, design, methodology, and scope. Just a few years later Colpin (2002) provided a theory-based overview of this research field literature using Belsky's (1984) model of the determinants of parenting and two years later Gibson and McMahon (2004) conducted another research review also based on Belsky's model. Since then, extensive research has been conducted and although some is based on theoretical assumptions (e.g. Colpin, Demyttenaere, & Vandemeulebroecke, 1995; Gibson, Ungerer, McMahon, Leslie, & Saunders, 2000a; Repokari et al., 2005) most of it does not rely on theory. Additionally, most of the implemented research has limited its focus to the parents-child dyad, ignoring or paying little attention

to more external environmental factors that have been proven to significantly influence the parenting process.

In the present chapter we argue for the adoption of a developmental ecological perspective of parenting²¹ by researchers focusing on the transition to parenthood after successful assisted reproduction. We claim that the adoption of this theoretical framework would be of increased value for empirical research conducted in this field, and we will try to substantiate our claim.

1.1. Investigating the broader social cultural context of the transition to parenthood after successful assisted reproduction

Infertility represents a violation of cultural norms to parent children. Infertility often represents a crisis, not only for the couple or the family, but for the larger society as well, because the inability to reproduce would result in the death of society. What is particularly noteworthy is that this happens in most cultures (e.g. Bornman, Schulenburg, Boomker, Chauke, & Reif, 1994; Inborn, 1994; Neff, 1994).

The infertility literature has always highlighted the role culture and society have on shaping the infertility experience (cf. Chapter 1, sections 3.2 and 3.3). As the value attributed to parenthood and children and gender roles definitions vary, not only across societies but also across time, so does the social meanings attributed to infertility.

Recently, increased importance has been given to the study of infertility in developing countries (Vayena, Rowe, & Griffin, 2002). One of the motivational factors for this shift of attention has been the increasing realization that the situation of infertile or childless couples is culturally defined and that treatments and solutions must fit that specific cultural context (van Balen & Bos, 2004). Consequently, by studying the cultural and social variations of the experience of parenthood after assisted reproduction,

²¹ As presented in the works of authors such as Bronfenbrenner, Belsky, Luster and Okagaki, Canavarro, among others; cf. Chapter 2, sections 1.1 and 4.

health programs could base their strategies and actions on an in-depth understanding of the needs of the people involved.

In spite of this growing awareness of the importance of addressing culture specificities when implementing infertility and ART related research, studies focusing on the specific period of the transition to parenthood after successful ART have seldom addressed cultural issues. Although cultural specificities may be implicit to some studies (e.g. Papaligoura, Panopoulou-Maratou, Solman, Arvaniti, & Sarafidou, 2004), these have never been operationalized as independent variable(s), nor controlled for. As such, it is only possible to speculate about their influence on results found. Also, almost no cross cultural research has been carried out.

One exception is the study implemented by Cook, Vatev, Michova and Golombok (1997), where the authors compared family functioning and the social and emotional development of children in families created as a result of ART in Western and Eastern European countries. In this study, Eastern European parents reported higher adjustment difficulties and their children exhibited more difficult behaviours, when compared to Western European parents and children. These parents were also more secretive with respect to telling others about their child's method of conception and they were more uncertain about disclosing this fact to their child. The authors concluded that family functioning and child development outcomes are dependent, to some extent at least, on the social context in which ART are carried out.

The adoption of a developmental ecological theoretical framework would be helpful for the conceptualization of those more distal factors (i.e. located in the macrosystem) that influence the transition to parenthood after successful assisted reproduction. Guided by this theoretical framework, Serafica and Vargas (2006) give some conceptual and methodological recommendations for addressing culture variations in empirical research.

Their recommendations include implementing more cross-cultural studies or, alternatively, using measures that assess the cultural bases of each society. In other words, it implies conceptualizing culture as an independent variable and study its relations with dependent variables of interest, depending on the study research goals.

However, they also advise caution, as these dependent variables may have different expressions according to culture. Thus, ethnographic or observational studies are advised to identify and classify cultural variations in the expression of 'outcome' variables (e.g. distress) that would facilitate hypothesis generation, to be followed by more formal hypothesis testing models.

Also, the use of reliable, culturally valid measures²² normed for the specific populations being investigated is important, because, by defining what a variable is (e.g. depression) with the aid of an instrument, we are increasing the likelihood that that variable will be the same everywhere.

Finally, more thoughtful consideration of the relevant cultural variables and processes involved in parenting should precede the choice of cultural variables to study, as culture plays a less prominent role in shaping some parenting phenomenon than others.

1.2. Expanding research beyond the dyadic level

Although most research done claims to investigate the psychosocial adjustment of families that conceived through ART, it often limits to the study of individual adjustment (of both parents and child), marital adjustment and of the parents-child relationship (cf. Hammarberg, Fisher, & Wynter, 2008). As only a small number of studies have broadened their focus to include factors located in other ecological systems (e.g. the social network, located in the exosystem, Abbey, Andrews, & Halman, 1994; Munro, Ironside, & Smith, 1992), one could ask where is the social dimension of adjustment in

²² Example of multicultural constructed measures are the WHO Quality of Life instruments (WHOQOL family, WHOQOL Group, 1994a, 1994b, 1995), whose brief version was adopted in the present study. The rationale underlying the development of the WHOQOL instruments was that, before thinking about the development of a quality of life instrument, a trans-cultural agreement on the definition of quality of life was needed. A pool of items was developed, from which only those that proved to be reliable across cultures were kept in the final version of the instrument. In the field of infertility, the FertiQoL instrument is also an example of an internationally validated instrument that measures the quality of life of individuals experiencing fertility problems (FertiQoL, 2009).

these studies.

The adoption of an ecological perspective of parenting calls for the importance of going beyond the dyadic level (i.e. the couple's and the parents-child relationships) to include other factors of influence. In his process model of parenting, Belsky (1984) gave special attention to the influence of work related factors and of the social network, but there is an amazing lack of research addressing these issues in the specific context of the transition to parenthood after successful assisted reproduction²³.

We claim that there are specific reasons that point to the importance of taking these factors into consideration.

Fertility treatments usually imply constant visits to healthcare centres and therefore infertile couples may miss hours and some times complete days from work. Nonetheless, due to fertility related stigma, infertile couples may choose not to disclose to their employers the reason for their constant absences. When they do choose to disclose, if an employer is not supportive of these frequent absences, the situation can lead to increased stress levels (Finamore, Seifer, Ananth, & Leiblum, 2007).

In one study implemented to determine, among other things, what infertile women were disclosing to their employer with regard to their infertility, results showed that around 43% of infertile women did not disclose about their fertility problems, and that, from those that did, 79% did so only because they had to be out of work due to fertility treatments (Finamore et al., 2007). In other studies, many women reported that having IVF interfered with their work commitments and negatively influenced their carriers (Hammarberg, Astbury, & Baker, 2001; Laffont & Edelmann, 1994).

On the other hand, gender studies have shown that men tend to increase their dedication to work when facing an infertility problem (Jordan & Revenson, 1999) and so one may speculate about the beneficial impact of

²³ In her literature review, Colpin (2002) only enumerated four studies that focused on social support and made no reference to studies that addressed work issues. Although this review was conducted seven years ago and much research has been done since, the scenario concerning these two specific factors of influence has not changed significantly.

this increased dedication on their professional careers.

Either way, it seems plausible that an infertility problem may have repercussions on the individuals' professional career that are not supposed to fade away immediately just because a pregnancy is achieved. On the contrary, a pregnancy may even worsen the situation. According to Belsky, these repercussions may feedback into the parenting system and, therefore, it's easy to understand that the influence of work related factors on parenting cannot be ignored.

A study by Colpin and colleagues (1995) provided data suggesting that, in the case of transition to parenthood after successful assisted reproduction, work related factors may interact differently with the parents-child relationship, producing different parenting outcomes. Employing an observational measure of mother-infant interaction to examine how parents that conceived through IVF built relationships with their children, these researchers found indications that employed mothers that conceived through IVF respected their child's autonomy to a lesser extent than both mothers that conceived through IVF that had not yet returned to work and employed spontaneously conceiving mothers. A possible explanation for this finding put forward by the authors was that it may be more difficult for mothers that conceived through IVF to resume work outside the home than it is for mothers that conceived spontaneously and that they may compensate by inhibiting their child from being autonomous (Colpin, Demyttenaere, & Vandemeulebroecke, 1995).

Evidence from the infertility literature also suggests that the infertility experience may affect the social network of infertile couples. Treatments also interfere with the couples' social routine, diminishing their opportunities to maintain contact with friends and acquaintances (Fekkes et al., 2003) and couples themselves may avoid maintaining relationships with other couples that already have children (Jordan & Revenson, 1999). Once a pregnancy is achieved, these couples have increased worries about a possible miscarriage and often delay telling others about their pregnancy (McMahon, Ungerer, Tennant, & Saunders, 1999). They may thus go through their transition to parenthood with an impoverished social network that may not be able to provide them with the necessary or adequate sup-

port (cf. Chapter 1, section 3.3).

Very little is known about the structural and functional changes that occur in the social network of parents that conceive through ART during the transition to parenthood and the value of the support provided by their social network members. One study conducted with parents of three-month old twins showed that parents that conceived through ART reported less availability of acquaintances, friends, or frank and confiding relationships and felt less reassured and socially integrated than parents with a spontaneous conception (Munro, Ironside, & Smith, 1992). Nonetheless, more recent studies focusing on this issue revealed no differences between parents that conceived spontaneously or through ART in their reported measures of perceived social support, social dysfunction or influence in social life (Colpin, 1996; cit. Colpin, 2002; Gibson, Ungerer, Tennant, & Saunders, 2000b; Golombok et al., 1996) (Pinborg, Loft, Schmidt, & Andersen, 2003; Vilska et al., 2009). None of these studies focused on the impact social support may have at the individual and relational level during the transition to parenthood period.

The adoption of a developmental ecological perspective of parenting after successful assisted reproduction implies acknowledging the influence of these more distal factors on the parenting process. This implies that increased empirical research should focus on the question of how does an infertility and ART experience impact on the higher ecological context of parenting (i.e. the exosystem) and how these changes feedback into the parenting process during the transition to parenthood.

1.3. Accounting for the temporal dimension

The demography of parenting is changing and throughout the developed world there is a well-established tendency towards postponement of the first pregnancy (Hamilton, Martin, & Sutton, 2004). In this context, ART have become an increasingly used resource for those mothers that delayed pregnancy (Golombok, MacCallum, Goodman, & Rutter, 2002). Very recently, researchers have started to question how these demographic trends may affect parenting. No linear association between maternal age and parenting is supposed. Rather, and coherently with a developmental ecological

perspective, researchers hypothesise that maternal age is likely to associate in different ways with different domains of parenting and parenting outcomes (Bornstein, Putnick, Suwalsky, & Gini, 2006).

For instance, parents that achieve pregnancy later in their life cycle may find they do not have friends going through the same experience with whom they can confide because their friends may have gone through the parenting experience earlier (Munro, Ironside, & Smith, 1992). Also, age-related biological changes may influence the parents' well being. For example, the onset of menopause may result on higher depressive symptoms in older mothers (Boivin et al., 2009). Then again, older mothers are more likely to be in partnerships with older fathers, who have been shown to be more highly involved in parenting and to show more positive paternal affect when compared with younger fathers (Cooney, Pedersen, Indelicato, & Palkovitz, 1993).

On the other hand, when Bronfenbrenner added the chronosystem into his ecological model of human development, he intended to take into account changes that occur across time, which could include the cumulative effects of an entire sequence of developmental transition that could occur over an extended period of the person's life (Bronfenbrenner, 1986). The infertility experience clearly fits this conceptualization. The infertility diagnosis implies a one year period of non-protected sexual intercourse and usually couples only start to question their fertility status after trying to conceive for some time. Between this questioning and the actual seeking of medical help an extended period of time can pass and many couples must wait a long time and undergo lengthy and repeated procedures before they finally manage to conceive (Colpin, 2002).

In the case of parenthood achieved through ART, the cumulative experience of the infertility and ART treatments has thus to be taken into account. For instance, Boivin and colleagues (2009) argued that findings regarding older mothers' lower engagement during pregnancy but greater warmth and involvement during the child's infancy could be better explained as a secondary effect of a so-called "hard-to-achieve" pregnancy than as a linear result of age. More specifically, previously infertile women worry more about their pregnancy and these concerns may explain their

lower engagement in pregnancy (cf. this Chapter, section 1.4.3) but, once the child is born and health risks are no longer present, they become highly involved in a long desired parenthood.

In short, the use of ART is associated with parenting later in the reproductive life cycle and both factors reflect on a different parenting ecology (Boivin et al., 2009). If this different ecology is not taken into consideration no reliable conclusions can be drawn when addressing the parenting experience of infertile couples.

1.4. Re-conceptualizing research at the dyadic level

At the dyadic level, Belsky focused on the parents' developmental history and personal psychological resources, on the child's characteristics and on the marital relationship as determinants of the parenting process.

Adopting Belsky's model to the study of the transition to parenthood after successful ART implies not only a descriptive and comparative approach, i.e. investigate differences in individual and relational adjustment between families that conceived through ART and spontaneously, but also trying to understand how these different determinants mutually influence each other. Nonetheless, most of the empirical research conducted on the transition to parenthood of previously infertile couples that resorted to ART has not gone beyond comparative proposes.

These and other methodological problems have been pointed out by researchers in the field. They are briefly summarized below.

The majority of studies include an ART group and a comparison group presumed to have conceived spontaneously and only a minority of studies compared characteristics and outcomes with existing evidence about general population (cf. Hammarberg, Fisher, & Wynter, 2008). However, the creation of control groups can be problematic. Inclusion and exclusion criteria are necessary (e.g. primiparous versus multiparous parents, single versus multiple pregnancies, own versus donated gametes) but at the same time may preclude the generalization of findings to the whole population of people that conceived through ART. Also, couples that conceive with ART are socio-demographically heterogeneous, have varied fertility difficulties

and are older than average couples that conceive spontaneously. Thus, constructing an equivalent comparison group or matching on these factors is unlikely to be possible. The proposed alternative was to control for those factors that may contribute to results, such as age and years in relationship with the partner (Colpin, 2002; Hammarberg, Fisher, & Wynter, 2008).

Studies in this research field are either cross-sectional, focusing on the pregnancy period or on early postpartum, or are short-term longitudinal studies, examining differences across pregnancy or from pregnancy to the postpartum period. They assess a variety of concepts, sometimes not clearly defined, and use different (and predominantly self-reporting) research instruments, which renders the integration and discussion of results more difficult. Furthermore, studies refer to different countries and cultures, but cultural differences are never taken into account and so inconsistent findings between studies may, at least partly, be explained by these cultural differences (Colpin, 2002).

Finally, some of these studies have low retention rates. Findings from these or other studies that do not disclose retention rates need to be interpreted with caution as there is a chance that non respondents have more negative experiences and thus drop out of the study. As such, results may not be representative of the whole study population (Hammarberg, Fisher, & Wynter, 2008)

Despite these methodological issues, this body of research has provided valuable information on the psychosocial aspects of parenting after assisted reproduction. A brief overview of these studies' main findings regarding pregnancy and the early postpartum period (i.e. until the child is one year old) will be presented below. Following Belsky's model, we will focus first on the parents characteristics, namely parents' individual psychological adjustment, then on the marital relationship and finally on the parents-child relationship, addressing both the contributions of parents and the child.

1.4.1. Parents' individual psychological adjustment

The infertility experience is part of the parents' developmental history and the main thesis motivating implemented research in the field is that this experience and the use of ART may shape parents' transition to parent-

hood in a different manner than when conception is spontaneous. To test this hypothesis researchers have compared both groups of parents regarding different adjustment dimensions during pregnancy and the early postpartum period.

Pregnancy

Anxiety

When general measures of anxiety were used, studies pointed for the non-existence of significant differences between parents that conceived through ART and spontaneously in either early or late pregnancy (e.g. Cox & Ndukwe, 2006; Harf-Kashdaei & kaitz, 2007; Hjelmstedt, Widström, Wramsby, & Collins, 2003a; Klock & Greenfeld, 2000; McMahon, Ungerer, Beaurepaire, Tennant, & Saunders, 1997a). A study that made comparison with psychometric data derived from general population actually found that antenatal anxiety was significantly lower in the group of women that conceived through ART (Fisher, Hammarberg, & Baker, 2008).

Nonetheless, when more specific measures of pregnancy-related anxiety were used, McMahon et. al (1997a) found that parents that conceived through ART reported increased anxiety concerning health and defects in the child, threats to the child during the birth process, negative feelings about childbirth, and time to trust the survival of the baby and to tell others about their pregnancy. Hjelmstedt and colleagues (2003b; 2003a) found that, at thirteen weeks of pregnancy, women that conceived through assisted reproduction were more anxious about losing the pregnancy and about the baby's health, although these differences disappeared as pregnancy progressed. These studies also identified more anxiety about the health of the baby among men with high recalled infertility stress, and van Balen et al. (1996) also found that previously infertile fathers recalled pregnancy as more "exceptional" and "stressful" than fathers with a spontaneously conceived child.

Mood/Depression

In general, parents that conceived through ART reported equal or decreased levels of mood disturbance than parents that conceived spontaneously (Cohen, McMahon, Tennant, Saunders, & Leslie, 2000; Fisher,

Hammarberg, & Baker, 2008; Harf-Kashdai & kaitz, 2007; Klock & Greenfeld, 2000; Repokari et al., 2005; Slade, Emery, & Lieberman, 1997). Nonetheless, in a recent study, Monti et. al (2008) found that women that achieved pregnancy through ART reported higher depression (mean scores and frequency of depressed subjects) than women with a spontaneous pregnancy, between the thirty and thirty-second weeks of pregnancy.

*Attitudes and adjustment to pregnancy*²⁴

The majority of the implemented studies did not point to significant differences between parents that conceived through ART and spontaneously regarding positive affect (e.g. Harf-Kashdai & kaitz, 2007) and self-esteem (e.g. Cox & Ndukwe, 2006; Klock & Greenfeld, 2000).

Women that used ART to conceive reported increased satisfaction with being able to get pregnant and less concerns regarding changes in weight, alienation from their husband, restriction of independence and increased expenses due to pregnancy. Nonetheless, these women also reported less satisfaction regarding sexual freedom and close family relationships (Klock & Greenfeld, 2000). In a different study, infertile individuals evaluated their pregnancy as more stressful, but also more “exceptional” than non-infertile individuals (van Balen, Naaktgeboren, & Trimbos-Kempre, 1996). McMahon and colleagues (1999) also found that women that achieved pregnancy through ART were more likely to endorse pregnancy as a positive and fulfilling experience, and Hjelmstedt and colleagues (2003a) found that these women rated the discomfort of being pregnant as more worthwhile and less physical demanding than those women with a spontaneous pregnancy. Hjelmstedt and colleagues (2003a) also found that fathers that conceived through ART had less ambivalent attitudes towards pregnancy than parents that conceived spontaneously.

In direct contrast, Bernstein et al. (1994) found that previously infertile women used more negative self-descriptors during pregnancy than women

²⁴ Includes other individual (positive and negative) adjustment measures, such as self-esteem and attitudes towards the pregnancy experience.

that conceived spontaneously and Lepecka-Klusec and Jakiel (2007) found that women that conceived through ART recalled adjustment to pregnancy as more difficult than women that conceived spontaneously.

Other studies focusing on negative or positive attitudes to pregnancy (Reading, Chang, & Kerin, 1989), acceptance of pregnancy (Halman, Oakley, & Ledrman, 1995) and identification with motherhood (Stanton & Golombok, 1993) did not find differences between parents that conceived spontaneously or through ART.

Childbirth

It is known that the use of ART is associated with multiple birth, short gestation, low birth weight babies and operative birth (Helmerhorst, Perquin, Donker, & Keirse, 2004). Consistently, women that conceived through ART were more likely to report having had an operative birth and less likely to report a pleasant birth experience than women that conceived spontaneously (Repokari et al., 2006).

In spite of knowledge about increased childbirth risks, women that conceived through ART did not report higher childbirth related fear (Poikkeus et al., 2006), and after the birth they even rated the birth experience as more “exceptional” than those women that conceived spontaneously (van Balen, Naaktgeboren, & Trimbos-Kempere, 1996).

Early postpartum

Mood/Depression

Findings regarding the prevalence of depressive symptoms in the early postpartum period were consistent in showing no differences between parents that conceived through ART and spontaneously (Cohen et al., 2000; Gibson et al., 2000b; Glazebrook, Cox, Oates, & Ndukwe, 2001; Greenfeld & Klock, 2001; McMahon, Ungerer, Tennant, & Saunders, 1997b).

Nonetheless, results from a recent study were perplexing in showing that mothers that conceived through ART had four times more probability of being admitted into residential early parenting services due to mild to moderate depressive symptoms than mothers that conceived spontaneously (that belonged to the same socioeconomic group, Fisher, Hammarberg, &

Baker, 2005).

Fisher and colleagues (2008) investigated antenatal correlates of postpartum-depression in mothers that conceived through ART and only identified antenatal mood disturbance as a significant predictor. Olshansky and Sereika (2005), also investigating correlates of postpartum depression, found that increased depression was associated with increased “divided self” (i.e., suppressing one’s authentic feelings) and decreased marital satisfaction.

*Adjustment to parenthood*²⁵

Two studies that focused on self-esteem and maternal self-efficacy showed no differences between parents that conceived through ART and spontaneously (Cox & Ndukwe, 2006; Greenfeld & Klock, 2001), however Hammarberg et al. (2008) have questioned the validity of these studies’ results, mainly due to their low recruitment and retention rates. In contrast, other studies have shown that parents that conceived through ART, especially those that experienced repeated treatment failure prior to conception, showed less self-esteem twelve months after the partum (Gibson et al., 2000b) and less self-confidence and confidence in their parenting abilities, four and twelve months after the birth of their child (Gibson et al., 2000b; McMahan et al., 1997b).

Generally, studies showed that parents that conceived through ART did not experience higher levels of parenting stress (Gibson et al., 2000b; Glazebrook et al., 2001; Golombok et al., 1996; Hahn & DiPietro, 2001; Hjelmstedt, Widström, Wramsby, & Collins, 2004) or parenting burden (van Balen, 1996), neither adapted worse to parenthood (Colpin, Demyttenaere, & Vandemeulebroecke, 1995; Halman, Oakley, & Lederman, 1995; Lederman, Toussie-Weingarten, & Lederman, 1981; Weaver, Clifford, Gordon, Hay, & Robinson, 1993) than those that conceived spontaneously.

²⁵ Includes measures of self evaluation, stress resulting from the parenting experience and nonspecific measures of satisfaction with parenthood.

Changes across time

Some studies have also looked at changes in adjustment across time. Although the transition to parenthood literature indicates that adjustment difficulties increase from pregnancy to the postpartum period, Glazebrook et al. (2001) found that anxiety decreased from before to after the partum in all participants, independently of method of conception, and other studies revealed no changes in depressive symptoms from pregnancy to postpartum (Cohen et al., 2000; Olshansky & Sereika, 2005).

Repokari and colleagues (2005) observed that parents that conceived through ART reported less depressive symptoms during pregnancy than parents that conceived spontaneously but that these symptoms increased across the transition to parenthood, being similar in both groups of parents one year after the partum.

Using study-specific measures and a longitudinal design, Abbey, Andrews and Halman (1994) explored the effects of parenthood on infertile and presumed fertile couples. They found that infertile women who became mothers experienced greater global well-being but diminished marital well-being when compared with infertile women that did not become mothers. Infertile men who became fathers experienced the same negative effects as their wives but did not experience the positive effects to the same degree. These positive effects were also not visible in presumed fertile fathers.

In summary, it seems that parents that conceived through ART do not significantly differentiate from parents that conceived spontaneously in their adjustment reports during pregnancy and the early postpartum period. The most significant differences found seem to be related with increased specific anxieties about pregnancy viability and foetal health (which may be no more than a realistic assessment of their pregnancy risk status) and a sense of decreased self- and parental efficacy.

However, some authors claim that these parents may refrain from expressing worries or ambiguities due to a sense of low entitlement to complain about such a desired parenthood and even to seek support (Fisher, Hammarberg, & Baker, 2008; Repokari et al., 2005). Consistently, one study

showed that, comparing to couples that conceived spontaneously, couples that conceived through ART acted less openly in the interviews they were subjected to and expressed their feelings less often, especially the more negative ones (Ulrich, Gagel, Hemmerling, & Hentenich, 2004).

It should be noticed, nonetheless, that the prevalence of risk factors (e.g. low socioeconomic status, younger age, single, high parity, undesired pregnancy) for maladjustment in parents that conceived through ART is low and therefore better adjustment levels than those of parents that conceived spontaneously could be expected (Colpin, 2002), which generally is also not the case.

Other authors claim that infertile couples may idealize parenthood, and consequently lack preparation for its inevitable reality and associated losses (Hammarberg, Fisher, & Wynter, 2008). Evidence that after the partum these parents show less confidence in themselves and in their parenting abilities seems consistent with this hypothesis.

Experiences of infertility and ART may vary to a great extent from couple to couple (e.g. infertility duration, number of ART treatment failures, types of ART treatment undergone, number of spontaneous pregnancy losses, pregnancy, and birth complications). Under a developmental perspective these individual variations should be taken into account; nonetheless, the design of most existing studies cannot determine exclusively whether group differences are a function of ART or of the experience of infertility in general (Hahn, 2001), and there is still limited evidence about the potential impact of the degree of difficulty involved in conceiving on parents' functioning.

Hammarberg et al. (2008) claim that sensitive quantification of these previous adverse reproductive events would improve understanding of these couples' transition to parenthood. This view is in accordance with Bronfenbrenner's proposal of considering the cumulative effects of life events or transitions.

It is important to further explore individual variability in previous adverse reproductive events, as this variability may contribute to the development of different individual trajectories on the experience of the transi-

tion to parenthood.

1.4.2. The marital relationship

Hypotheses were also raised about how the infertility and ART experience could influence the marital relationship of previously infertile couples during their transition to parenthood. Although initially researchers claimed that infertility could add strain to the marital relationship (e.g. Golombok, 1992), as research results progressively showed that these couples generally reported high satisfaction with their intimate partnerships (Hammarberg, Astbury, & Baker, 2001; Sydsjö, Ekholm, Wadsby, Kjellberg, & Sydsjö, 2005), hypotheses started to be made about the possible benefits of the infertility and ART experience on the marital relationship (e.g. Schmidt et al., 2005b; Sydsjö et al., 2005).

There is a strong consensus that during the transition to parenthood the marital relationship is at least as good as or better among couples that conceived through ART than among couples that conceived spontaneously. In almost all comparisons these couples reported being highly satisfied with their marital relationship and showed equal or higher marital adjustment levels than couples that conceived spontaneously, both during pregnancy (Fisher, Hammarberg, & Baker, 2008; Hjelmstedt et al., 2003a; Sydsjö, Wadsby, Kjellberg, & Sydsjö, 2002; Ulrich et al., 2004) and the postpartum period (Greenfeld & Klock, 2001; Hjelmstedt et al., 2004; Gibson et al., 2000b; McMahon et al., 1997b; Repokari et al., 2007; Sydsjö et al., 2002; Ulrich et al., 2004).

A few studies have also looked at changes in the marital relationship across the transition to parenthood. Repokari and colleagues (2007) observed that, as would be expected considering the transition to parenthood literature, from two to twelve months after the birth of their child, couples that conceived spontaneously reported a decline in their “dyadic consensus”. However, this decline was not reported by couples that conceived through ART. Sydsjö and colleagues (2002) found similar results. While the marital satisfaction of couples that conceived spontaneously decreased over time, the marital relationship of couples that conceived through ART remained stable.

The benefits of a stable and emphatic marital relationship on parents' individual adjustment during this life transition have been reported (e.g. Belsky et al., 1991; Cummings & Watson O'Reilly, 1997), and Olshansky and Sereika (2005) found that previously infertile women with high marital satisfaction reported lower levels of post partum depression.

However, this specific stable pattern of the marital relationships of couples that conceived through ART may also reflect at other contextual levels. For instance, couples with such supportive relationships may feel a lower need to maintain social relationships (especially when these relationships may increase their chance of being the target of some form of stigma, neglect or moral judgment, Ellison & Hall, 2003; Malik & Coulson, 2008; Redshaw, Hockley, & Davidson, 2007; Slade et al., 2007) and this may ultimately have a deleterious impact on the parenting system.

Thus, it also seems important to investigate the mutual "collateral" effects of the different parenting determinants within the specific context of parenting after infertility and ART (i.e. research the mesosystem), as these may differ from when conception is achieved spontaneously.

1.4.3. The parents-child relationship

The parents' contribution

During the early years of reproductive medicine development, the major focus of clinicians was directed to the well-being of the infertile couples and the development of successful infertility treatments was their first priority. It was only in the course of the 1980s that questions were raised about the long term effects of ART on the well-being of children born as a result of such treatments. In the same period a plea for social regulation of assisted conception was becoming heard in all Western countries, in order to assure a responsible use of these techniques. Within this context, the rights of the future child became a major point, as the child's position was considered to be the most vulnerable one (Brewaeys, 1998).

Addressing the *welfare of the child* implies considering what aspects of parenting matter most for children's optimal psychosocial development (Golombok, 1998). From a psychological perspective, the quality of the

children's relationships with their parents, and particularly how securely attached they are to their parents, is considered to be central to their emotional well-being throughout childhood and into adult life (Ainsworth et al., 1978; Bowlby, 1969; Sroufe, 2005).

Golombok (1998) advocated that, in considering the welfare of a child born through ART, one should examine whether these families deviate from the "ideal" family unit in ways that are likely to have a negative impact upon the aspects of parenting that matter most for children's psychological well-being. In so far as such parents do not differ with respect to quality of parenting, difficulties would not be expected for the child.

Indeed, this is what researchers in the field have been looking at, motivated by concerns that a history of infertility would lead parents to demonstrate greater anxiety in the parenting role (Gibson et al., 2000a). A brief overview of the studies that addressed this question will be presented.

Antenatal attachment to the foetus

The formation of an emotional relationship between the mother and her growing foetus through pregnancy has been investigated. Some studies did not find significant differences between mothers (Hjelmstedt, Widström, & Collins, 2006; McMahon et al., 1997b) and fathers (Cohen et al., 2000; Hjelmstedt, 2007) that conceived spontaneously and through ART. On the other hand, other studies revealed that mother-to-foetus attachment tended to grow as pregnancy advanced and scores indicated that these mothers had significantly more intense and protective emotional attachments to the unborn baby than a sample from the general population (Fisher, Hammarberg, & Baker, 2008). In clear contrast, Bernstein et al. (1994) and McMahon et al. (1999) found that mothers that conceived through ART reported fewer conversations with their "baby" and tended to delay preparation for nursery, when compared with mothers that conceived spontaneously. Several studies' results further indicated that prenatal maternal and paternal attachment to the foetus increased during pregnancy (Fisher, Hammarberg, & Baker, 2008; Hjelmstedt, Widström, & Collins, 2006; Hjelmstedt, 2007).

Hjelmstedt and colleagues explored correlates of prenatal attachment to

the foetus in mothers and fathers that conceived through ART and spontaneously (Hjelmstedt, Widström, & Collins, 2006; Hjelmstedt, 2007). Results showed that higher marital satisfaction associated positively with maternal prenatal attachment to the foetus, while age, an emotional reaction of ambivalence to pregnancy and the personality trait detachment (reflects preference for distance in interpersonal relationships) associated negatively. In the case of fathers, ambivalence and the personality trait detachment associated negatively with prenatal attachment to the foetus, while the personality trait psychastenia (reflects anxiety proneness) associated positively. In another study, they also found that fathers who rated higher attachment to their unborn baby during pregnancy, who were less anxious and irritable and more assertive, were also more attached to their infants during the postpartum period (Hjelmstedt & Collins, 2008).

Parent-infant relationship

Current evidence does not suggest a negative effect of ART on the parent-infant relationship (cf. Hammarberg, Fisher, & Wynter, 2008). No differences between parents that conceived through ART and spontaneously were found on standardized self-report measures (Cohen et al., 2000; McMahan et al., 1997b), on interview-assessed (Raoul-Duval, Bertrand-Servais, & Frydman, 1993) and on observational measures (e.g. the strange situation, Ainsworth et al., 1978) of the quality of mother/father-infant interaction (Colpin, Demyttenaere, & Vandemeulebroecke, 1995; Gibson et al., 2000a). Also, no differences were found regarding maternal sensitivity (Gibson et al., 2000a; Holditch-Davis, Sandelowski, & Harris, 1999; McMahan et al., 1997b; McMahan & Gibson, 2002; Papaligoura & Trevarthen, 2001).

This positive parenting observed has been attributed, at the representational level, to the high investment these parents make on their child. Indeed, studies have shown that mothers that conceived through ART reported higher levels of emotional involvement with their child and that their partners contributed more to parenting when compared to mothers with a spontaneously conceived child (Golombok, Cook, Bish, & Murray, 1995; van Balen, 1996). These parents' method of conception has even been claimed to act as a protective factor, buffering the caregiving system from

social, marital and child-related risk factors (Gibson et al., 2000a; Repokari et al., 2006), and their high investment in parenthood has been signalled as the underlying protective mechanism.

Indeed, a series of studies looking at parents' mental health, their marital relationship and their parental experience across the transition to parenthood (Repokari et al., 2005; Repokari et al., 2006; Repokari et al., 2007) has provided evidence on the buffering role of method of conception. More specifically, these studies showed that (1) social and child-related stressors (e.g. socio-economic status, child's health at two months) had negative impacts on mental health changes across the transition to parenthood among parents that conceived spontaneously, whereas no impact was found among parents that conceived through ART; (2) depression during pregnancy predicted deteriorated marital relationships only in couples that conceived spontaneously; and (3) unpleasant birth experiences, low birth weight, and difficulty soothing the child were associated with higher levels of parenting stress in parents that conceived spontaneously but not among parents that conceived through ART.

These results support Belsky's proposition that parenting is a buffered system. More importantly, they show that a previous condition of infertility may alter the ecology of parenting in such way that it benefits the parenting process, thus attenuating less positive changes that may occur on other contextual levels.

This calls for the importance of going beyond comparative studies to explore the causal mechanisms of positive adaptation during the transition to parenthood after assisted reproduction. In this particular case, it calls for the importance of exploring the possible mediator role of parents' investment in their child in the relationship between method of conception and parental care, as it seems to be an important mechanism in explaining these parents' resilience during the transition to parenthood.

Another important variable whose moderator role of the relationship between method of conception and parental care is important to explore is gender. Abbey and colleagues (1994) showed that parenthood had equal negative effects (e.g. less intimacy in the marital relationship, less sexual intercourse, higher home life stress) for both previously infertile men and

women, but diminished positive effects (e.g. global life quality, personal control) for men. Another study showed that previously infertile women enjoyed their pregnancy more than men; however, women were also more likely to consider themselves infertile and to think about ART in conjunction with the child than were men (Braverman, Boxer, Corson, Coutifaris, & Hendrix, 1998). These data suggest that although women seem to benefit more from parenthood, they also seem to carry on with them their infertility experience throughout parenthood to a greater extent than men. It seems important to explore how these gender specificities may differently impact the parenting process of mothers and fathers. Nonetheless, most of current investigation of the parent-infant relationship after ART has focused solely on women (cf. Hammarberg, Fisher, & Wynter, 2008).

The child's contribution

The parent-child relationship has two actors, and individual differences in children influence the way they are treated by their parents. Child behaviour has been constantly cited as an important influential child-related factor and a number of investigations did provide evidence linking infant and child negativity/difficulty with less supportive and even problematic parenting (e.g. lack of playfulness, coercive discipline, Goldberg, Clarke-Stewart, Rice, & Dellis, 2002; Hinde, 1989; van den Boom & Hoeksma, 1994).

Method of conception appears to be associated with increased children difficulty. Greenfeld and Klock (2001) reported that two month old children conceived through ART were more difficult to soothe than children conceived spontaneously. Similarly, parents of four month old children conceived through ART rated them as more difficult to care for than did parents of spontaneously conceived children (McMahon et al., 1997b; Cohen et al., 2000) and, twelve months after the partum, mothers that conceived through ART described their children as more irritable and moody and reported that they displayed a greater number of difficult behaviours than spontaneously conceived children (Gibson, Ungerer, Leslie, Saunders, & Tennant, 1998). Two studies, nonetheless, provided contradictory evidence. Sydsjö et al. (2002) found that parents that conceived through assisted reproduction perceived their one year old children as more regular, sensitive

and manageable than parents that conceived spontaneously, and another study showed that parents of children conceived through ART reported that their children had fewer behaviour problems than parents of spontaneously conceived children (Alastair, Edwards, Beeson, & Barnes, 2004).

There seems to be a lack of consensus about the ways children who are conceived by ART may differently impact on their parents' care giving.

Some authors claimed that individuals who become parents after a period of infertility may have unrealistic expectations regarding their children (van Balen, 1998) and thus may lack the necessary preparation to deal with a more difficult infant or with other child-related stressors, such as premature and low birth weight. Considering that premature and low birth weight are associated with higher parenting stress, parental neglect and, consequently, insecure attachment (Davis, Edwards, Mohay, & Wollin, 2003; Sachs, Hall, Lutenbacher, & Rayens, 1999; Sajaniemi et al., 2001), this negative impact may be aggravated by the unrealistic expectations of parents that conceived through ART. In other works, method of conception is said to moderate the relation between difficult child characteristics and parenting and has been conceptualized as a risk factor for less efficient parenting.

In clear contrast, some authors also claimed that difficult and disappointing infant characteristics should not have a negative impact on parents that conceived through ART because these children born through ART were also highly desired and expected (Colpin, 2002; Repokari et al., 2006). Although also moderating the relationship between difficult and disappointing infant characteristics and the parenting process, these authors claim that method of conception acts as a protective factor.

Although empirical research favours the buffer hypothesis (as it was already discussed above, Gibson et al., 2000a; Repokari et al., 2006), the underlying mechanism(s) that may explain it was/were not yet investigated. Results found by McMahan and colleagues (1999) that showed that parents that conceived through ART anticipate more difficult infants than parents with a spontaneously conceived child, suggest that previous acknowledgment of the difficulties of parenting may also explain the buffer hypothesis.

1.5. Integrating the different contextual levels of analysis

The parenting literature has provided a series of snapshots that describe how parenting may be affected by different contextual variables. At a higher degree of analysis, very little has been done empirically to pull together these different contextual pieces into a more complete picture that encompasses the social ecology in which parenting evolves and manifests itself (Kotchick & Forehand, 2002).

In the specific field of parenting after an infertility and ART experience this work has just began to be done. Throughout this chapter we provided examples of the specificities of parenting after infertility and ART and of those studies that questioned possible interactions between method of conception and influential variables, so as to make clear how this kind of studies may contribute with added knowledge about the parenting process in this specific context.

Additionally, we also made clear suggestions regarding future research, which we now briefly summarise:

1. Increase research on the cultural and social variations of the experience of transition to parenthood after assisted reproduction, by conducting more cross cultural research or using measures that assess the cultural bases of each society;
2. Further investigate how a previous infertility and ART experience may change the higher ecological context of parenting and how these changes feedback into the parenting process during the transition to parenthood;
3. When conducting research, take into account the direct and cumulative temporal effects of an infertility and ART experience on the parenting ecology. This includes exploring individual variability in previous adverse reproductive events, as this variability may contribute to the development of different individual (mal)adaptation trajectories across the transition to parenthood;
4. Further investigate the interactive effects of the different parenting determinants, located at different contextual levels, since these may differ from when conception is achieved spontaneously, thus having

a different impact on parenting;

5. Expand research from simply comparative purposes to investigate risk and protective factors and the underlying causal mechanisms of resilience in the specific context of parenthood after assisted reproduction.

The adoption of a developmental and ecological perspective also has implications at the methodological level. Future research should be more often longitudinal and prospective, not only rely on self-reporting by the parents and pay considerable attention to the choice of instruments, so that they are population normed and vary as little as possible across studies. Moreover, multi-method designs are recommended, including different informants (e.g. teachers and the children themselves) and using observational techniques for the assessment of the parents-child relationship in order to increase reliability and validity²⁶. In this context, some authors argue that more specific measures designed for the ART context are needed (Hahn, 2001; McMahon et al., 1997a). Finally, future work should focus on cross-cultural samples and other developmental phases such as adolescence and young adulthood should be further investigated.

In Figure 3.1 we try to summarily represent the ecology of parenting after infertility and assisted reproduction by putting together those different contextual factors that the field literature has identified as being specific to this parenting experience. Although literature suggests that the ecologic context of infertile couples that conceive through ART is not that much favourable (e.g. impoverished social network, difficult child behaviour), these parents seem to exhibit high levels of resilience in different areas of functioning across the transition to parenthood.

²⁶ This multi-methodology (multiple assessment moments, multiple assessment methods, multiple informants, assessment of multiple contexts) is coherent with the assumption that adaptation is a complex phenomenon that is negotiated across many different functioning dimensions that also vary in response to the multiple contexts that individuals encounter on a daily basis (Cummings, Davies, & Campbell, 2000).

The most prevalent explanation for these parents' resilience has been that the stress that accompanies infertility is compensated for by the birth of a deeply desired child. Children who are born through ART are the most extreme examples of planned and wanted children. Their parents waited for a long time and have gone to great lengths to have them and so appreciate the value of the child and of parenthood more intensely (Colpin, 2002; Gibson et al., 2000a; Golombok et al., 1995; Repokari et al., 2006; van Balen, 1998). Other explanations included these parents' older age, the absence of risk factors for poor parenting, the self selection process of infertility and ART treatments (only the more resilient couples manage to undergo ART treatments and thus achieve parenthood), and a previous acknowledgment of the difficulties of parenting.

A comprehensive model of parenting that could further help our understanding of these and/or other operating resilience mechanisms would greatly enhance prevention and intervention efforts not only regarding this particular group of parents but regarding parenting in general. Although the model presented here is nothing more than a tentative approximation, we hope it stimulates further theoretical discussion in this research field.

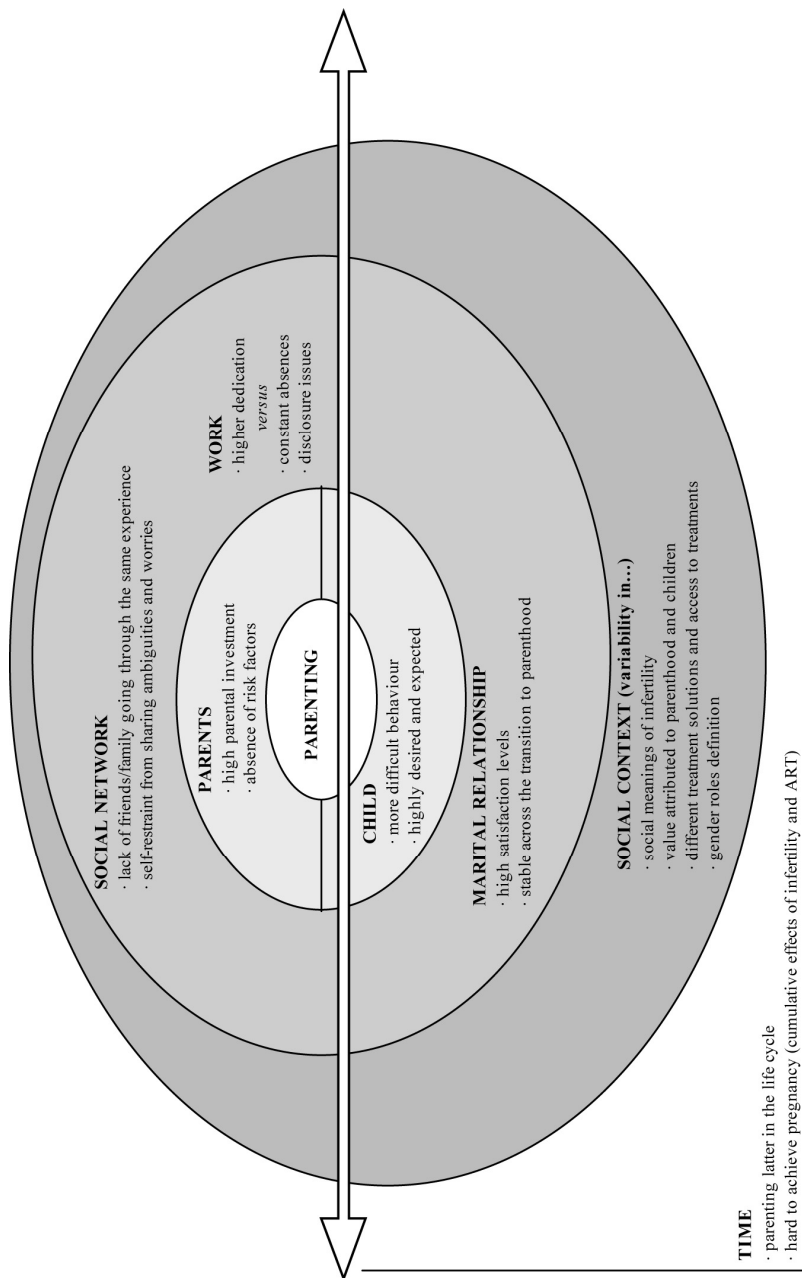


Figure 3.1. The ecology of parenting after infertility and assisted reproduction

Part II

Empirical Studies

Chapter 4

Study I. Psychosocial Adjustment during the Transition to Parenthood of Portuguese Men and Women that Conceived Spontaneously or through Assisted Reproductive Technologies

The present study examined differences and changes in the psychosocial adjustment (i.e. subjective perception of pregnancy and parenthood, psychological distress, quality of life, marital relationship and parenting stress) of Portuguese men and women that conceived spontaneously or through Assisted Reproductive Technologies (ART), during their transition to parenthood. Thirty five couples that conceived through ART and 31 couples that conceived spontaneously completed self report questionnaires during pregnancy and four months after the partum. When compared with parents that conceived spontaneously, parents that conceived through ART perceived their pregnancy as being of higher risk and more demanding and they reported a decrease in their psychological quality of life from pregnancy to postpartum. However, fathers that conceived through ART perceived themselves as being more competent fathers. There was a decrease in the marital relationship quality of all men and women and several gender differences were found regarding changes in quality of life from pregnancy to the postpartum period. Results indicate that although adjustment differences between Portuguese parents that conceive through ART and spontaneously may exist, they do not appear to be clinically significant. Nonetheless, they also reinforce the idea that the transition to parenthood is a period of increased familiar distress. As such, health professionals should be available to assist couples in their efforts to cope with their transition to parenthod, taking into consideration the different ways men and women experience this life transition and in which adjustment may differ for parents that conceive through ART.

Keywords: Infertility; Assisted Reproductive Technologies; Transition to Parenthood; Psychosocial Adjustment.

Introduction

Infertility is a reproductive health problem defined by the World Health Organization (WHO) as the inability of a couple to achieve conception or to bring a pregnancy to term after a year or more of regular, unprotected intercourse (WHO, 1992), that affects 9% of the population worldwide (Boivin et al., 2007). Infertility threatens most couples' assumption that parenthood is a part of adult life and may be experienced as a major life crisis and a source of social and psychological suffering for both men and women (Vayena, Rowe, & Griffin, 2002).

The strain of assisted reproduction technology (ART) treatments (Klonoff-Cohen et al., 2001) and the increased obstetrical risks and medical complications associated with pregnancy following successful ART (Basso & Baird, 2003) have been pointed out as explanations for data suggesting that infertility distress still lingers on after pregnancy is achieved (Bernstein, Lewis, & Seibel, 1994).

Although there is a significant number of studies focusing on the psychosocial adjustment of families created by assisted reproduction, results are not always consistent and may even be contradictory. Indeed, in a recent systematic review focusing on this subject, the body of empirical evidence reviewed was classified as "emergent" (p. 395) and "exploratory in nature" (p. 410), especially concerning the psychosocial well-being of men that conceived through ART (Hammarberg, Fisher, & Wynter, 2008).

These studies have shown that women and men that conceived through ART seem to adjust well during pregnancy and the early postpartum period, reporting similar levels of depression and general anxiety and sometimes even higher levels of marital satisfaction than women and men that conceived spontaneously (e.g. Fisher, Hammarberg, & Baker, 2008;

Hjelmstedt et al., 2003a; Repokari et al., 2005; Ulrich et al., 2004; Sydsjö et al., 2002). However, research has also shown that they report higher levels of specific anxieties about the viability of their pregnancy and about foetal normality and survival (Hjelmstedt et al., 2003a; McMahan et al., 1997a).

This body of research, either based on self report questionnaires or behaviour observation, has further revealed that the parents-child relationship is similar and many times apparently better in families that conceived through ART than in families with a spontaneous conception (SC, e.g. Gibson et al., 2000a; Golombok et al., 1996; McMahan et al., 1997b; van Balen, 1996). In contrast, some of these same studies also revealed that mothers that conceived through ART reported being less confident in their parenting abilities and that their infants exhibited more difficult behaviours than infants conceived spontaneously (Cohen et al., 2000; Gibson et al., 2000b; McMahan et al., 1997b).

Longitudinal studies designed to investigate these couples' adjustment across the transition to parenthood are also scarce and results are not consensual, sometimes even contradicting the general notion that transition to parenthood constitutes a moment of crisis that implies change and reorganization in the parents' life (Boss, 2002). For instance, some studies revealed no adjustment changes across time (Cohen et al., 2000; Olshansky & Sereika, 2005) and another study showed that general anxiety levels decreased across the transition to parenthood, independently of method of conception (Glazebrook et al., 2001). More coherently with the transition to parenthood literature, another study showed that couples that conceived through ART reported lower levels of depressive symptoms during pregnancy but that these increased along the transition to parenthood, being the same as those of couples that conceived spontaneously one year after the partum (Repokari et al., 2005). Sydsjö and colleagues (2002) investigated changes in the marital relationship during the transition to parenthood and found that for couples that conceived through ART the marital relationship remained stable while for couples with a SC it decreased. Two other studies showed a decrease in marital satisfaction from pregnancy to the postpartum period among both couples that conceived through ART or spontaneously (Hjelmstedt et al., 2004; Ulrich et al., 2004).

It is expected that men and women experience transition to parenthood in different ways. This field literature has shown that this is a demanding period, especially for women, who tend to report worse adjustment levels (i.e. more depressive symptoms, increased stress levels) and higher decreases across time in their marital relationship than men (Belsky & Rovine, 1990; Cowan & Cowan, 1995; Cox, Holden, & Sagovsky, 1987; Georgsson-Ohman, Grunewald, & Waldenstrom, 2003; Shapiro, Gottman, & Carrère, 2000). In the specific case of transition to parenthood after ART, research has shown that women that conceived through ART tend to experience pregnancy as more satisfying and parenthood as associated with increased general well-being (Abbey, Andrews, & Halman, 1994; McMahon et al., 1999; van Balen, Naaktgeboren, & Trimbos-Kempre, 1996), but that men that conceived through ART do not report such positive experiences.

The access and workings of assisted reproduction have only recently been legislated in Portugal (Law n° 32/2006, July 2006) and nothing is known about the incidence of fertility problems in Portuguese couples or about their experience during and after treatments, whether these are successful or not. In order to have a deeper understanding of how families experience ART, it is important to study their psychosocial functioning in a variety of different cultural contexts, such as countries like Portugal that are just starting to regulate the use of these technologies.

The aim of this study was to examine the psychosocial adjustment during the transition to parenthood of Portuguese men and women that conceived through ART, compared to men and women with a SC. Gender differences were also investigated.

Following recommendations in the field, psychological adjustment across the transition to parenthood was assessed as a multidimensional construct (Jomeen, 2004). Hence, the first goal was to examine differences in the subjective perception of pregnancy (i.e. related pregnancy problems, risks and demands, but also rewards) between men and women that conceived through ART and spontaneously. Four months after the partum we also examined differences in these parents' subjective perception of their parenthood (i.e. parental competence, but also rewards from parenthood).

On the basis of the research reviewed, it was hypothesized that men and women that conceived through ART would report having more pregnancy related problems and would perceive their pregnancy as being more risky and personally demanding, but also more rewarding, when compared with men and women with a spontaneous pregnancy. They would also report higher levels of perceived rewards from parenthood and women only would report lower levels of perceived maternal competence. Compared to men, all women were expected to perceive their pregnancy and parenthood as more rewarding.

The second goal was to examine differences and changes during the transition to parenthood in the individual and relational adjustment of men and women that conceived through ART, comparing to men and women that conceived spontaneously. At the individual level, psychosocial adjustment has been conceptualized most in terms of the severity of self-reported symptoms of anxiety and/or depression (cf. Hammarberg, Fisher, & Wynter, 2008) and so we considered measures of psychological distress (somatisation, depression and anxiety symptoms). However, we also included a measure of quality of life, intended to capture parents' subjective perception of their well-being in the context of the culture and value systems in which they live (WHOQOL Group, 1998), that is, considering their cultural and social environmental specificities. At the relational level we considered the quality of the marital relationship.

We expected levels of psychological distress to increase and levels of quality of life and marital relationship quality to decrease from pregnancy to the postpartum period for both parents that conceived through ART and spontaneously. We also expected that parents that conceived through ART would report overall lower levels of quality of life and higher levels of marital relationship quality than parents with a SC and that women would report lower levels of adjustment and higher decreases in their marital relationship than men.

Finally, the last goal was to examine differences in the parenting stress of parents that conceived through ART and spontaneously, once that parenting stress is considered to be a more specific measure of adjustment to

parenthood. We expected that both groups of parents and both men and women would report similar levels of parenting stress.

Method

Participants and Procedures

This study was approved by the Ethics Committee of the University of Coimbra Hospitals.

The final sample consisted of 35 couples that conceived through ART and 31 couples that conceived spontaneously.

Couples that conceived through ART and spontaneously were recruited during their first month of pregnancy while attending their obstetrical consultation at the Genetics and Human Reproduction Service and at the Dr. Daniel de Matos Maternity, respectively, both in the University of Coimbra Hospitals. When recruiting participants, a full explanation of the research objectives, the participants' role and the researchers' obligations were given. Inclusion criteria were age (18 years or older), nulliparity, singleton pregnancy and literacy skills to complete the assessment protocol.

If individuals agreed to collaborate, they filled a consent form and were later contacted prior to their twenty-fourth pregnancy week (first assessment point), while attending their obstetric consultation. Questionnaires were then delivered with the instructions that they should complete them separately during the following week and bring them to the next consultation. One week before the second assessment point (four months postpartum), questionnaires were sent by mail together with a preaddressed envelope, and parents were instructed to complete them separately and post them back to the research team. Within a week, a phone text message was sent requesting parents to return the questionnaires and within two weeks a phone call was made with the same goal. Obstetrical and perinatal data (occurrence of obstetrical complications during pregnancy; mode of delivery; gender, gestational age and birth weight of the baby) were also collected from the women's medical records.

A total of 136 couples (66 that conceived through ART and 70 with a SC)

were initially contacted. From the ART group, 11 couples never delivered the questionnaires, 8 couples had multiple pregnancies and 3 lost their pregnancies prior to the assessment moment. From the remaining 44 couples, only 39 women and 35 men also completed the questionnaires at 4 months (participation rate of 66.66%, attrition rate from pregnancy to postpartum assessment points of 14.77%). From the SC group, 20 couples never delivered the questionnaires and, from the remaining 50, only 33 women and 32 men also completed the questionnaires at 4 months postpartum (participation rate of 71.43%, attrition rate from pregnancy to postpartum assessment points of 35%). In the present study we only considered those couples in which both partners completed the questionnaires at both assessment points, which corresponded to a participation rate of 53.03% for the ART group and of 44.29% for the SC group. Women that did not deliver questionnaires after the partum were younger ($t(1, 89) = -2.36, p = .021$) than those who did. No differences were found between those men that did and did not deliver the questionnaires 4 months after the partum.

Sample socio-demographic characteristics are presented in Table 4.1. Women that conceived with ART were older than women that conceived spontaneously ($t(1, 64) = 6.63, p < .001$) and were with their partner for a longer time ($t(1, 53) = 8.21, p < .001$). Men that conceived with ART were also older than men that conceived spontaneously ($t(1, 64) = 5.92, p < .001$) and were with their partner also for a longer time ($t(1, 53) = 8.19, p < .001$). No significant differences were found regarding education and socioeconomic status.

Couples that conceived through ART were trying to achieve pregnancy for an average of 5 years (mean = 5.18, sd = 2.61, range 1-15) and had done on average one treatment (mean = 1.16, sd = 1.08, range 0-4). Twelve (34.29%) couples were diagnosed with female infertility, 10 (28.57%) with mixed infertility, 8 (22.86%) with male infertility and 3 (8.57%) with idiopathic infertility.

The two groups were also compared regarding obstetrical and perinatal data. The frequency of male infants conceived spontaneously was significantly higher than those conceived by ART ($\chi^2(1, 66) = 4.29, p = .034$). There were no significant group differences concerning the occurrence of

problems during pregnancy, mode of delivery and the baby's gestational age and weight at birth.

Materials

Parents' subjective perception of their pregnancy was assessed at pregnancy week twenty-four and subjective perception of parenthood and parenting stress were assessed at four months postpartum. Psychological distress, quality of life and the marital relationship were assessed during pregnancy and at four months postpartum.

Four single items were developed by the authors to assess the participants' subjective perception of their pregnancy. These referred to perceived pregnancy related problems, risk, demands and rewards. Two additional single items were developed to assess the participants' subjective perception of their parenthood, i.e. their sense of parental competence and rewards from parenthood. As an example, the problems during pregnancy item presented participants with the following question "Comparing to most women, my [partner's] pregnancy is developing with:" and included the following judgments: 1 – absolutely no problems, 2 – few problems, 3 – normally, 4 – more problems, and 5 – much more problems.

Psychological distress was assessed using the somatisation, depression and anxiety subscales of the Brief Symptom Inventory – BSI (Derogatis, 1993), that ranged from 0 to 3, with higher scores indicating higher psychological distress. The Portuguese version of this scale presents good levels of internal consistency for these scales (.73 to .80), test-retest coefficients (.74 to .81) and construct and discriminant validity (Canavarro, 2007). In the present sample Cronbach alpha coefficients for women were between .75 and .79 during pregnancy and between .68 and .72 at postpartum. For men, Cronbach alpha coefficients were between .80 and .87 during pregnancy and between .82 and .84 at postpartum.

Table 4.1. Sample socio-demographic characteristics (N=132)

	Women						Men					
	ART			SC			ART			SC		
	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n
Age	33.09	2.853	26.52	4.816	6.63***	35.11	3.802	28.90	4.721	5.92***		
Years in current relationship	7.71	2.198	2.96	1.583	9.98***	7.71	2.198	2.96	1.583	9.96***		
	n	%	n	%	χ^2	n	%	n	%	χ^2	n	%
Education												
Primary	2	5.7	5	16.1		5	14.3	5	16.1			
Secondary Junior	5	14.3	4	12.9	3.50 ^a	5	14.3	11	35.5	4.58		
Secondary Senior	9	25.7	11	35.5		16	45.7	9	29.0			
University	19	54.3	11	35.5		9	25.7	6	19.4			
Socioeconomic status												
Medium low	10	28.6	15	48.4		10	28.6	16	51.6			
Medium	10	28.6	8	25.8	3.12	10	28.6	7	22.6	3.82		
Medium high	15	42.9	8	25.8		15	42.9	8	25.8			

Note: *p < .05, **p < .01, ***p < .001. ^a Cramer's V, SD = standard deviation. ART = Assisted Reproductive Technologies. SC = spontaneous conception

Quality of life was assessed with the World Health Organization Quality of Life brief instrument - WHOQOL-bref (WHOQOL Group, 1998), a 5-point Likert scale with 26 items that assesses quality of life in relation to four specific domains (physical, psychological, social relationships and environment) that range from 0 to 100, with higher scores indicating better quality of life. The Portuguese version of this instrument revealed good internal consistency (.64 to .87), test-retest coefficients (.65 to .85) and good construct validity (Vaz Serra et al., 2006). In the present sample Cronbach alpha coefficients for women were between .68 and .80 and between .62 and .72 at postpartum. For men, Cronbach alpha coefficients were between .59 and .85 during pregnancy and between .64 and .84 at postpartum. However, for men, the Cronbach alpha for the social relationships domain, which was only of .43, departed from these values.

The marital relationship was assessed with the satisfaction, communication, conflict resolution and sexual relationship dimensions of the ENRICH marital inventory (Olson, Fournier, & Druckman, 1983; Portuguese Version by Lourenço, 2006), a 5-point Likert scale with 109 items that provides scores of the women's and men's evaluation of their relationship in term of eleven dimensions. Scores vary from 1 to 5 with higher scores indicating higher satisfaction with the marital relationship. The Portuguese version of the scale has been evaluated, whereby the reliability and the validity of the instrument have been established to be satisfactory (Lourenço, 2006). In the present sample Cronbach alpha coefficients for women were between .63 and .71 during pregnancy and between .70 and .76 at postpartum. For men, Cronbach alpha coefficients were between .57 and .69 during pregnancy and between .54 and .72 at postpartum.

Parenting stress was assessed with the parental and child domains of the Parenting Stress Index - PSI (Abidin, 1983). Child domain scores vary from 50 to 250, with higher scores indicating that certain characteristics of the child (e.g. mood, hyperactivity) may contribute to the overall stress level in the parent-child dyad. Parental domain scores vary from 54 to 270 with higher scores reflecting that the source of stress is in the functioning of the parent. The Portuguese version of this instrument has proved to be valid and reliable (Santos, 2008). In the present study, Cronbach alpha

coefficients for women were of .81 for the child domain and of .91 for the parental domain and, for men, of .81 for the child domain and .89 for the parental domain.

Socioeconomic status was measured considering five categories (low, e.g. house maids; medium-low, e.g. non-specialized workers; medium, e.g. small companies' owners; medium-high, e.g. high school and university professors; and high, e.g. government or private companies administrators), defined in terms of achieved education level and current profession (Neves, 2007). Education referred to the highest education level participant had achieved (primary, secondary junior, secondary senior, university).

Statistical Analyses

Data were statistically analysed using SPSS, v.15.0.

Missing data were random and low level (<5%) and were therefore handled by simple group means substitution. Demographic data were not substituted.

Multivariate analysis of variance (MANCOVA) was used to reduce the risk of inflation from carrying out separate analyses of variance. The MANCOVAs on subjective perception of pregnancy and parenthood and on parenting stress were performed with Group (ART, SC) as the between-subjects factor and Gender (Male, Female) as the within subjects factor, so that within couple differences could be explored. The MANCOVAs on psychological distress, quality of life and the marital relationship were performed with Group (ART, SC) as the between-subjects factor and Gender (Male, Female) and Time (Pregnancy, Postpartum) as the within subjects factors, so that changes across time could also be analysed. Age and years in current relationship were inserted as covariates in all analyses and the gender of the baby was also controlled when analysing differences regarding parenting stress.

Significance was defined as $p < .05$ but marginally significant effects are also reported ($p < .10$). Effect size measures (η^2) are presented for all analyses (small effect-size: $\eta^2 = .10$; medium: $\eta^2 = .25$; large: $\eta^2 = .40$). Post hoc power calculations demonstrated that the achieved sample size was suffi-

cient to detect medium to large effects ($\eta^2 = .30$, $p < .05$, power = .80, G*Power, Faul, Erdfelder, Lang, & Buchner, 2007).

Results

Subjective Perception of Pregnancy and Parenthood

Table 4.2 presents mean scores on women's and men's subjective perception of pregnancy and parenthood.

The multivariate group effect for parents' subjective perception of pregnancy was significant (Pillai's Trace = .46, $F(4,59) = 12.49$, $p < .001$, $\eta^2 = .46$). Parents that conceived through ART perceived their pregnancy was more demanding ($F(1,62) = 3.75$, $p = .016$, $\eta^2 = .09$) than parents that conceived spontaneously. The group main effect was qualified by a significant multivariate interaction effect between group and gender (Pillai's Trace = .14, $F(4,61) = 2.57$, $p = .047$, $\eta^2 = .14$) for pregnancy risk ($F(1,64) = 3.08$, $p = .084$, $\eta^2 = .05$) and rewards ($F(1,64) = 5.49$, $p = .022$, $\eta^2 = .08$). Both men and women that conceived through ART perceived their pregnancy was of higher risk (men: $F(1,62) = 6.15$, $p = .016$, $\eta^2 = .09$, women: $F(1,62) = 13.47$, $p = .001$, $\eta^2 = .19$) but also more rewarding (men: $F(1,62) = 4.34$, $p = .041$, $\eta^2 = .07$, women: $F(1,62) = 30.51$, $p < .001$, $\eta^2 = .33$) than men and women with a SC, but these associations proved to be stronger for women.

The multivariate effect for gender (Pillai's Trace = .08, $F(4,61) = 1.33$, $p = .270$, $\eta^2 = .08$) was not significant.

The multivariate gender effect for parents' subjective perception of parenthood was significant (Pillai's Trace = .15, $F(2,63) = 5.64$, $p = .006$, $\eta^2 = .15$), but was qualified by a significant multivariate interaction effect between group and gender (Pillai's Trace = .14, $F(2,63) = 4.91$, $p = .010$, $\eta^2 = .14$) for perceived parental competence ($F(1,64) = 6.58$, $p = .013$, $\eta^2 = .09$). While no differences between groups were found for mothers ($F(1,62) = 0.37$, $p = .546$, $\eta^2 = .01$), fathers that conceived through ART perceived themselves as more competent than fathers that conceived spontaneously ($F(1,62) = 4.45$, $p = .039$, $\eta^2 = .07$).

The multivariate effect for group (Pillai's Trace = .05, $F(2,61) = 1.51$, $p =$

.229, $\eta^2 = .05$) was not significant.

In summary, during pregnancy, parents that conceived through ART perceived their pregnancy as more demanding than parents that conceived spontaneously. Although both men and women that conceived through ART perceived that their pregnancy was of higher risk but also more rewarding than men and women with a SC, these associations proved to be stronger for women. Four months after the partum, fathers that conceived through ART perceived themselves to be more competent than fathers that conceived spontaneously.

Table 4.2. Women’s and men’s subjective perception of pregnancy and parenthood (N=132)

	Women				Men			
	ART		SC		ART		SC	
	(n = 35)		(n = 31)		(n = 35)		(n = 31)	
	M	SD	M	SD	M	SD	M	SD
Subjective perception of pregnancy								
Problems	2.83	.82	2.90	.75	2.86	.85	2.70	.99
Demands	3.68	.81	3.16	.37	3.51	.74	3.16	.64
Risk	3.71	.71	2.93	.68	3.59	.66	3.15	.46
Rewards	4.09	.62	3.33	.62	4.03	.76	3.70	.82
Subjective perception of parenthood								
Parental competence	3.29	.62	3.26	.58	3.82	.83	3.32	.60
Rewards	3.97	.66	3.90	.79	4.20	.80	3.65	.71

Note: M = mean, SD = standard deviation, ART = Assisted Reproductive Technologies, SC = Spontaneous conception

Adjustment from Pregnancy to Four Months Postpartum

Table 4.3 presents scores on women’s and men’s individual and relational adjustment during pregnancy and four months after the partum.

Table 4.3. Women's and men's adjustment (psychological distress and marital relationship) during pregnancy and four months after the partum (N=132)

	Women						Men									
	Pregnancy			4 months postpartum			Pregnancy			4 months postpartum						
	ART	SC		ART	SC		ART	SC		ART	SC					
	n = 35	n = 31		n = 35	n = 31		n = 35	n = 31		n = 35	n = 31					
M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD			
Psychological distress																
Somatisation	.50	.49	.51	.53	.39	.41	.40	.41	.34	.48	.36	.45	.40	.51	.34	.47
Depression	.59	.61	.60	.55	.64	.59	.65	.40	.55	.37	.46	.40	.40	.46	.45	.52
Anxiety	.59	.49	.64	.47	.55	.59	.58	.53	.54	.56	.49	.49	.49	.49	.54	.41
Marital Relation																
Satisfaction	3.88	.49	3.99	.38	3.66	.53	3.79	.42	3.91	.38	4.03	.86	3.79	.52	3.72	.44
Communication	3.89	.57	3.83	.53	3.61	.54	3.75	.55	3.96	.47	3.73	.51	3.74	.57	3.72	.40
Conflict Resolution	3.68	.49	3.64	.52	3.39	.60	3.55	.46	3.56	.51	3.52	.44	3.56	.48	3.57	.41
Sexual Relation	3.92	.57	4.07	.47	3.57	.58	3.78	.55	3.82	.59	4.02	.45	3.60	.61	3.72	.43

Note: M = mean, SD = standard deviation, ART = Assisted Reproductive Technologies, SC = spontaneous conception, data on quality of life consult figures

Psychological Distress from Pregnancy to Four Months Postpartum

No multivariate effects were found regarding parents' psychological distress. That is, the multivariate group (Pillai's Trace = .00, $F(3,60) = 0.06$, $p = .978$, $\eta^2 = .00$), time (Pillai's Trace = .05, $F(3,62) = 1.04$, $p = .380$, $\eta^2 = .05$) and gender (Pillai's Trace = .07, $F(3,62) = 1.65$, $p = .186$, $\eta^2 = .07$) effects, the interaction group by time (Pillai's Trace = .02, $F(3,62) = 0.36$, $p = .781$, $\eta^2 = .02$), time by gender (Pillai's Trace = .08, $F(3,62) = 1.73$, $p = .170$, $\eta^2 = .08$) and group by gender (Pillai's Trace = .02, $F(3,62) = 0.34$, $p = .798$, $\eta^2 = .02$) effects and the three way interaction (Pillai's Trace = .01, $F(3,62) = 0.19$, $p = .902$, $\eta^2 = .01$) effects were not significant.

Quality of life from Pregnancy to Four Months Postpartum

The multivariate time effect for quality of life was significant (Pillai's Trace = .34, $F(4,59) = 7.43$, $p < .001$, $\eta^2 = .34$). This time main effect was qualified by an interaction effect of time by group (Pillai's Trace = .15, $F(4,59) = 2.65$, $p = .042$, $\eta^2 = .15$) for the psychological domain ($F(1,62) = 4.40$, $p = .040$, $\eta^2 = .07$). While no changes across time were found when conception was spontaneous ($F(1,62) = 0.12$, $p = .727$, $\eta^2 = .00$), when it was achieved through ART parents reported a decrease in their psychological quality of life from pregnancy to the postpartum period ($F(1,62) = 11.39$, $p = .001$, $\eta^2 = .25$; see Figure 4.1).

The multivariate effect for gender was significant (Pillai's Trace = .27, $F(4,59) = 5.49$, $p = .001$, $\eta^2 = .27$). Women reported lower levels of psychological quality of life than men ($F(1,62) = 3.38$, $p = .071$, $\eta^2 = .05$). The gender main effect was qualified by an interaction effect of time by gender (Pillai's Trace = .37, $F(4,59) = 8.58$, $p < .001$, $\eta^2 = .37$) for the physical ($F(1,62) = 13.51$, $p < .001$, $\eta^2 = .18$), social ($F(1,62) = 3.00$, $p = .088$, $\eta^2 = .05$) and environmental ($F(1,62) = 6.77$, $p = .012$, $\eta^2 = .10$) domains.

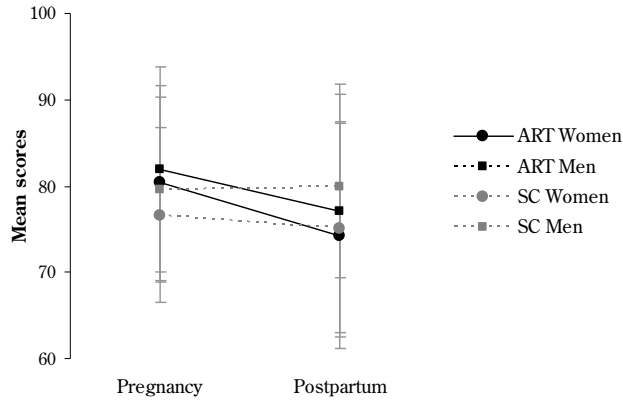


Figure 4.1. Women’s and men’s psychological quality of life during pregnancy and after the partum

While women reported an increase in their physical quality of life from pregnancy to the postpartum period ($F(1,62) = 4.95, p = .030, \eta^2 = .07$), men reported a decrease ($F(1,62) = 4.47, p = .038, \eta^2 = .07$; see Figure 4.2).

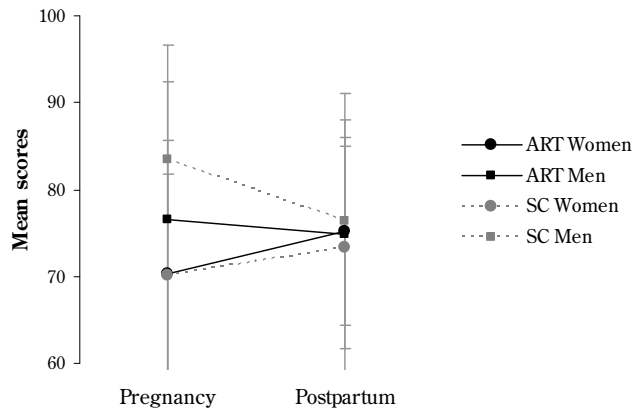


Figure 4.2. Women’s and men’s physical quality of life during pregnancy and after the partum

Both men and women reported a decrease in their social quality of life from pregnancy to the postpartum period (men: $F(1,62) = 22.90, p < .001, \eta^2 = .27$, women: $F(1,62) = 6.47, p = .013, \eta^2 = .09$), but this decrease was

higher for men (see Figure 4.3).

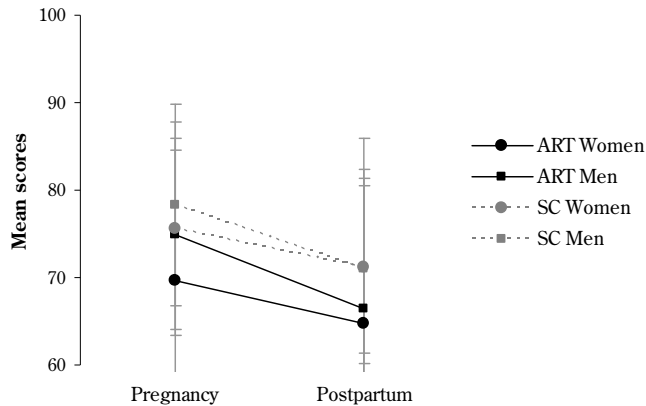


Figure 4.3. Women’s and men’s social quality of life during pregnancy and after the partum

Finally, while no changes across time were found for men ($F(1,62) = 0.24, p = .622, \eta^2 = .00$), women reported a decrease in their environmental quality of life from pregnancy to the postpartum period ($F(1,62) = 14.54, p < .001, \eta^2 = .19$; see Figure 4.4).

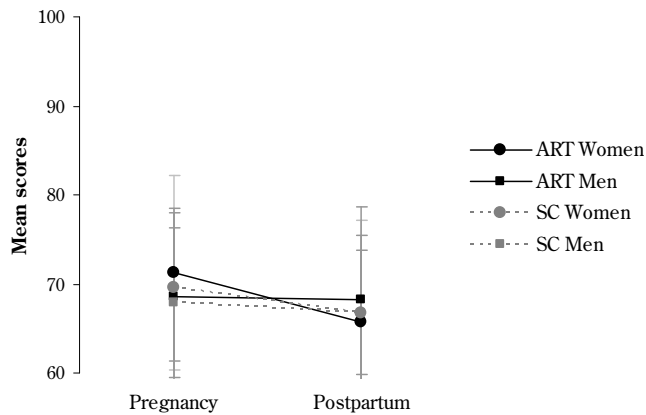


Figure 4.4. Women’s and men’s environmental quality of life during pregnancy and after the partum

The multivariate group effect (Pillai's Trace= .05, $F(4,57) = 0.83$, $p = .515$, $\eta^2 = .05$), the group by gender interaction effect (Pillai's Trace= .10, $F(4,59) = 1.58$, $p = .192$, $\eta^2 = .10$) and the three-way-interaction effect (Pillai's Trace= .04, $F(4,59) = 0.54$, $p = .710$, $\eta^2 = .04$) were not significant.

Marital relationship from Pregnancy to Four Months Postpartum

The multivariate time effect for the marital relationship was significant (Pillai's Trace= .35, $F(4,50) = 5.69$, $p = .001$, $\eta^2 = .31$). Parents reported a decrease in their satisfaction ($F(1,53) = 8.98$, $p = .004$, $\eta^2 = .14$), communication ($F(1,53) = 7.89$, $p = .007$, $\eta^2 = .13$) and sexual relationship ($F(1,53) = 18.92$, $p < .001$, $\eta^2 = .26$) scores from pregnancy to the postpartum period.

The multivariate group (Pillai's Trace= .12, $F(4,46) = 1.64$, $p = .181$, $\eta^2 = .12$) and gender (Pillai's Trace= .05, $F(4,50) = 0.72$, $p = .579$, $\eta^2 = .05$) effects, the interaction time by group (Pillai's Trace= .08, $F(4,50) = 1.05$, $p = .389$, $\eta^2 = .08$), group by gender (Pillai's Trace= .03, $F(4,50) = 0.37$, $p = .827$, $\eta^2 = .03$), and time by gender (Pillai's Trace= .12, $F(4,50) = 1.78$, $p = .147$, $\eta^2 = .12$) effects and the three way interaction (Pillai's Trace= .04, $F(4,50) = 0.56$, $p = .695$, $\eta^2 = .04$) effect were not significant.

In summary, no significant differences were found for psychological distress regarding group, gender and time.

Parents that conceived through ART reported a decrease in their psychological quality of life from pregnancy to the postpartum period. This decrease was not reported by parents that conceived spontaneously.

Women reported overall lower levels of psychological quality of life than men and, from pregnancy to the postpartum period, they also reported a decrease in their environmental quality of life. During this period both men and women reported a decrease in their social quality of life, but this decrease was higher for men. Finally, while women reported an increase in their physical quality of life, men reported a decrease.

Independently of gender and method of conception, from pregnancy to the postpartum period, all parents reported a decrease in their marital rela-

tionship, more precisely, in their satisfaction, communication and sexual relationship scores.

Parenting Stress Four Months after the Partum

Table 4.4 presents scores on women’s and men’s parenting stress.

The multivariate group (Pillai’s Trace= .00, $F(2,60) = 0.11$, $p = .894$, $\eta^2 = .00$) and gender (Pillai’s Trace= .09, $F(2,63) = 3.15$, $p = .050$, $\eta^2 = .09$) effects and the interaction group by gender (Pillai’s Trace= .03, $F(2,63) = 1.03$, $p = .362$, $\eta^2 = .03$) effect were not significant.

In summary, no group and gender differences were found regarding parenting stress.

Table 4.4. Women’s and men’s parenting stress four months after the partum (N=132)

	Women				Men			
	ART		SC		ART		SC	
	(n = 35)		(n = 31)		(n = 35)		(n = 31)	
	M	SD	M	SD	M	SD	M	SD
Parenting Stress								
Child domain	112.50	13.89	110.90	13.94	111.62	14.57	115.29	9.47
Parents domain	120.26	24.05	118.97	21.95	113.82	19.20	117.37	14.32

Note: M = mean, SD = standard deviation, ART = Assisted Reproductive Technologies, SC = spontaneous conception

Discussion

The main finding from this prospective study was that Portuguese men and women that conceived through ART showed similar psychosocial adjustment levels during the transition to parenthood to men and women that conceived spontaneously. The few differences found concerned previously infertile parents’ subjective perception of pregnancy as being of higher risk and more demanding, but also more rewarding, and fathers’ self perception

as being more competent. The results found did not support the existence of different adjustment patterns during the transition to parenthood between parents that conceived spontaneously or through ART, either. The only difference found concerned a decrease in the psychological quality of life of parents in the ART group from pregnancy to the postpartum period, not reported by the SC group.

These results are in line with research suggesting that because previously infertile parents usually undergo lengthy and repeated treatment, and because their pregnancy has higher obstetrical risks, they experience increased pregnancy related anxieties but also feel more gratified (Klock & Greenfeld, 2000; McMahon et al., 1999), and that this is especially true for women. Some authors claim that these parents also tend to idealize parenthood and may thus lack preparation for the inevitable losses that it brings (Hammarberg, Fisher, & Wynter, 2008). The fact that they shifted from perceiving their pregnancy as more rewarding to reporting no differences in perceived rewards from parenthood (assessed after the partum) when compared with parents with a SC may reflect this confrontation between the idealization and the realities of parenthood.

The decrease found in the psychological quality of life (e.g. less positive and more negative feelings, lower self-esteem, worse learning, memory and concentration capacities) of men and women that conceived through ART from pregnancy to the postpartum period is also consistent with the idealization of parenthood hypothesis. Nonetheless, it may also reflect increased psychological adjustment difficulties resulting from a less favourable social and cultural context. For instance, due to infertility and ART related stigma, parents may refrain from confiding about the fact that their child was conceived through ART and may thus have less opportunities to express concerns and worries about their infant's behaviours or developmental status that could eventually be related to method of conception.

Whatever the causes for this decrease in their psychological wellbeing, results from the present study do not substantiate the claim that previously infertile women benefit more from achieving parenthood than previous infertile men. In fact, these results even suggest that, for both mothers and fathers that conceived through ART, parenthood even has a negative im-

pact on their well-being, more specifically, on their psychological well-being.

Mothers that conceived through ART did not report lower levels of perceived maternal competence and fathers even perceived themselves as being more competent than fathers that conceived spontaneously. Previous studies have not indicated differences in the fathers' paternal competence or other adjustment indicators such as parenting stress (e.g. Gibson et al., 2000b), and our own results with this indicator also showed no significant group differences. However, other studies have shown that these fathers contributed more to parenting and were more involved in interacting with their infant when compared with parents with a SC (Golombok et al., 1996; Holditch-Davis, Sandelowski, & Harris, 1999), thus this sense of increased paternal competence may be associated with a stronger involvement in parenting.

Transition to parenthood is known to be associated with higher risk for individual and relational distress (Cowan & Cowan, 1995). Although no increase in psychological distress was reported, the decrease experienced by all men and women in their marital relationship quality and quality of life confirm that this period is one of increased familiar distress (regardless of conception method).

It should also be noted that changes in quality of life during the transition to parenthood seemed to differ for Portuguese men and women. While both genders reported a decrease in the social domain, women's physical quality of life increased while men's decreased and women also reported a decrease in their environmental quality of life that was not reported by men. Additionally, women tended to report overall lower levels of psychological quality of life than men.

While men's decrease in physical well-being was as expected, the increase reported by women, although not hypothesized, may simply result from the birth of the child, that is, from the end of the physical demands and body changes experienced during pregnancy (O'Brien & Naber, 1992).

The decrease in women's reported scores of environmental quality of life reflects a decline in their satisfaction with their social environmental

conditions (e.g. quality of health care, financial security, home environment, opportunities for leisure activities and new learning opportunities). Although different hypothesis may be drawn to explain these results (e.g. because women receive less health care assistance in the postpartum than during pregnancy their satisfaction with health care providers may decrease; because after their child is born they tend to stay at home taking care of household and parental tasks they may have less leisure and less new learning opportunities), caution is advisable because the environmental domain of quality of life assesses a broad array of different issues that need to be further explored before conclusions can be drawn.

Finally, although both men and women reported a decrease in their social quality of life (e.g. satisfaction with social relationships, social support from friends and sexual relationship) during the transition to parenthood, the fact that this decrease was higher for men is consistent with research studies showing that the social relationships of men are more negatively impacted by this life transition (Belsky & Rovine, 1984; Bost, Cox, & Payne, 2002). However, it should be noticed that the social relationships domain of the WHOQOL-bref proved to be less reliable, presenting an especially problematic value of .43 in its internal consistency that referred to men assessed during pregnancy. The worse psychometric performance of this quality of life domain has been reported in previous studies (e.g. Fleck et al., 2000; WHOQOL Group, 1998) and may be related to the fact that this domain is only comprised of three items. As such, and although its internal consistency indexes were better regarding women and the postpartum period, all above .62, caution is advisable when considering these results.

Unfortunately, evidence regarding quality of life during pregnancy and the postnatal period remains scant and thus it is difficult to say whether group and gender differences found reflect increased adjustment difficulties resulting from a different (presumed less favourable) social and cultural context, not expected to be found in other western countries, or only the use of a more sensitive adjustment measure. It seems important to further investigate this issue taking into consideration not only the method of conception but also different socio-cultural contexts.

It should be noticed that although in general these results suggest that

women experience somewhat more adjustment difficulties than men across the transition to parenthood, the scenario found is not as accentuated as the literature suggests (e.g. Cox, Holden, & Sagovsky, 1987; Cowan & Cowan, 1995; Levy-Shiff, 1999).

The strengths of the present study were its prospective nature, inclusion of both members of the couple, the fact that the ART group did not present worse obstetrical and perinatal outcomes than the SC group and the assessment of different psychosocial well-being indicators. In particular, the assessment of quality of life allowed for the detection of variations not detected by measures only directed for the assessment of psychological distress. However, the prospective design and the use of an extensive assessment protocol had implications on sample size. Although it is common in psychological studies (Cohen, 1962), power analyses showed that only medium to large effects could be detected, which means that smaller effects may have been ignored.

In practice, our findings suggest that although pregnancy and early postpartum adjustment differences may exist between Portuguese parents that conceive through ART and spontaneously, they do not appear to develop into clinically significant individual and relational problems. Nonetheless, these results also reinforce the idea that transition to parenthood is a demanding period for all men and women, independently of the way they achieve conception, and that healthcare professionals should be available to assist couples in their efforts to adapt to the individual and relational challenges associated with this life cycle transition (Cowan & Cowan, 1995; Glade, Bean, & Vira, 2005). In providing psychological support, sensitivity is required in addressing the different ways in which men and women experience this life transition and in which adjustment may differ for parents that conceive through ART.

Chapter 5

Study II. Social Nesting: Changes in Social Network and Support across the Transition to Parenthood in Couples that Conceived Spontaneously or through Assisted Reproductive Technologies

Research has shown that following the birth of a first child parents increase contact with family members and other parents of young children, while diminishing contact with friends. This inward movement towards the family, a sort of social nesting, may result from a need for additional support during this critical period and from a desire to build a protective social environment capable of promoting optimal child development. Evidence from the infertility literature suggests that the social nesting experience may be different for couples that used Assisted Reproductive Technologies (ART) to conceive because they do not share with others their pregnancy and parenthood experiences to the same degree as parents with a spontaneous conception (SC) do.

Based on the Convoy Model (Kahn & Antonucci, 1980) perspective of close social relationships, the aim of the present study was to examine changes across the transition to parenthood in the social networks and support of men and women that conceived spontaneously or through ART.

Thirty one women and 22 men (22 couples) that conceived through ART and 28 women and 24 men (24 couples) with a SC provided data on social network and perceived emotional and instrumental support from nuclear family, extended family and friends twice: at twenty-four weeks pregnancy and four months postpartum.

Results demonstrated that during the transition to parenthood new parents showed a strong nesting movement towards their nuclear family members, perceiving increasing levels of nuclear family support across time. This nesting movement was found to be similar for both women and men that conceived through ART and spontaneously, suggesting that it is independent of conception method. Results from this study also add to empirical evidence that validates the Convoy Model.

Keywords: Infertility; Assisted Reproductive Technologies; Transition to Parenthood; Social Network; Social Support.

Introduction

The idea that parenting is carried out in isolation is a misconception (Booth & Booth, 1996). Researchers interested in understanding the processes and outcomes of the transition to parenthood have highlighted this point, advocating the need to examine the social ecologies in which parents-to-be are embedded (Belsky, 1984; Bronfenbrenner & Morris, 1998; Cowan et al., 1991). The concepts of social support and social networks are critical constructs for this understanding as they allow researchers to map those social structures and connections that constrain and empower individual and relationship development in the transition to parenthood (Bost, Cox, & Payne, 2002).

Using a developmental framework, Kahn and Antonucci (1980) defined the individual's social network or convoy as the evolving hierarchy of relations that are perceived by the individual to be close and important to his or her life and that set the stage for supportive interchanges. The convoy functions optimally to afford the exchange of social support, in the form of affective support, self-affirmation, and direct aid. With no a priori assumptions regarding network members, the convoy structure is conceptualized empirically as a hierarchy of three concentric circles surrounding the individual that represent different levels of perceived intimacy or closeness, regardless of the specific roles of network members.

An example of a convoy diagram is presented in Figure 5.1.

Relationships in the innermost circle (Circle 1 in Figure 5.1) are the most intimate and stable across age and time, providing high levels of support, while the outer ones represent increasingly less intimate and stable relationships. The relation between support provision and network membership position is however not necessarily linear as it may vary across time

and according to specific situational demands (Levitt, 2005). Kahn and Antonucci (1980) observe that the structural and functional properties of the network can be described in terms of their status at any given point in time and in terms of changes that occur during normative and non-normative transitions over the life span (i.e., transitions that are expected to occur, such as marriage, versus unexpected events, such as the sudden death of a relative).

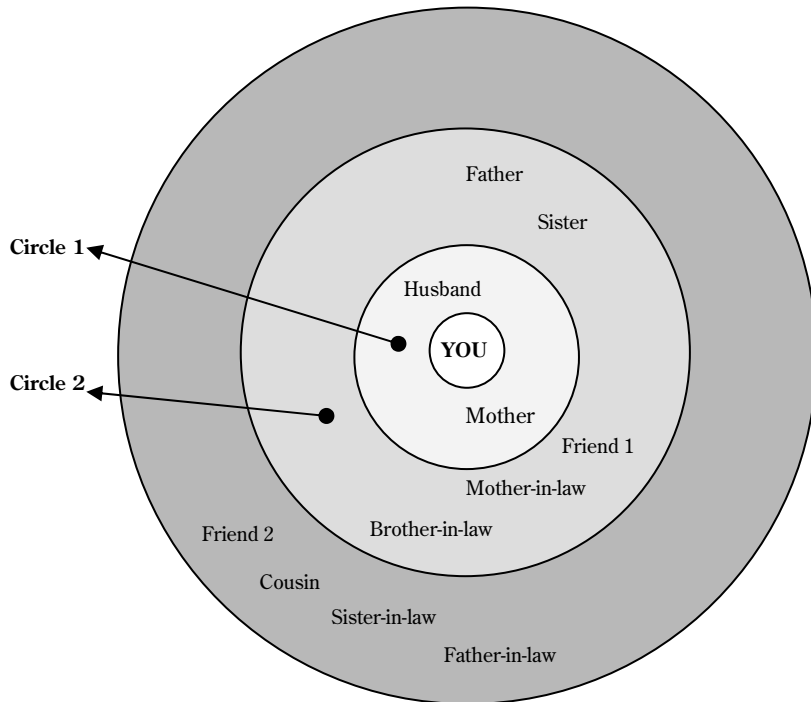


Figure 5.1. Example of a Convoy Model diagram

One such normative transition is the birth of the first child. Involving great demands and change, this period brings with it the potential for individuals to activate or reconstitute their social network, as they seek to construct a network that better meets their new support needs (Levitt, 2005). Research has shown that following the birth of a first child, contact with parents, other family members and other adults who are parents of young

children tends to increase (Belsky & Rovine, 1984; Bost, Cox, & Payne, 2002; Flaherty & Richman, 1989), and that more support is requested and perceived, especially from family members (Belsky & Rovine, 1984; Power & Parke, 1984). At the same time, the number of friends in the network seems to decrease (Bost, Cox, & Payne, 2002). It seems, therefore, that the demands of caring for a newborn makes parents turn to their kinships for support, probably due to their family affiliation ties with the baby. This inward movement towards the family, a sort of social nesting, may also result from the parents' desire to build a more appropriate environment for the provision of childcare (Cox & Paley, 1997).

Evidence from the infertility literature suggests that the social nesting of couples that use Assisted Reproductive Technologies (ART) may be different because their pathway to parenthood is atypical.

Infertile couples usually wait a long time and have to undergo lengthy and repeated treatments before they manage to conceive (Colpin, 2002). Although most of the time infertile couples inform their close friends and family of their difficulty in conceiving and perceive overall support from them (Peronace, Boivin, & Schmidt, 2007; van Balen, Trimbos-Kempre, & Verdurmen, 1996), this is mainly because couples choose carefully whom to tell and the way to tell them (van Balen, Trimbos-Kempre, & Verdurmen, 1996). In fact, either due to social expectations regarding procreation or to lack of knowledge about infertility, infertile couples can be the target of painful comments regarding their inability to conceive. Studies have shown that infertile women report feeling devalued, different or morally judged (Ellison & Hall, 2003) and that infertile couples have concerns about the ways of coping with their families' interest or disapproval regarding infertility treatments (McNaughton-Cassill et al., 2000). Perceived stigma may be even greater in specific circumstances, such as when highly traditional familiar patterns are socially predominant, imposing a significant pressure for biological procreation (Qiu, 2002), or when infertility is related to a male factor (Peronace, Boivin, & Schmidt, 2007). Couples' social relationships may also be affected because treatments are often time consuming and require many clinic visits, diminishing opportunities for contact with friends and acquaintances (Fekkes et al., 2003), and/or because the couple may

avoid maintaining relationships with friends that have children, as these are emotionally demanding (Miall, 1985).

Although pregnancy after infertility represents the fulfilment of a dream, it is not the unproblematic moment of joy it usually is when conception is spontaneous. If after a usually long period of treatments couples finally manage to conceive, they may find they do not have friends going through the same experience in whom they can confide (Munro, Ironside, & Smith, 1992). Because obstetrical risks are higher than in a spontaneous pregnancy (Basso & Baird, 2003), couples have more worries about a miscarriage and so often delay telling others about their pregnancy (McMahon et al., 1999). Despite these more difficult circumstances, these couples feel it is inappropriate to express their mixed feelings and ambivalence about the realities of parenthood (Fisher, Hammarberg, & Baker, 2008).

This review suggests that because couples that use ART experience a hard-to-achieve-pregnancy, they may share their pregnancy and parenthood experience with fewer persons or to a lesser degree than parents with a spontaneously conceived child. As sharing experiences and uncertainties are important mechanisms in eliciting social support, they may perceive less support than those conceiving spontaneously.

To date research on pregnancy and parenting after ART has mainly focused on aspects such as adjustment to pregnancy and parenthood, marital relation, parent-infant relations and childrens' socio-emotional development (cf. Hammarberg, Fisher, & Wynter, 2008). Research on social relationships in this context has almost exclusively focused on the treatment period (e.g. Jirka, Schuett, & Foxall, 2006), with only a few studies exploring social aspects of pregnancy and postpartum. One study conducted with parents of three-month old twins, (Munro, Ironside, & Smith, 1992) showed that parents that conceived through ART reported less availability of acquaintances, friends, or frank and confiding relationships and felt less reassured and socially integrated than parents with SC. Nonetheless, more recent studies comparing singletons (Gibson et al., 2000b) or twins (Pinborg et al., 2003; Vilska et al., 2009) conceived with ART and spontaneously revealed no differences in the parents' reported measures of perceived social support, social dysfunction or influence in social life.

Gender plays an important role in establishing and maintaining social relationships. Generally, women have and benefit more from diverse sources of social support (Greenberger & Goldberg, 1989) and, across the transition to parenthood women also maintain more contact with relatives and friends than men (Belsky, 1984; Bost, Cox, & Payne, 2002), which may suggest that their nesting movement would be characterized by an inferior withdrawal from friends.

The aim of the present study was to examine changes across the transition to parenthood in the social networks and support of men and women that conceived through ART compared with men and women with a spontaneous conception (SC).

We used the Convoy Model (Kahn & Antonucci, 1980) to map movements in social network and assess changes in emotional and instrumental support during the transition to parenthood from the twenty-fourth week of pregnancy to four months postpartum.

Based on the research reviewed, it was hypothesized that social nesting would empirically manifest in an increase of extended family members into the innermost circles of the convoy (C1 and C2) and in a decrease of friends in these same circles, both for couples that conceived spontaneously or through ART. The number of nuclear family members was expected to be stable across time.

In the case of couples that used ART the social nesting was expected to be modified by the experience of infertility, whereby even fewer extended family would be drawn into the inner circles and there would be even greater withdrawal from friends. This pattern of nesting was expected to be more pronounced in C2 of the convoy than in C1 for both SC and ART groups. Finally, it was also expected that the social network size would be smaller for ART versus SC groups (extended family and friends only).

Regarding perceived support, a similar pattern was expected. Support from nuclear and extended family was expected to increase and support from friends was expected to decrease across the transition to parenthood. This pattern was expected to be modified by the experience of infertility such that the perceived increase in support would be less pronounced

whereas the decrease more pronounced. These changes were also expected to be higher regarding members located in C2 than in C1 of the convoy. Couples that conceived through ART were expected to report lower levels of overall perceived support from extended family and friends.

Method

Participants and Procedures

This study was approved by the Ethics Committee of the University of Coimbra Hospitals.

The final sample consisted of 31 women and 22 men (22 couples) that conceived through ART and 28 women and 24 men (24 couples) with a SC.

Consecutive couples (ART or spontaneous conception) attending for their obstetrical consultation during their first pregnancy month at the Genetics and Human Reproduction Service and at the Dr. Daniel de Matos Maternity (respectively) both in the University of Coimbra Hospitals, were invited to collaborate in the study. When recruiting participants a full explanation of the research objectives, the participants' role and the researchers' obligations were given. Inclusion criteria were age (18 years or older), nulliparous, singleton pregnancy and literacy skills sufficient to complete the assessment protocol. Furthermore, only participants that completed the data regarding social network and support at both assessment points were included in the sample.

If participants agreed to collaborate, they filled a consent form and were later contacted prior to their 24th pregnancy week (first assessment point), while attending their obstetric consultation. Questionnaires were then delivered with the instructions that they should complete them separately during the following week and bring them to the next consultation. One week before the second assessment point (four months postpartum), questionnaires were sent by mail together with a preaddressed envelope, and parents were instructed to complete them separately in the next week and to post back to the research team. Within a week, a phone text message was sent requesting parents to return the questionnaires and within two weeks a phone call was made with the same goal.

A total of 136 couples (66 that conceived through ART and 70 with a SC) were initially contacted. From the ART group, 11 couples never delivered the questionnaires, 8 couples had multiple pregnancies and 3 lost their pregnancies prior to the assessment moment. From the remaining 44 couples, only 39 women and 35 men also completed the questionnaires at 4 months (participation rate of 66.66%, attrition rate from pregnancy to postpartum assessment points of 14.77%). From these, 8 women and 13 men did not have social data at both assessment points, which corresponded to a participation rate of 46.97% in women and 33.33% in men. From the SC group, 20 couples never delivered the questionnaires and, from the remaining 50, only 33 women and 32 men also completed the questionnaires at 4 months postpartum (participation rate of 71.43%, attrition rate from pregnancy to postpartum assessment points of 35%). From these, 5 women and 8 men did not have social data at both assessment points, which corresponded to a participation rate of 40% in women and 34.29% in men.

Those women that did not deliver questionnaires at T2 tended to be younger ($t(1,88) = -1.912, p < .059$) and less educated (Cramer's $V(3,88) = .270, p = .093$) than those that delivered them. No differences were found between men that did and did not delivered questionnaires at T2.

Sample socio-demographic characteristics are presented in Table 5.1.

All individuals who agreed to collaborate were Portuguese Caucasian. Women that conceived with ART were older than women that conceived spontaneously ($t(1, 57) = 6.34, p < .001$) and were with their partner for a longer time ($t(1, 45) = 5.83, p < .001$). Men that conceived with ART were also older than men that conceived spontaneously ($t(1, 44) = 3.38, p = .002$) and were with their partner also for a longer time ($t(1, 26) = 5.57, p < .001$). No significant differences were found regarding education, socioeconomic status and women's employment status (after the partum) between the ART and SC groups.

Table 5.1. Sample socio-demographic characteristics (N=105)

	Women						Men					
	ART			SP			ART			SP		
	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n
Age	33.60	3.22	27.52	4.25	6.13*	34.06	3.26	30.05	5.02	2.92*		
Years in current relationship	7.28	3.03	3.08	1.88	5.83*	7.24	2.56	3.12	1.91	5.57*		
	n	%	n	%	χ^2	n	%	n	%	χ^2	n	%
Education												
Primary	3	10.0	1	3.7		4	18.2	5	21.7			
Secondary Junior	5	16.7	2	7.4	.262 ^a	3	13.6	6	26.1	.180 ^a		
Secondary Senior	6	20.0	11	40.7		8	36.4	6	26.1			
University	16	53.3	13	48.1		7	31.8	6	26.1			
Socioeconomic status												
Medium low	9	30.0	7	26.9		7	31.8	7	31.8			
Medium	8	26.7	11	42.3	1.64	5	22.7	7	31.8	.556		
Medium high	13	43.3	8	30.8		10	45.5	8	36.4			
Professional situation (four months postpartum)												
Childbirth leave	20	66.6	20	71.4	.153	---	---	---	---			
/unemployment/vacations												
Working	10	33.3	8	28.6		---	---	---	---			

Note: * p < .01, ^a Cramer's V. SD = standard deviation, ART = Assisted reproduction conception, SC = spontaneous conception

Materials

The Convoy Model (Kahn & Antonucci, 1980) offers a developmental perspective of an individual's social network and perceived support from network members. Network information was obtained by asking individuals to map their relations hierarchically onto a concentric circle diagram. Participants were asked to place in the innermost circle (C1) those individuals who are "so close that it's hard to imagine life without them", in the second circle (C2) "those that are not quite as close, but are still very important" and in the third circle (C3) those that are "not quite as close, but still important".

Network members were described by the type of relationship they had with participants and this description was used to assign the member to the nuclear family (parents and siblings), extended family (in-laws and other relatives) or friends category (cf. Figure 5.1). Based on this configuration a total of 6 network scores were computed for number of nuclear family, extended family and friends included in each of the two innermost circles (C1 and C2) of the convoy.

After completing the Convoy diagram, participants were asked to rate, from 0 (no relations included in the convoy and/or no perceived support from included relations) to 5 (maximum perceived support), perceived support regarding eight different support functions for each person included in C1 and C2 of the convoy (to a total maximum of 12 persons). Factorial analyses on 119 persons from general population (university students, their relatives and friends) revealed two support dimensions, emotional (four items; e.g., confiding about important things) and instrumental (four items; e.g., helping with household tasks) with good internal consistency, test-retest reliability and good construct validity (Gameiro, Soares, Moura-Ramos, Pedrosa, & Canavarro, 2008b). In the present sample, Cronbach alpha coefficients for the pregnancy period for emotional and instrumental support in men and women were between .72 and .88 and between .72 and .93 at postpartum. Twelve average summed scores for the four items of emotional and four items of instrumental perceived support were calculated for each type of relationship (nuclear family, extended family, friends) in C1

and C2. These values ranged from 0 (minimum perceived support) to 20 (maximum perceived support). No network and support scores were computed regarding the third circle of the convoy.

Socioeconomic status was measured considering five categories (low, e.g. house maids; medium-low, e.g. non-specialized workers; medium, e.g. small companies' owners; medium-high, e.g. high school and university professors; and high, e.g. government or private companies administrators), defined in terms of achieved education level and current profession (Neves, 2007). Education referred to the highest education level participant had achieved (primary, secondary junior, secondary senior, university).

Statistical Analyses

Data were statistically analysed using SPSS, v.15.0.

Distributions were examined for missing data. Demographic data were not substituted but missing data regarding social support and network size (<3% for the pregnancy period and <6% for the postpartum period) were substituted with the relevant group (ART, SC) mean.

Multivariate analysis of variance (MANOVA) was used to reduce the risk of alpha inflation from carrying out separate analyses of variance on the nuclear family, extended family and friends variables. The MANOVAs on social network size and perceived emotional and instrumental support were performed with Group (ART versus SC) as the between-subjects factor and Time (Pregnancy versus Postpartum) and Circle of the Convoy Model (C1 versus C2) as the within subjects factor.

Significance was defined as $p < .05$ but marginally significant effects are also reported ($p < .10$). Effect size measures (η^2) are presented for all analyses (small effect-size: $\eta^2 = .10$; medium: $\eta^2 = .25$; large: $\eta^2 = .40$). Post hoc power calculations demonstrated that the achieved sample size was sufficient to detect large effects ($\eta^2 = .40$, $p < .05$, power = .80, G * Power, Faul et al., 2007).

Analyses were conducted separately for women and men. For men all measures concerning friends were not analysed because men that conceived spontaneously did not include friends in C1 of the convoy four

months postpartum (cf. Table 5.3). As a result all related variables had a mean value of zero and presented no variance, which violates assumptions for analysis of variance.

Results

Social Network Size during Pregnancy and Postpartum

Table 5.2 shows extended family and friends network composition during pregnancy and postpartum, for both women that conceived through ART and spontaneously.

Table 5.2. Number of extended family members and friends included in each circle of the Convoy for both women that conceived through ART and spontaneously (N=59)

	Pregnancy				4 months postpartum			
	ART n = 31		SC n =28		ART n = 31		SC n =28	
	M	SD	M	SD	M	SD	M	SD
C1								
Extended Family	0.48	0.96	1.29	1.88	0.16	0.53	0.68	1.09
Friends	0.03	0.18	0.04	0.19	0.03	0.18	0.04	0.19
C2								
Extended Family	1.94	1.73	2.18	2.36	1.32	1.40	1.89	2.01
Friends	1.06	1.31	0.93	1.12	0.45	0.68	0.89	0.99

Note: M = mean, SD = standard deviation, ART = Assisted reproduction conception, SC = spontaneous conception, C1 = first/innermost circle of the Convoy Model, C2 = second circle of the Convoy Model, data on nuclear family consult figures

For women, the multivariate effect for time was significant (Pillai's Trace = .34, $F(3,55) = 9.39$, $p < .001$, $\eta^2 = .34$). From pregnancy to postpartum, women reported an increase in the number of nuclear family members in their network ($F(1,57) = 10.88$, $p = .002$, $\eta^2 = .16$; see Figure 5.2) and a decrease in the number of extended family members ($F(1,57) = 8.04$, $p = .006$, $\eta^2 = .12$) and friends ($F(1,57) = 4.09$, $p = .048$, $\eta^2 = .07$).

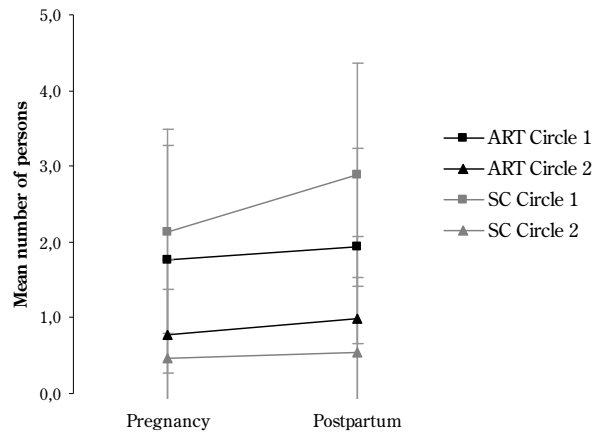


Figure 5.2. Women’s nuclear family by each circle of the Convoy

There was a multivariate main effect for circle (Pillai’s Trace = .65, $F(3,55) = 33.42$, $p < .001$, $\eta^2 = .65$). Women reported more nuclear family members ($F(1,57) = 42.97$, $p < .001$, $\eta^2 = .43$) and fewer extended family members ($F(1,57) = 27.72$, $p < .001$, $\eta^2 = .33$) and friends ($F(1,57) = 50.29$, $p < .001$, $\eta^2 = .47$) in the first circle of the convoy than in the second.

The time and circle main effects were qualified by a marginally significant multivariate interaction effect (Pillai’s Trace = .12, $F(3,55) = 2.55$, $p = .065$, $\eta^2 = .12$) regarding friends ($F(1,57) = 4.09$, $p = .048$, $\eta^2 = .07$). While the number of friends located in C1 did not change from pregnancy to the postpartum period ($F(1,58) = .00$, $p = 1.000$, $\eta^2 = .00$), the number of friends located in C2 of the convoy decreased ($F(1,58) = 4.41$, $p = .040$, $\eta^2 = .07$). This interaction was not significant for nuclear ($F(1,57) = 1.45$, $p = .233$, $\eta^2 = .02$) or extended family ($F(1,57) = 0.00$, $p = .972$, $\eta^2 = .00$).

The multivariate main effect of group (Pillai’s Trace = .05, $F(3,54) = 1.04$, $p = .384$, $\eta^2 = .05$) and interaction effects between time by group (Pillai’s Trace = .07, $F(3,55) = 1.48$, $p = .229$, $\eta^2 = .08$), group by circle (Pillai’s Trace = .09, $F(3,55) = 1.76$, $p = .166$, $\eta^2 = .09$) and the three way interaction (Pillai’s Trace = .071, $F(3,55) = 1.40$, $p = .253$, $\eta^2 = .07$) were not significant.

Table 5.3 shows extended family and friends network composition during pregnancy and postpartum, for both men that conceived through ART and spontaneously.

Table 5.3. Number of extended family members and friends included in each circle of the Convoy for both men that conceived through ART and spontaneously (N=46)

	Pregnancy				4 months postpartum			
	ART		SC		ART		SC	
	n = 22		n =24		n = 22		n =24	
	M	SD	M	SD	M	SD	M	SD
C1								
Extended Family	0.59	1.30	1.04	1.78	0.27	0.55	0.96	1.46
Friends	0.23	0.69	0.13	0.34	0.14	0.47	0.00	0.00
C2								
Extended Family	2.32	1.46	1.83	2.30	2.00	2.51	2.00	1.87
Friends	0.73	1.32	0.75	1.22	0.32	0.72	0.58	0.78

Note: M = mean, SD = standard deviation, ART = Assisted reproduction conception, SC = spontaneous conception, C1 = first/innermost circle of the Convoy Model, C2 = second circle of the Convoy Model, data on nuclear family consult figures

For men, only data on nuclear and extended family members are reported because data regarding friends violates assumptions for analysis of variance (see Methods).

The multivariate effect for time was significant (Pillai's Trace = .24, $F(2,43) = 6.87$, $p = .003$, $\eta^2 = .24$). From pregnancy to postpartum, men reported an increase in the number of nuclear family members in their network ($F(1,44) = 11.83$, $p = .001$, $\eta^2 = .21$; see Figure 5.3). The time main effect was not significant for extended family ($F(1,44) = 0.64$, $p = .429$, $\eta^2 = .01$).

There was a multivariate main effect for circle (Pillai's Trace = .43, $F(2,43) = 16.49$, $p < .001$, $\eta^2 = .43$). Men included a greater number of nuclear family members ($F(1,44) = 11.14$, $p = .002$, $\eta^2 = .20$) and a smaller number of extended family members in C1 than C2 of the convoy ($F(1,44) = 17.90$, $p < .001$, $\eta^2 = .29$).

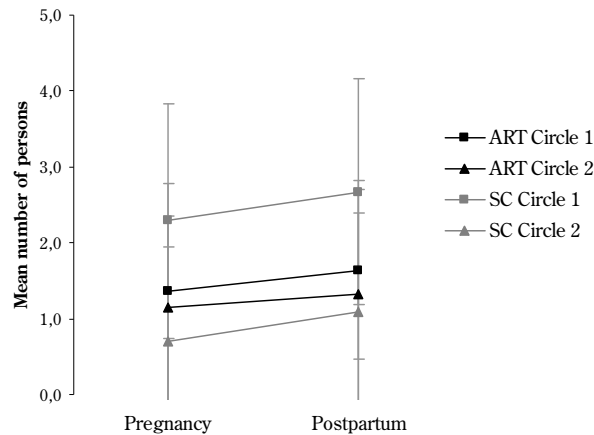


Figure 5.3. Men's nuclear family by each circle of the Convoy

The circle main effect was qualified by a significant multivariate interaction effect between group and circle (Pillai's Trace = .13, $F(2,43) = 3.19$, $p = .052$, $\eta^2 = .13$) regarding nuclear family ($F(1,44) = 5.55$, $p = .023$, $\eta^2 = .11$). Men that conceived through ART included fewer nuclear family members in C1 of the convoy than men that conceived spontaneously ($F(1,43) = 11.80$, $p = .001$, $\eta^2 = .22$), but there was no difference between groups in C2 ($F(1,43) = 1.21$, $p = .277$, $\eta^2 = .03$). This interaction was not significant for extended family ($F(1,44) = 1.68$, $p = .201$, $\eta^2 = .04$).

The multivariate main effect of group (Pillai's Trace = .09, $F(2,43) = 2.05$, $p = .141$, $\eta^2 = .09$), interaction effects of time by group (Pillai's Trace = .03, $F(2,43) = 0.74$, $p = .485$, $\eta^2 = .03$) and time by circle (Pillai's Trace = .00, $F(2,43) = 0.05$, $p = .950$, $\eta^2 = .00$) and the three way interaction (Pillai's Trace = .001, $F(2,43) = 0.04$, $p = .960$, $\eta^2 = .00$) were not significant.

In summary, for women the transition to parenthood was associated with an overall increase in nuclear family members and a decrease in extended family and [mainly in circle 2] friends. For men there was an overall increase in the number of nuclear family members but no change in the

number of extended family (friends were not examined). For men and women the innermost circle (C1) included more nuclear family members and fewer extended family and [for women only] friends. These associations did not differ by conception groups. The only group effect observed was that men who had used ART included fewer nuclear family members in their innermost circle than men in the SC group.

Emotional Support from the Social Network during Pregnancy and Postpartum

Table 5.4 shows perceived emotional support from extended family and friends during pregnancy and postpartum, for both women that conceived through ART and spontaneously.

Table 5.4. Perceived emotional support from extended family and friends by each circle of the Convoy for both women that conceived through ART and spontaneously (N=59)

	Pregnancy				4 months postpartum			
	ART		SC		ART		SC	
	n = 31		n = 28		n = 31		n = 28	
	M	SD	M	SD	M	SD	M	SD
C1								
Extended Family	3.46	6.58	5.93	7.35	0.74	2.64	5.55	7.84
Friends	0.45	2.51	0.61	3.21	0.35	1.98	0.68	3.59
C2								
Extended Family	9.79	6.51	10.41	7.16	6.04	6.63	7.35	6.93
Friends	7.93	8.22	8.16	8.58	5.39	7.74	8.78	8.73

Note: M = mean, SD = standard deviation, ART = Assisted reproduction conception, SC = spontaneous conception, C1 = first/innermost circle of the Convoy Model, C2 = second circle of the Convoy Model, ES = emotional support, IS = instrumental support, data on nuclear family consult figures

For women, a significant multivariate time effect was found (Pillai's Trace = .255, $F(3,55) = 6.28$, $p = .001$, $\eta^2 = .26$). From pregnancy to postpartum, women perceived an increase in emotional support from nuclear family ($F(1,57) = 4.55$, $p = .037$, $\eta^2 = .07$; see Figure 5.4) and a decrease in emo-

tional support from extended family ($F(1,57) = 8.77, p = .004, \eta^2 = .13$). The main effect of time was not significant for friends ($F(1,57) = 0.55, p = .463, \eta^2 = .01$).

A significant multivariate effect was found for circle (Pillai's Trace = .681, $F(3,55) = 39.17, p < .001, \eta^2 = .68$). More support was perceived from nuclear family ($F(1,57) = 61.36, p < .001, \eta^2 = .52$) and less from extended family ($F(1,57) = 25.69, p < .001, \eta^2 = .31$) and friends ($F(1,57) = 63.93, p < .001, \eta^2 = .53$) located in C1 of the convoy than in C2.

The main effect of circle was qualified by a significant multivariate interaction effect between group and circle (Pillai's Trace = .183, $F(3,55) = 4.10, p = .011, \eta^2 = .18$) for nuclear family ($F(1,57) = 10.80, p = .002, \eta^2 = .16$). While in C1 no differences were found ($F(1,56) = 1.43, p = .238, \eta^2 = .03$), in C2 women that conceived through ART perceived more emotional support from nuclear family than women that conceived spontaneously ($F(1,56) = 4.53, p = .038, \eta^2 = .08$). The group by circle interaction was not significant for extended family ($F(1,57) = 2.30, p = .135, \eta^2 = .04$) or friends ($F(1,57) = 0.80, p = .376, \eta^2 = .01$).

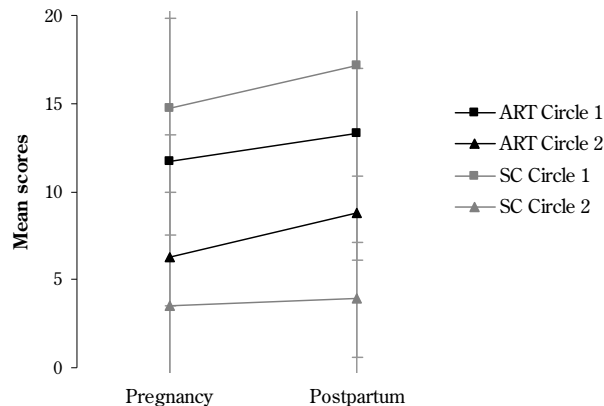


Figure 5.4. Women's perceived emotional support from nuclear family by each circle of the Convoy

The multivariate effect of group (Pillai's Trace = .082, $F(3,54) = 1.62$, $p = .196$, $\eta^2 = .08$), interaction effects of time by group (Pillai's Trace = .040, $F(3,55) = 0.77$, $p = .517$, $\eta^2 = .04$) and time by circle (Pillai's Trace = .033, $F(3,55) = 0.63$, $p = .597$, $\eta^2 = .03$), and the three way interaction (Pillai's Trace = .035, $F(3,55) = 0.67$, $p = .573$, $\eta^2 = .04$) were not significant.

Table 5.5 shows perceived emotional support from extended family and friends during pregnancy and postpartum, for both men that conceived through ART and spontaneously.

For men, the multivariate effect for time was significant (Pillai's Trace = .19, $F(2,43) = 5.19$, $p = .010$, $\eta^2 = .19$). From pregnancy to postpartum, men reported an increase in perceived emotional support from nuclear family ($F(1,44) = 8.95$, $p = .005$, $\eta^2 = .17$; see Figure 5.5).

Table 5.5. Perceived emotional support from extended family and friends by each circle of the Convoy for both men that conceived through ART and spontaneously (N=46)

	Pregnancy				4 months postpartum			
	ART		SC		ART		SC	
	n = 22		n = 24		n = 22		n = 24	
	M	SD	M	SD	M	SD	M	SD
C1								
Extended Family	3.72	7.16	5.67	7.59	3.45	6.65	6.26	7.05
Friends	2.41	6.25	2.13	5.77	1.30	4.19	0.00	0.00
C2								
Extended Family	11.75	6.26	6.38	6.74	6.56	7.29	8.11	6.69
Friends	4.64	7.24	5.62	7.77	2.82	6.23	6.45	8.00

Note: M = mean, SD = standard deviation, ART = Assisted reproduction conception, SC = spontaneous conception, C1 = first/innermost circle of the Convoy Model, C2 = second circle of the Convoy Model, ES = emotional support, IS = instrumental support, data on nuclear family consult figures

The time main effect was not significant for extended family ($F(1,44) = 1.15$, $p = .289$, $\eta^2 = .03$) but there was a significant multivariate interaction effect between time and group (Pillai's Trace = .16, $F(2,43) = 3.97$, $p = .026$, $\eta^2 = .16$) regarding perceived emotional support from extended family

($F(1,44) = 7.11, p = .011, \eta^2 = .14$). Men that conceived through ART reported a decrease in perceived emotional support from pregnancy to the postpartum period ($F(1,44) = 6.71, p = .013, \eta^2 = .27$) whereas this differences was not significant in men that conceived spontaneously ($F(1,44) = 1.33, p = .256, \eta^2 = .05$).

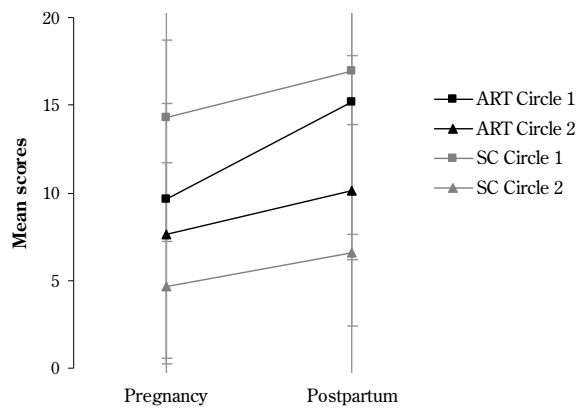


Figure 5.5. Men's perceived emotional support from nuclear family by each circle of the Convoy

A multivariate main effect for circle was found (Pillai's Trace = .46, $F(2,43) = 18.12, p < .001, \eta^2 = .46$). Men perceived more emotional support from nuclear family ($F(1,44) = 24.24, p < .001, \eta^2 = .36$) and less support from extended family ($F(1,44) = 9.28, p = .004, \eta^2 = .17$) located in C1 of the convoy than in C2.

The circle main effect was qualified by a significant multivariate interaction effect between group and circle (Pillai's Trace = .16, $F(2,43) = 4.07, p = .024, \eta^2 = .16$), regarding emotional support perceived from nuclear family ($F(1,44) = 5.55, p = .023, \eta^2 = .11$). In C1, men in the ART group perceived less emotional support from nuclear family ($F(1,43) = 4.20, p = .046, \eta^2 = .09$) than men in the SC group. In C2, they perceived more emotional support from nuclear family ($F(1,43) = 4.83, p = .033, \eta^2 = .10$; see Figure 5.5) than

men in the SC group.

The multivariate main effect for group (Pillai's Trace = .00, $F(2,42) = 0.05$, $p = .953$, $\eta^2 = .00$), the interaction effect for time by circle (Pillai's Trace = .03, $F(2,43) = 0.69$, $p = .506$, $\eta^2 = .03$) and the three-way-interaction (Pillai's Trace = .058, $F(2,43) = 1.32$, $p = .277$, $\eta^2 = .06$) were not significant.

In summary, transition to parenthood was associated with an overall increase in perceived emotional support from nuclear family members for men and women and a decrease in emotional support from extended family for all women, and men in the ART group. The circle effects demonstrated that for women and men in the ART group emotional support from nuclear family members located in C2 was higher when compared with women and men that conceived spontaneously. For men that conceived through ART, nonetheless, emotional support from nuclear family members located in C1 was lower, when compared to men that conceived spontaneously.

Instrumental Support from the Social Network during Pregnancy and Postpartum

Table 5.6 shows perceived instrumental support from extended family and friends during pregnancy and postpartum, for both women that conceived through ART and spontaneously.

For women, a significant multivariate time effect was found (Pillai's Trace = .159, $F(3,55) = 3.47$, $p = .022$, $\eta^2 = .16$). From pregnancy to postpartum, women reported an increase in perceived emotional support from nuclear family ($F(1,57) = 7.94$, $p = .007$, $\eta^2 = .12$; see Figure 5.6). The time effect was not significant for extended family ($F(1,57) = 0.35$, $p = .5577$, $\eta^2 = .01$) or friends ($F(1,57) = 0.49$, $p = .485$, $\eta^2 = .01$).

Table 5.6. Perceived instrumental support from extended family and friends by each circle of the Convoy for both women that conceived through ART and spontaneously (N=59)

	Pregnancy				4 months postpartum			
	ART		SC		ART		SC	
	n = 31		n = 28		n = 31		n = 28	
	M	SD	M	SD	M	SD	M	SD
C1								
Extended Family	1.93	3.85	2.95	4.23	0.77	2.42	3.46	6.11
Friends	0.03	0.18	0.14	0.76	0.00	0.00	0.39	2.08
C2								
Extended Family	4.48	4.14	4.18	4.06	3.60	4.29	4.38	5.02
Friends	2.48	3.23	3.06	4.30	1.84	3.03	4.53	6.22

Note: M = mean, SD = standard deviation, ART = Assisted reproduction conception, SC = Spontaneous conception, C1 = first/innermost circle of the Convoy Model, C2 = second circle of the Convoy Model, ES = emotional support, IS = instrumental support, data on nuclear family consult figures

A significant multivariate effect was found for circle (Pillai's Trace = .710, $F(3,55) = 44.92$, $p < .001$, $\eta^2 = .71$). More support was perceived from nuclear family ($F(1,57) = 66.47$, $p < .001$, $\eta^2 = .54$) and less from extended family ($F(1,57) = 13.62$, $p = .001$, $\eta^2 = .19$) and friends ($F(1,57) = 51.92$, $p < .001$, $\eta^2 = .48$) located in C1 than in C2 of the convoy.

The circle main effect was qualified by a significant interaction effect between group and circle (Pillai's Trace = .134, $F(3,55) = 2.82$, $p = .047$, $\eta^2 = .13$) regarding nuclear family ($F(1,57) = 6.56$, $p = .013$, $\eta^2 = .10$) and friends ($F(1,57) = 3.09$, $p = .084$, $\eta^2 = .05$). While in C1 no differences were found between groups regarding perceived instrumental support from nuclear family ($F(1,56) = 0.41$, $p = .525$, $\eta^2 = .01$), in C2 women that conceived through ART perceived more instrumental support from nuclear family than women that conceived spontaneously ($F(1,56) = 3.53$, $p = .065$, $\eta^2 = .06$). In both C1 and C2 of the convoy, women that conceived through ART also perceived less instrumental support from friends than women that conceived spontaneously, but this association was stronger regarding C1 ($F(1,56) = 6.35$, $p = .015$, $\eta^2 = .16$) than C2 ($F(1,56) = 3.92$, $p = .053$, $\eta^2 = .07$).

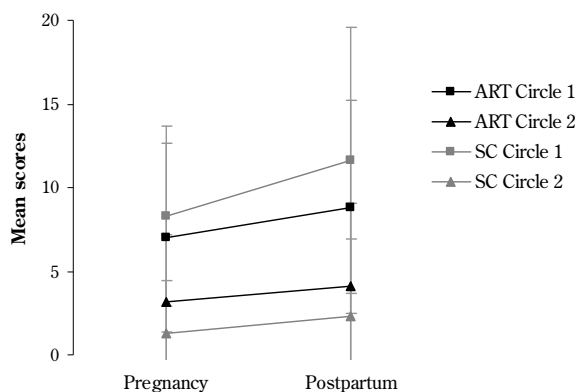


Figure 5.6. Women’s perceived instrumental support from nuclear family by each circle of the Convoy

The multivariate effect of group (Pillai’s Trace = .097, $F(3,54) = 1.92$, $p = .137$, $\eta^2 = .10$), interaction effects of time by group (Pillai’s Trace = .059, $F(3,55) = 1.14$, $p = .340$, $\eta^2 = .06$), time by circle (Pillai’s Trace = .024, $F(3,55) = 0.46$, $p = .713$, $\eta^2 = .02$) and the three-way-interaction (Pillai’s Trace = .022, $F(3,55) = 0.41$, $p = .743$, $\eta^2 = .02$) were not significant.

Table 5.7 shows perceived instrumental support from extended family and friends during pregnancy and postpartum, for both men that conceived through ART and spontaneously.

For men, a significant multivariate time effect was found (Pillai’s Trace = .246, $F(2,43) = 7.03$, $p = .001$, $\eta^2 = .23$). Perceived instrumental support from nuclear family increased from pregnancy to postpartum ($F(1,44) = 13.39$, $p = .001$, $\eta^2 = .23$; see Figure 5.7). The main effect of time was not significant for extended family ($F(1,44) = 1.74$, $p = .194$, $\eta^2 = .04$).

Table 5.7. Perceived instrumental support from extended family and friends by each circle of the Convoy for both men that conceived through ART and spontaneously (N=46)

	Pregnancy				4 months postpartum			
	ART		SC		ART		SC	
	n = 22		n = 24		n = 22		n = 24	
	M	SD	M	SD	M	SD	M	SD
C1								
Extended Family	1.97	4.45	2.56	3.72	3.05	6.64	3.93	5.26
Friends	0.77	2.51	0.88	2.58	0.86	3.44	0.00	0.00
C2								
Extended Family	5.95	4.55	3.00	4.14	4.93	6.67	4.42	4.75
Friends	0.70	1.52	2.17	3.90	0.86	2.46	2.78	3.99

Note: M = mean, SD = standard deviation, ART = Assisted reproduction conception, SC = spontaneous conception, C1 = first/innermost circle of the Convoy Model, C2 = second circle of the Convoy Model, ES = emotional support, IS = instrumental support, data on nuclear family consult figures

A significant multivariate effect was found for circle (Pillai's Trace = .32, $F(2,43) = 10.33$, $p < .001$, $\eta^2 = .33$). More instrumental support was perceived from nuclear family located in C1 of the convoy than located in C2 ($F(1,44) = 15.15$, $p < .001$, $\eta^2 = .26$). On the contrary, less instrumental support was perceived from extended family members located in C1 than located in C2 ($F(1,44) = 5.19$, $p = .028$, $\eta^2 = .11$).

The multivariate effect of group (Pillai's Trace = .08, $F(2,42) = 1.73$, $p = .190$, $\eta^2 = .08$), interaction effects of time by group (Pillai's Trace = .08, $F(2,43) = 1.98$, $p = .151$, $\eta^2 = .08$), group by circle (Pillai's Trace = .10, $F(2,43) = 2.48$, $p = .100$, $\eta^2 = .10$), time by circle (Pillai's Trace = .02, $F(2,43) = 0.41$, $p = .667$, $\eta^2 = .10$) and the three-way-interaction (Pillai's Trace = .01, $F(2,43) = 0.21$, $p = .809$, $\eta^2 = .01$) were not significant.

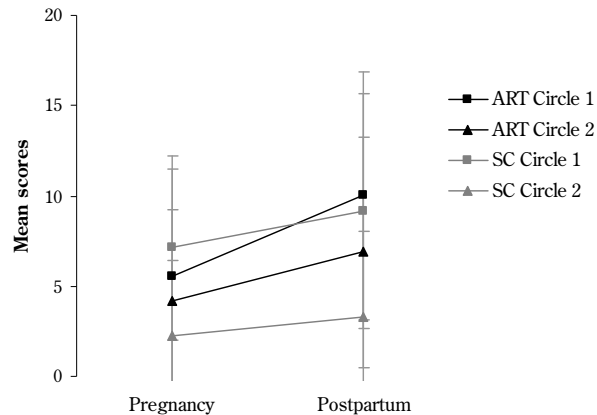


Figure 5.7. Men's perceived instrumental support from nuclear family by each circle of the Convoy

In summary, men and women perceived instrumental support from nuclear family to increase from pregnancy to the postpartum whereas there was no change in the support provided by extended family and friends [for women]. Group effects showed that women in the ART group perceived more instrumental support from their nuclear family members located in C2 of the convoy, but less instrumental support from friends located in both circles, when compared to women in the SC group. Men and women also perceived less instrumental support from extended family members located in C1 than from locate in C2 of the convoy, and men perceived more instrumental support from nuclear family members located in the C1 than in C2.

Discussion

The main finding from this prospective study was that during the transition to parenthood parents showed a strong social nesting movement that consisted in drawing towards them their nuclear family members, from

whom they perceived increased emotional and instrumental support across the transition. This nesting movement was found to be similar for women and men whether they conceived through assisted reproduction or spontaneously. Thus, regardless of conception method, the birth of a child was seen to strengthen nuclear family ties, thereby potentially promoting the creation of the intimate and supportive environment believed to enhance parenting and, consequently, child development (Belsky & Jaffee, 2006). The results also provided support for the Convoy Model (Kahn & Antonucci, 1980) via differential effects in network size and support level in innermost versus outer circles of the convoy.

The strengths of the present study were its prospective nature, inclusion of both parents in 88% of participants and the use of a conceptual framework from which to consider close social relationships that allowed for analyses to be made with a significant level of complexity. By articulating network members' degree of intimacy with type of relationship (nuclear family, extended family, and friends) and by considering both structural (size) and functional characteristics (emotional and instrumental support) of the convoy, a deeper view of the social nesting movement was possible. However, the prospective design and the use of such a complex social support measure had implications on the sample size. Power analyses showed that only medium to large effects could be detected and although typical for psychological studies (Cohen, 1962) it does mean that smaller effects could have been ignored.

Participants were recruited in a single major public hospital and may not be representative of the ART or SC populations in other clinics though the educational level and socioeconomic status reported here were similar to Portuguese national levels. Despite these limitations, the results produced expected associations (e.g. highest scores of perceived support regarded nuclear family members included in C1). Consequently, we are confident that the associations reported here are valid.

The results demonstrate clearly and in accordance with previous research (Belsky & Rovine, 1984; Bost, Cox, & Payne, 2002; Power & Parke, 1984) that parents direct their nesting efforts particularly on nuclear family members. It seems important to note that we had not hypothesized an in-

crease in nuclear family size because we considered them to be stable over time. The fact that their size increased reveals that even the strongest filial relationships may be the subject of change during important life transitions.

Contrary to what was expected, all women, and men that conceived through ART reported a decrease in the number and perceived emotional (but not instrumental) support from extended family members. Few previous studies differentiated between nuclear and extended family, but Belsky and colleagues (1984) had already reported a decrease in contact with other relatives that were not part of family of origin, although only from three to nine months postpartum. It may be that with the birth of the child, parents grow more distant from extended family, as they focus on the baby. They may then not feel comfortable confiding or asking for advice or reassurance from extended family members but expect or accept other types of instrumental help that do not imply a significant level of intimacy. Thus, the participation of extended family members in the social nest may be role dependent.

It seems, therefore, that the social nesting movement is essentially a familial one, with parents and siblings as its main actors and other family members having secondary roles in providing instrumental help. A secondary effect of this familial nesting may be a withdrawal from friends, as was hypothesised and as there were slight indications of (for women the number of friends included in C2 of the convoy decreased), but the fact that no analyses were made regarding men do not allow us to state this fact with full confidence for them.

In the future it seems important to better describe this nesting phenomenon. Complex measures such as the Convoy Model seem adequate for the purpose, but larger multicultural samples should be considered, just as longer postpartum assessment periods. A more comprehensive view of the social nesting is also advisable, as it may help to understand how parents influence their child's own formation of relational ties, beyond exclusive dyadic attachment relationships.

Few differences were found regarding the nesting of parents in the ART group when compared to SC families. For women they concerned higher levels of perceived emotional and instrumental nuclear family support in C2

and lower levels of instrumental friends' support. For these women the birth of the child may draw the attention of nuclear family members regardless of their closeness because of long-standing expectations regarding family descendents and filial ties to the newborn that are finally met with the birth of the child. Alternatively (or simultaneously) these mothers may simply be so enthusiastic about the newborn (Golombok et al., 1996) that they project more their own feelings of happiness onto nuclear family members than do those conceiving naturally. Nonetheless, this late "out-of-synch" pregnancy also reflects in lower perceived support from friends, as hypothesized.

The pattern of results indicated that men in the ART group had an impoverished innermost circle but enriched outer network. From the design of this study one cannot say whether this result was due to a character difference or one that emerged as a result of fertility problems. There is evidence in the fertility literature that men withdraw from social networks as they experience longer durations of childlessness (Peronace, Boivin, & Schmidt, 2007) and perhaps this distancing persists even after the fertility problem has been resolved. However, this does not mean that they do not perceive support, but that support is perceived from less intimate nuclear family members (compared to SC men, they reported higher levels of emotional support from nuclear family in C2).

Either way, it is important to note that this scenario happens within a broader one of strong nesting with nuclear family members. Indeed, present results add up to the emerging literature that points to an overall positive adjustment of ART parents and for a lack of significant differences regarding early parenting between these parents and those parents that conceive spontaneously (cf. Hammarberg, Fisher, & Wynter, 2008).

In general, results were consistent for men and women. Previous research had also pointed to similar nesting patterns across gender with the exception of friendship relations (e.g. Belsky, 1984), but in the present study these could not be analysed for men. Given the different parenting gender associated roles (Cowan & Cowan, 2000), this lack of overall differences may reflect a nesting movement that is not only activated as a function of perceived stress (e.g. Power & Parke, 1984) but, as already sug-

gested, in response to a desire shared by both parents to build a protective social environment for the newborn.

Results also provided evidence that validates the Convoy Model. The inner circle of the convoy was mostly composed of nuclear family members, i.e. attachment figures, while C2 included, besides other nuclear family members, especially extended family members and friends (Kahn & Antonucci, 1980). Also, generally the highest scores of perceived support regarded nuclear family members included in C1 of the convoy (Levitt, 1991). Although we did not find that changes across time were more noticeable regarding C2, the majority of group differences found and stated above concerned only this second circle, which supports the idea that most intimate network members are more stable than less intimate ones (Levitt, 2005).

We also found that, generally, support from nuclear family was higher regarding members included in C1 than in C2 of the convoy, and support from extended family and friends was lower regarding members included in C1 than in C2. While results concerning nuclear family are consistent with model predictions, those concerning extended family and friends are inconsistent but this may be due to the methodological artefact. The model predicts inequality in the distribution of relationship types (i.e., extended, nuclear, friends) between the two circles, that is, it predicts more nuclear family in C1 and more extended family and friends in C2. At an extreme this could mean that someone would report not having friends or extended family at all in C1 and that would skew support ratings. When we exclude participants who did not include any network members in a given circle then support mean values are as expected, i.e., higher concerning C1.

In conclusion, the present study has important theoretical implications. Besides adding to empirical evidence that validates the Convoy Model, it documents parents' social nesting movement and the central role that nuclear family members play in it. Besides the strong provision of support, nuclear family sets the stage in which the newborn develops, functioning as 'secondary attachment figures' (Cochran & Brassard, 1979).

Chapter 6

Study III. Social Network Support and Parenting Stress and Investment in the Child in Mothers and Fathers that Conceived Spontaneously or through Assisted Reproductive Technologies: A Prospective Controlled Study

The purpose of the present study was to examine the role of perceived network support on parenting stress and investment in the child in parents that conceived spontaneously or through Assisted Reproductive Technologies (ART), during their transition to parenthood.

Thirty five couples that conceived through ART and 31 couples that conceived spontaneously completed self-report questionnaires regarding perceived emotional and instrumental support from their social network members (i.e. nuclear and extended family members and friends) during pregnancy (twenty-fourth week) and regarding parenting stress and investment in the child four months after the partum.

Results showed that, independently of method of conception, perceived instrumental support from nuclear family associated with maternal investment in the child and that perceived emotional and instrumental support from extended family members and friends were associated with paternal parenting stress.

These results substantiate the claim that there are more similarities than differences in the parenting experience of couples that conceived through ART and spontaneously, not only at the dyadic level but also at a more ecological level. Results also add to empirical research that shows that parenting is affected by other social factors beyond the parents' dyad and, as such, their contribution should be taken into account.

Key-words: Infertility; Assisted Reproductive Technologies; Social Support; Adjustment to Parenthood; Parenting.

Introduction

In view of the now fairly documented distress experienced by infertile couples that undergo assisted reproduction in order to achieve pregnancy (Cousineau & Domar, 2007; Greil, 1997; Verhaak et al., 2007), several studies have tried to examine the role of social relationships in this context. Although results found suggest that support from both formal (health professionals) and informal (social network members) providers seems to be beneficial when couples first attend an infertility clinic (Slade et al., 2007) and during treatment (Boivin, 2003; Wischmann, 2008), little is known about its value after pregnancy is achieved.

This apparent lack of interest in the social relationships of parents that conceive through Assisted Reproductive Technologies (ART) is, in our perspective, the result of a tendency of the field research literature to focus almost exclusively on the couple and parents-child dyads (cf. Hammarberg, Fisher, & Wynter, 2008), lacking a more ecological perspective that takes into account different environmental levels and sources of influence, such as the closer social system where the family is embedded, which would allow for a better understanding of the parenting process and outcomes (Belsky, 1984; Belsky & Jaffee, 2006; Bronfenbrenner, 1979).

This closer social system or social network, i.e. the set of relationships perceived by the individual to be close and important to his or her life, is assumed to have positive effects, helping individuals meet the challenges of life and influencing their health status (Kahn & Antonucci, 1980). This influence operates through different mechanisms, being social support the most frequently cited and studied (Berkman et al., 2000). Social support refers to the level of resources provided by the network in the form of emotional availability, caring and acceptance (i.e. emotional support) or of prac-

tical help with every-day tasks (i.e. instrumental support, Due et al., 1999; Wills & Shinar, 2000).

Although research literature suggests that the emotional adjustment to pregnancy and early parenthood of couples that conceived through ART and spontaneously is similar (Hammarberg, Fisher, & Wynter, 2008), there is evidence suggesting that the social context and needs of these two groups of parents may differ. Either due to the long and repeated treatments infertile couples usually have to undertake in order to achieve conception or due to the increased obstetrical risks associated to pregnancy after ART (Helmerhorst et al., 2004), parents that conceive through assisted reproduction seem to exhibit a self-protective delay believing in their pregnancy and confiding in others about it (Hammarberg, Fisher, & Wynter, 2008; McMahan et al., 1999). This means that although these parents may have increased concerns about pregnancy loss and foetal health (Hjelmstedt et al., 2003b), they restrain from discussing them and may therefore not experience adequate support.

The fact that parenthood is wished for so long and usually takes a long time to be achieved also has its repercussions, as it is suggested that parents that conceive through ART may idealize parenthood, and consequently have difficulty adapting to the realities of child rearing (Barnes et al., 2004). Coherently, there is empirical evidence showing that, compared to parents with a spontaneous conception (SC), parents that conceive through ART show less self-confidence and confidence in their parenting abilities, four and twelve months after the birth of their child (Gibson et al., 2000b; McMahan et al., 1997b) and may thus be in need of increased reassurance and help from significant others regarding child care issues.

This review suggests that, because their path to parenthood is different, parents that conceived through ART may be in need of increased support regarding parenting issues but lack intimate relationships that could be of assistance.

The purpose of the present study was to examine the relations between perceived emotional and instrumental social support and parental adjustment and care during the transition to parenthood in parents that conceived spontaneously or through ART.

Parental adjustment or well-being was conceptualized considering the magnitude of stress associated to infant care and parenthood, that is, considering parenting stress. Parental care was conceptualized as the parents' investment in the child, a measure of the parents' attitudes towards child-bearing and their child that is expected to shape both parents' identity as caregivers and the process of caregiving itself (Bradley, Whiteside-Mansell, & Brisby, 1997). Empirical research has validated this claim by showing that parental investment in the child associated positively with behavioural observations of parental positive interactions with the child and negatively with behavioural observations of parental negative interactions for both mothers and fathers (Cox et al., 2004) and that it has predictive value for infant-parent security attachment (Cox et al., 1992a).

Social support is said to influence parenting both directly, through the direct provision of assistance and advice regarding the tasks and responsibilities of parenting, and indirectly, through expressions of affection and encouragement and through the provision of practical help that are likely to have a positive impact on parents' well-being and thus can indirectly impact parenting (Simons & Johnson, 1996). Coherently studies have documented positive associations between social support and parents' well-being and their investment in their child (e.g. Bradley, Whiteside-Mansell, & Brisby, 1997; Corwyn & Bradley, 1999; Goldstein, Diener, & Mangelsdorf, 1996).

In the present study indirect, i.e. through its association with parental adjustment, and direct associations between social support and parenting were examined. This examination took into account the fact that social support can be provided by different social actors and thus three different categories of support providers were considered: nuclear family (parents and siblings), extended family (parents-in-law and other relatives) and friends, which were expected to have different support value for couples that conceived through ART and spontaneously.

Although several studies have documented the value of support from extended family members and friends in parenting (Crnic & Greenberg, 1990; Leinonen, Solantaus, & Punamäki, 2003; Richardson, Barbour, & Bubenzer, 1991), nuclear family members are regarded as more important support providers for new parents because they have strong filial ties with

the parents and the newborn and are usually more frequently inside the household (Belsky & Rovine, 1984; Antonucci, Akiyama, & Takahashi, 2004). Their support has proved to be especially important during the transition to parenthood, when couples are still adapting to their new parenting role and, women in particular, tend to focus on childbearing issues and diminish their social activities (Belsky & Rovine, 1984; Cowan & Cowan, 2000; Levitt, Weber, & Clark, 1986).

In the specific case of parenthood after assisted reproduction, support from nuclear family members may have an even stronger value than when conception is achieved spontaneously because nuclear family members are usually aware of the couples' previous infertility problems (Peronace, Boivin, & Schmidt, 2007; van Balen, Trimbos-Kempre, & Verdurmen, 1996) and might also have had expectations regarding their achievement of parenthood. As such they may be particularly motivated and have adequate knowledge of the specificities of these parents' atypical pathway to parenthood in order to provide sensitive and adequate help.

For several reasons, the same may not happen with other family members and friends. Achieving parenthood later in their life cycles, couples that conceived through ART may find that their friends have all gone through this life transition earlier and may not be available to confide or provide advice or reassurance (Munro, Ironside, & Smith, 1992). When support is provided, there is also the question of its necessary adequacy, as support is only valuable to the point that it addresses those particular needs that arise from a specific situation (Cohen & Wills, 1985). Receiving adequate support may imply disclosing the method of conception and parents may not be willing to do so to less intimate family members and friends because they may still remember the sense of stigma associated to infertility (Slade et al., 2007). Even if they do choose to disclose that they conceived through ART, contrary to their expectations, they may receive un-supportive responses (e.g. insensitive questions, moral judgments, punitive comments, Ellison & Hall, 2003; Mindes et al., 2003).

With this review in mind, we hypothesized that emotional and instrumental support from nuclear family members would be negatively associated with parenting stress and positively associated with parental invest-

ment in the child, but stronger associations were expected for those parents that conceived through ART. Emotional and instrumental support from extended family members and friends would also be negatively associated with parenting stress and positively associated with parental investment in the child, but weaker associations were expected for those parents that conceived through ART. In other words, method of conception was expected to moderate the relationships between support and parental adjustment and investment in the child, in the case of perceived family support by strengthening those relations, and in the case of perceived extended family and friends support by weakening those relations. Instrumental support, i.e. practical help, was expected to be of special value to mothers, who are much more involved in the daily care and supervision of children.

Method

Participants and Procedures

This study was approved by the Ethics Committee of the University of Coimbra Hospitals.

The final sample consisted of 35 couples that conceived through ART and 31 couples that conceived spontaneously.

Couples that conceived through ART and spontaneously were recruited during their first month of pregnancy while attending their obstetrical consultation at the Genetics and Human Reproduction Service and at the Dr. Daniel de Matos Maternity, respectively, both in the University of Coimbra Hospitals. When recruiting participants, a full explanation of the research objectives, the participants' role and the researchers' obligations were given. Inclusion criteria were age (18 years or older), nulliparity, singleton pregnancy and literacy skills to complete the assessment protocol.

If participants agreed to collaborate, they filled a consent form and were later contacted prior to their twenty-fourth pregnancy week (first assessment point), while attending their obstetric consultation. Questionnaires were then delivered with the instructions that they should complete them separately during the following week and bring them to the next consultation. One week before the second assessment point (four months postpar-

tum), questionnaires were sent by mail together with a preaddressed envelope, and parents were instructed to complete them separately and post them back to the research team. Within a week, a phone text message was sent requesting parents to return the questionnaires and within two weeks a phone call was made with the same goal.

A total of 136 couples (66 that conceived through ART and 70 with a SC) were initially contacted. From the ART group, 11 couples never delivered the questionnaires, 8 couples had multiple pregnancies and 3 lost their pregnancies prior to the assessment moment. From the remaining 44 couples, only 39 women and 35 men also completed the questionnaires at 4 months (participation rate of 66.66%, attrition rate from pregnancy to postpartum assessment points of 14.77%). From the SC group, 20 couples never delivered the questionnaires and, from the remaining 50, only 33 women and 32 men also completed the questionnaires at 4 months postpartum (participation rate of 71.43%, attrition rate from pregnancy to postpartum assessment points of 35%). Women that did not deliver questionnaires after the partum were younger ($t(1, 89) = -2.36, p = .021$) than those who did. No differences were found between those men that did and did not deliver the questionnaires four months after the partum. In the present study we only considered those couples in which both partners completed the questionnaires at both assessment points, which corresponded to a participation rate of 53.03% for the ART group and of 44.29% for the SC group.

Sample socio-demographic characteristics are presented in Table 6.1. Women that conceived with ART were older than women that conceived spontaneously ($t(1, 64) = 6.63, p < .001$) and were with their partner for a longer time ($t(1, 64) = 9.98, p < .001$). Men that conceived with ART were also older than men that conceived spontaneously ($t(1, 64) = 5.92, p < .001$) and were with their partner also for a longer time ($t(1, 64) = 9.96, p < .001$). No significant differences were found between the ART and SC groups regarding education, socioeconomic status and women's employment status after the partum.

Table 6.1. Sample socio-demographic characteristics (N=132)

	Women				Men				t	χ ²	χ ²
	ART n=35	SD	Mean	SC n=31	ART n=35	SD	Mean	SC n=31			
Age	33.09	2.853	26.52	4.816	35.11	3.802	28.90	4.721	6.63***	5.92***	5.92***
Years in current relationship	7.71	2.198	2.96	1.583	7.71	2.198	2.96	1.583	9.98***	9.96***	9.96***
Education	n	%	n	%	n	%	n	%	n	%	χ ²
Primary	2	5.7	5	16.1	5	14.3	5	16.1	5	16.1	
Secondary Junior	5	14.3	4	12.9	5	14.3	11	35.5	3.50 ^a	4.58	
Secondary Senior	9	25.7	11	35.5	16	45.7	9	29.0			
University	19	54.3	11	35.5	9	25.7	6	19.4			
Socioeconomic status											
Medium low	10	28.6	15	48.4	10	28.6	16	51.6			
Medium	10	28.6	8	25.8	10	28.6	7	22.6	3.12	3.82	
Medium high	15	42.9	8	25.8	15	42.9	8	25.8			
Employment status (four months postpartum)											
Working	8	25.9	10	33.3							
Childbirth leave /unemployment/vacations	23	74.2	20	66.7					.415		

Note: *p < .05, **p < .01, ***p < .001, ^aCramer's V, SD = standard deviation, ART = Assisted Reproductive Technologies, SC = spontaneous conception

Couples that conceived through ART were trying to achieve pregnancy for an average of 5 years (mean = 5.18, sd = 2.61, range 1-15) and had done on average one in vitro fertilization treatment (mean = 1.16, sd = 1.08, range 0-4). Twelve (34.29%) couples were diagnosed with female infertility, 10 (28.57%) with mixed infertility, 8 (22.86%) with male infertility and 3 (8.57%) with idiopathic infertility.

The two groups were also compared regarding obstetrical and perinatal data. The frequency of male infants conceived spontaneously was significantly higher than those conceived by ART ($\chi^2(1, 66) = 4.29, p = .034$). There were no significant group differences concerning the occurrence of problems during pregnancy, mode of delivery and the baby's gestational age and birth weight.

Materials

Social support was assessed at the twenty-fourth pregnancy week using the Portuguese version of the Convoy Model diagram (Kahn & Antonucci, 1980). Network information was obtained by asking individuals to map their relations hierarchically onto a concentric circle diagram. Participants were asked to place in the innermost circle (C1) those individuals who are "so close that it's hard to imagine life without them", in the second circle (C2) "those that are not quite as close, but are still very important" and in the third circle (C3) those that are "not quite as close, but still important". Network members were described by the type of relationship they had with participants and this description was used to assign the member to the nuclear family (parents and siblings), extended family (in-laws and other relatives) or friends category.

After completing the Convoy diagram, participants were asked to rate, from 0 (no relations included in the convoy and/or no perceived support from included relations) to 5 (maximum perceived support), perceived support regarding eight different support functions for each person included in C1 and C2 of the convoy (to a total maximum of 12 persons). Factorial analyses on 119 persons from general population (university students, their relatives and friends) revealed two support dimensions, emotional (four items; e.g., confiding about important things) and instrumental (four

items; e.g., helping with household tasks) with good internal consistency, test-retest reliability and good construct validity (Gameiro et al., 2008b). In the present sample, Cronbach alpha coefficients for emotional support in women and men were of .88 and .84 and for instrumental support were of .73 and .77, respectively. Two average summed scores (for the four items of emotional and four items of instrumental perceived support) were calculated for each type of relationship (nuclear family, extended family, friends). These values ranged from 0 (minimum perceived support) to 20 (maximum perceived support).

Parenting stress was assessed four months after the partum with the Portuguese version of the Parenting Stress Index - PSI (Abidin, 1983), a measure of the magnitude of stress existing in the parent-child system. The Portuguese version of this instrument, with 104 items, proved to be valid and reliable (Santos, 2008). The total stress score ranges from 104 (minimum stress) to 520 (maximum stress) and in the present sample, Cronbach alpha coefficients were of .93 for women and of .87 for men.

Parental investment in the child was assessed four months after the partum with the Portuguese version of the Parental Investment in the Children – PIC (Bradley, Whiteside-Mansell, & Brisby, 1997) scale, a 19-item questionnaire designed to assess parents' socioemotional investment in their children, that ranges from 4 (minimum investment) to 76 (maximum investment). The Portuguese version of the scale revealed good internal consistency (.73) and good test-retest reliability (.89, Gameiro, Martinho, Canavaro, & Moura-Ramos, 2008a). In the present sample Cronbach alpha coefficients for the total index were of .75 for women and of .80 for men.

Socioeconomic status was measured considering five categories (low, e.g. house maids; medium-low, e.g. non-specialized workers; medium, e.g. small companies' owners; medium-high, e.g. high school and university professors; and high, e.g. government or private companies administrators), defined in terms of achieved education level and current profession (Neves, 2007). Education referred to the highest education level participants had achieved (primary, secondary junior, secondary senior, university). Obstetrical and perinatal data (occurrence of obstetrical complications

during pregnancy; mode of delivery; gender, gestational age and birth weight of the baby) were collected from the women's medical records.

Statistical Analyses

Data were statistically analysed using SPSS, v.15.0.

Missing data were random and low level (<5%) and were therefore handled by simple group means substitution. Demographic data were not substituted.

Analyses were conducted separately for men and women.

In a first moment, product moment correlations were calculated between social support scores and parenting stress and parental investment in the child. Product moment and point-biserial correlations were also calculated regarding those socio-demographic and child related variables for which the ART and SC group differed (i.e. age, years in current relationship and gender of the baby), so that they could be controlled for in the regression models.

In order to investigate the associations between support from the three different categories of providers considered and parenting stress and investment in the child and to see if these associations varied across method of conception, several hierarchical regression models (method enter) were developed. Because perceived instrumental and emotional support scores were highly correlated (Pearson r scores varied between .752 and .838 for women and between .706 and .811 for men) and this would create a collinearity problem, separate regression models were developed for instrumental and emotional support. As such, for each gender, two separate hierarchical regressions were performed for parenting stress (one including perceived emotional support scores from nuclear family, extended family and friends and other including perceived instrumental support scores from nuclear family, extended family and friends) and two for parental investment in the child (with the same independent variables).

Following Aiken and West (1991) recommendations, in each regression model the main effects of support from the different categories of providers considered (i.e. nuclear and extended family and friends) and of the mod-

erator (method of conception: 0=SC; 1=ART) were entered on the first step of the regression (unless there were socio-demographic variables that needed to be controlled and were thus entered in the first step of the model, in which case the regression model had one more step). The products of method of conception and each on the support sources scores (i.e. interaction terms) were entered on the following step. Continuous variables, i.e. all instrumental and emotional support scores, were transformed to standard scores to reduce collinearity between the main effect and product terms.

Results

Table 6.2 shows means, standard deviations and Pearson's correlation indexes between social support scores, control (socio-demographic and child related) variables and parenting stress and parental investment in the child for all women and men.

Parents' age and years in current relationship and the child's gender were not significant correlated to parenting stress and parental investment in the child, neither for women nor men, and were thus not included in the regression models developed.

Table 6.2. Mean, standard deviations and zero-order correlations among study variables, for women and men (N=132)

Variables	Mean (SD)				Correlations				
	Women		Men		Women n=66		Men n=66		
	ART n = 35	SC n = 31	ART n = 35	SC n = 31	11	12	11	12	
Control variables									
1. Age									
2. Years in current relationship									
3. Gender of the baby ^a									
Social support									
4. Nuclear family – ES	15.31 (4.24)	15.15 (5.54)	14.60 (5.21)	15.83 (4.16)	-.064	.234†	.128	.057	
5. Nuclear family – IS	8.83 (3.33)	8.82 (4.55)	7.93 (4.12)	8.63 (3.75)	-.015	.301*	.154	-.015	
6. Extended family – ES	10.47 (6.68)	10.79 (6.63)	11.65 (6.53)	9.54 (6.05)	.032	.088	.225†	.022	
7. Extended family – IS	5.34 (4.28)	4.77 (4.21)	5.71 (4.16)	4.17 (3.39)	-.014	.182	.286*	.008	
8. Friends – ES	8.83 (8.09)	8.08 (8.33)	5.31 (6.79)	6.09 (7.48)	-.070	-.111	-.184	-.016	
9. Friends - IS	2.81 (3.20)	3.23 (4.51)	1.38 (2.40)	2.28 (3.70)	.022	-.075	-.170	.074	
Parental adjustment									
11. Parenting stress	232.76 (33.25)	229.87 (30.91)	225.76 (30.63)	232.26 (20.03)					
Parental care									
12. Parental investment child	55.03 (6.26)	55.42 (4.30)	54.91 (6.87)	54.54 (4.45)					

Note: † p < .10. * p < .05. ^a 0 = female, 1 = male, 1 = spontaneous conception, SC = standard deviation, SC = assisted reproductive techniques

Parenting Stress

For women, the overall regression model including main effects from emotional support from nuclear and extended family and friends was not significant ($F(4, 61) = .235$; $p = .918$; Adjusted $R^2 = .00$). The regression model that included both main and interaction effects was also non significant ($F(7, 58) = .749$; $p = .632$; Adjusted $R^2 = .00$).

The regression model that included main effects from instrumental support from nuclear and extended family and friends was also non significant ($F(4, 61) = .054$; $p = .994$; Adjusted $R^2 = .00$), and neither was the regression model that included both main and interaction effects ($F(7, 58) = .909$; $p = .506$; Adjusted $R^2 = .00$).

Table 6.3 presents significant hierarchic regression analyses for fathers' parenting stress.

For men, the overall regression model including main effects from emotional support from nuclear and extended family and friends was significant ($F(4, 61) = 2.716$; $p = .038$). Both emotional support from extended family ($\beta = .334$; $p = .016$) and friends ($\beta = -.283$; $p = .026$) were associated with parenting stress, explaining 10% of its total variance. The addition of the interaction terms to the regression model did not significantly contribute to an increase in the total of explained variance ($F \text{ change}(3, 58) = .173$; $p = .914$; $R^2 \text{ change} = .008$).

The overall regression model including main effects from instrumental support from nuclear and extended family and friends was significant ($F(4, 61) = 3.303$; $p = .016$). Both emotional support from extended family ($\beta = .367$; $p = .006$) and friends ($\beta = -.255$; $p = .037$) were associated with parenting stress, and method of conception was also marginally associated with parenting stress ($\beta = -.235$; $p = .060$). Together these variables explained 12% of the parenting stress total variance. Although the overall regression model remained significant when the interaction effects were added to the regression model ($F(7, 58) = 2.486$; $p = .027$), these did not significantly contribute to an increase in the total of explained variance ($F \text{ change}(3, 58) = 1.326$; $p = .275$; $R^2 \text{ change} = .053$).

Table 6.3. Significant hierarchic regression analyses for fathers' parenting stress (N=66).

Predictor	F	Adjusted R ²	R ² change	b	β	p
St 1: Method of conception ^a				-10.248	-.197	.115
Emotional Support from						
Nuclear family				-.125	-.005	.971
Extended family				8.899	.334	.016
Friends				-8.098	-.283	.026
	2.716	.10	.15			.038
St 2: Method of conception ^a x						
Emotional Support from						
Nuclear family						
Extended family						
Friends						
			.01			.914
Predictor	F	Adjusted R ²	R ² change	b	β	p
St 1: Method of conception ^a				-12.254	-.235	.060
Instrumental Support from						
Nuclear family				.087	.003	.979
Extended family				10.041	.367	.006
Friends				-7.626	-.255	.037
	3.303	.12	.18			.016
St 2: Method of conception ^a x						
Instrumental Support from						
Nuclear family						
Extended family						
Friends						
			.05			.275

Note: St = regression step, ^a 0 = spontaneous conception, 1 = Assisted Reproductive Technologies

Parental Investment in the Child

Table 6.4 presents significant hierarchic regression analyses for maternal investment in the child.

Table 6.4. Significant hierarchic regression analyses for maternal investment in the child (N=66).

Predictor	F	Adjusted R ²	R ² change	b	β	p
St 1: Method of conception ^a				-.604	-.056	.641
Instrumental Support from						
Nuclear family				1.516	.281	.031
Extended family				.774	.150	.263
Friends				-.866	-.175	.174
	2.219	.07	.13			.077
St 2: Method of conception ^a x						
Instrumental Support from						
Nuclear family						
Extended family						
Friends						
			.02			.665

Note: St = regression step, ^a 0 = spontaneous conception, 1 = Assisted Reproductive Technologies

For women, the overall regression model including main effects from emotional support from nuclear and extended family and friends was not significant ($F(4, 61) = 1.385$; $p = .250$; Adjusted $R^2 = .02$). The regression model that included both main and interaction effects was also non significant ($F(7, 58) = .917$; $p = .500$; Adjusted $R^2 = .00$).

The regression model that included main effects from instrumental support from nuclear and extended family and friends was marginally significant ($F(4, 61) = 2.219$; $p = .077$). Instrumental support from nuclear family

was associated to maternal investment in the child ($\beta = .281$; $p = .031$), explaining 7% of its total variance (cf. Table 6.4). The addition of the interaction terms to the regression model did not significantly contribute to an increase in the total of explained variance (F change (3, 58) = .528; $p = .665$; R^2 change = .023).

For men, the overall regression model including main effects from emotional support from nuclear and extended family and friends was not significant (F (4, 61) = .078; $p = .989$; Adjusted $R^2 = .00$). The regression model that included both main and interaction effects was also non significant (F (7, 58) = .206; $p = .983$; Adjusted $R^2 = .00$).

The regression model that included main effects from instrumental support from nuclear and extended family and friends was also non significant (F (4, 61) = .116; $p = .976$; Adjusted $R^2 = .00$), and neither was the regression model that included both main and interaction effects (F (7, 58) = .139; $p = .995$; Adjusted $R^2 = .00$).

Discussion

Findings from this prospective study substantiate that parenting is affected by other social actors beyond the parents and the parents-child dyads. Indeed, perceived social support from nuclear family during pregnancy reflected on the quality of mothering, i.e., on the mother's psychosocial investment in the child, and both emotional and instrumental support from extended family members and friends reflected on paternal adjustment, i.e. on paternal parenting stress.

Results were innovative in that they showed that the effects of social network support on adjustment to parenthood and parental care did not differ when conception was achieved through assisted reproduction, adding to empirical research that has been showing that there are more similarities than differences in the parenting experience of couples that conceive through ART and spontaneously (Colpin, 2002; Hammarberg, Fisher, & Wynter, 2008). This study's results suggest that these similarities exist not only at the dyadic level, but also when other parents' significant relationships are considered, that is, at a more ecological level.

The strengths of the present study were its prospective nature, inclusion of both members of the couple, and the fact that the ART group did not present worse obstetrical and perinatal outcomes than the SC group. Of special interest was the inclusion of different categories of social support providers that allowed for the investigation of the relative value of support at different ecological levels (i.e. nuclear family, extended family and friends). Nonetheless, sample size was small and post hoc power analyses showed that only medium to large effects could be detected (effect size = .20, $p < .10$, power = .83, G*Power, Faul et al., 2007), which means that smaller effects may have been ignored.

This study focused on the early postpartum period (four months after the partum), when couples are still adapting to their new parental role, and results showed that, independently of method of conception, perceived instrumental support from nuclear family was positively associated with maternal investment in the child. During this period women tend to be on childbirth leave (70% of the women in our sample) and to take over more household and childcare tasks (Cowan & Cowan, 2000) and, as such, opportunities for socialization diminish. Nonetheless, contact with nuclear family members increases (Belsky & Rovine, 1984; Bost, Cox, & Payne, 2002) and this may reflect on the amount of practical help perceived that may free mothers to be with their child and to increase dedication to their parental duties. As such, these results substantiate not only this idea but also the claim that the beneficial impact of support from less intimate network members is secondary in relation to nuclear family support (Belsky & Rovine, 1984; Antonucci, Akiyama, & Takahashi, 2004).

For men, parental stress proved to be positively associated with perceived emotional and instrumental support from extended family members and negatively associated with perceived emotional and instrumental support from friends. Contrary to women, men are socialized to be the family breadwinners and consequently have fewer opportunities to acquire and practice skills that are central to caregiving activities (Parke & Brott, 1999) and, when the child is born, tend to concentrate more on work duties than on childcare tasks (Cowan & Cowan, 2000). Research has shown that during the postpartum period men worry about the new demands of being the

family provider and feel that they are prevented from achieving closeness with their child (Nyström & Öhring, 2004). Perceived support from family members may increase feelings of exclusion and lower sense of paternal competence and thus increase parenting stress levels. However, it should be noticed that no associations between extended family support and paternal investment in their child were found, which means that although increased support may make fathers experience increased parenting stress, their attitudes towards childbearing and the child are not affected.

In contrast, friendship relations, probably with other male friends, may provide fathers' with opportunities for reassurance and for comparing experiences, thus increasing feelings of self-efficacy and normalizing their parenthood experience (Cutrona, 1984; Goldstein, Diener, & Mangelsdorf, 1996). Then again, support from friends was not also associated with paternal investment in the child, which means that its beneficial role does not extend to actual parental care.

While the above explanation seems plausible to elucidate on the positive associations observed between perceived extended family support and fathers' parenting stress (and the positive correlations observed between perceived nuclear family support and paternal parenting stress, although not statistically significant, are consistent with this hypothesis), it should be noticed that from the design of this study it is not possible to say whether extended family support is negatively influencing paternal adjustment or if a third variable may exist that makes fathers look for support while simultaneously leads them to experience increasing parenting stress.

Additionally to the consideration of multiple categories of support providers, the discrimination made between different types of perceived support also proved to be important. In general, stronger associations were found regarding perceived instrumental support, suggesting that, at least during this specific life course transition, practical help is especially important.

In summary, researchers have stressed that support from different network members may serve different functions and may be differently related to outcome variables (Bost, Cox, & Payne, 2002; Simons & Johnson, 1996) and results from this study substantiate this claim. However, it should be

noticed that some of the hypothesized associations were not found and that those that were found were modest (small effect sizes). Therefore, it is important not to forget that support from the social network accounts only for a small part of the parenting phenomena and that several different studies have indicated that it is the parents' partner that acts as the principal parenting support system (Belsky, 1984; Simons & Johnson, 1996).

Results from this study have both implications for research and clinical practise. At the research level, the present findings corroborate the importance of obtaining multiple structural and functional indicators of social network support and of how these relate to adjustment and parenting over time, so that the different underlying mechanism can be investigated. Our results also show that, when helping mothers and fathers in adjusting to parenthood and providing adequate childcare, the parents' social network should be taken into consideration, as it may offer additional support beyond the partners' support. Additionally, they suggest that this is equally important regarding parents that conceive through ART and spontaneously.

Chapter 7

Study IV. Parental Investment in the Child in Couples that Conceived Spontaneously or through Assisted Reproductive Technologies

This longitudinal study investigated how the investment parents make in their child varied as a function of gender, method of conception (spontaneous conception – SC versus conception achieved through Assisted Reproductive Technologies - ART) and other contextual variables (at the individual level parents' scores on depression, at the relational level satisfaction with the marital relationship, and at the social level perceived support from the parents' social network members). Also, we were interested in investigating whether the influence of these contextual factors differed according to gender and method of conception.

Thirty nine couples that conceived through ART (39 women and 35 men) and 34 couples that conceived spontaneously (33 women and 32 men) completed self-report questionnaires regarding depression, satisfaction with the marital relationships and perceived network support during pregnancy (twenty-fourth week), and regarding parental investment in the child four months after the partum.

Results from the multilevel regression analyses conducted showed that parents that conceived spontaneously or through ART did not differ in the investment they make in their child, contradicting the generalized idea in the infertility and ART field that previously infertile couples are more aware of the importance of parenthood and more strongly committed to parenting.

Furthermore, results indicate that there is a strong dependence between the mother's and father's investment in the child and that these are associated with their satisfaction with their marital relationship and with the amount of support they perceive from their social network members. Thus, results point for the importance of treating the couple as a unit when developing preventive and/or intervention strategies directed at the promotion of adequate parental care.

Keywords: Parental Investment in the Child; Infertility; Assisted Reproductive Technologies; Individual and Contextual Parenting Determinants.

Introduction

Evolutionary theories have highlighted the role parents have on their child development, conceptualizing parental care as the result of the investment parents make, in an individual and distinctive way, in each of their children (Clutton-Brock, 1991). The degree to which parents commit to their caregiver role and the way they administer their own resources in order to provide for their child's well-being influences their parenting practices and, consequently, their child's socio-emotional development (Bradley, Whiteside-Mansell, & Brisby, 1997; Greenberger & Goldberg, 1989).

In modern western societies issues centred on the nature and extent of parental investment in children are controversial. Differences in the extent of fathers' and mothers' commitment to their parental role are a source of marital conflict and much social debate, as western cultures try to impose the ideology of equality, that is, that mothers and fathers should contribute equally to the well being of their children (Geary, 2000). From an evolutionary and social perspective, nonetheless, it is expected that mothers and fathers differ to some extension in their attitudes and values regarding child rearing. This is because the biology of reproduction results in higher level of maternal investment (Geary, 2000) and because, even though the request of men's participation in the day-to-day activities of the family has increased as women more and more pursue a professional career, women are still expected to retain the primary responsibility for household tasks and childcare (Cowan & Cowan, 2000). Indeed, empirical evidence indicates that mothers tend to invest more in their child than fathers (e.g. Cox et al., 2004).

Although research on parental investment has increased over the past decades, relatively little is known about the way it is experienced by parents

(Corwyn & Bradley, 1999). Bradley and colleagues (1997) proposed that parental investment in the children results from a desire to protect and strengthen filial ties, concurrent with the formation of a parental identity. Thus, the quality of the parents' investment in their child should manifest in the acceptance of the child and of the parental role, which implies consistency choices on the parents' part to act in the best interest of the child (i.e. Acceptance of parental role); in the amount of joy or delight parents experience with the child and expressions of affection towards the child (i.e. Delight); and in sensitivity towards the child's needs and responsiveness to those needs (i.e. Knowledge and sensitivity). On the whole, these aspects are likely to shape not only how parents feel as caregivers, but the caregiving process itself, and ultimately the child's developmental outcomes (Bradley, Whiteside-Mansell, & Brisby, 1997; Whiteside-Mansell, 2001).

Although still scarce, research has shown that parental investment in the child is differently multi-determined for mothers and fathers (Corwyn & Bradley, 1999). Parental commitment to the care of their children seems to be intimately related to the satisfaction they derive from their marital relationship, and this factor proved to be especially important regarding paternal investment (Belsky et al., 1991; Corwyn & Bradley, 1999). Parental investment in their children is directly dependent on environmental resources (Geary, 2000). Beyond the marital relationship, social support is one important resource in the parenting context (Belsky & Jaffee, 2006) and its positive association with maternal (but not with paternal) investment in the child has been reported (e.g. Bradley, Whiteside-Mansell, & Brisby, 1997). Parents' mental health status is also likely to be an important factor, as increased depression interferes with the parents' ability to feel joy in their socialization with their children and to act responsively and sensitively (e.g. Bradley, Whiteside-Mansell, & Brisby, 1997; Cox et al., 2004; Murray & Cooper, 1997).

Pregnancy achieved through Assisted Reproductive Technologies (ART) is often the end of a long period of involuntary childlessness, infertility investigations and treatments (Colpin, 2002). Pregnancy itself has also increased obstetrical risks (Basso & Baird, 2003) and childbirth can also be more difficult than initially anticipated by mothers (Hammarberg, Fisher, &

Wynter, 2008). On the whole, the path to parenthood of infertile couples is presented with a set of psychologically demanding experiences and it has been suggested that, as a result, infertile couples are more aware of the importance of parenthood and of having children (van Balen, Trimbos-Kempre, & Verdurmen, 1996) and are thus more strongly involved in parenting (van Balen, 1996).

In general, results from empirical research support this idea, in that they showed that, when compared with parents with a spontaneous conception (SC), parents that conceived through ART experience equal or higher levels of involvement with their child and pleasure in being with him/her, and provide more sensitive care. More specifically, studies showed that mothers that conceived through ART reported higher levels of emotional involvement with their child and that their partners contributed more to parenting when compared to mothers with a spontaneously conceived child (Golombok et al., 1995; van Balen, 1996). Other studies also showed that infertile parents experienced more pleasure and reported significantly more positive feelings towards their child, compared with parents of spontaneously conceived children (van Balen, 1996; Weaver et al., 1993). Finally, observation based studies revealed that mothers that conceived through ART showed more care-taking and play episodes during free play with their child (Papaligoura & Trevarthen, 2001) and that fathers with a history of infertility were more involved in interacting with their infant (Holditch-Davis, Sandelowski, & Harris, 1999), when compared with parents with a SC.

It thus seems reasonable to infer that infertile couples do a strong emotional and financial investment in order to be able to conceive and that this investment seems to continue after parenthood is achieved. Repokari and colleagues (2006) argued that these parents' infertility and treatment experience made them highly aware of the uniqueness of their children and that this 'unique' perspective may allow them to evaluate differently other life stressors and may therefore function like a buffer, neutralizing the negative impact of those stressors on parenting experiences.

These researchers found that while negative birth subjective experiences predicted negative mothering and fathering among fertile spontane-

ously conceiving parents, the same did not happen with parents that conceived through ART. Gibson et. al (2000a) also found that factors known to endanger mother-child relationship, such as increased maternal anxiety during pregnancy over the baby's well-being, anticipation of more infant difficulty and increased perinatal and neonatal risks, did not place mother and infants at risk for poor attachment relationship outcomes. They concluded that the impact of these risks could be buffered by "other less well-identified mechanisms, like the very strong desire for parenthood shared by these couples" (p.1002).

In other words, parents that conceived through ART may experience higher levels of investment in their child and this investment may be less affected by those variables known to have a negative impact on it, when compared to parents with a SC.

The main goal of our study was to investigate how parental investment in the child varied as a function of gender, method of conception and other contextual variables (at the individual level parents' scores on depression, at the relational level satisfaction with the marital relationship, and at the social level perceived support from the parents' social network members). Also, we were interested in investigating whether the influence of these contextual factors differed according to gender and method of conception.

Based on the previous review, we hypothesised that parental investment in the child would be higher for women and when assisted conception was used in order to conceive. We expected higher parental investment in the child to be associated with lower depression, higher satisfaction with the marital relationship, especially for men, and higher perceived social support, especially for women.

Method of conception was expected to moderate the impact of those variables that may function as risk factors for poor parental investment. Those are depression and lack of social support. Although transition to parenthood is also associated with increased risk of marital distress (Cowan & Cowan, 1995), the quality of the marital relationship is not considered to be a risk factor for poor parenting in the context of ART (cf. Colpin, 2002; Hammarberg, Fisher, & Wynter, 2008) and as such no moderation effects of method of conception on the impact of this variable were expected.

Method

Participants and Procedures

This study was approved by the Ethics Committee of the University of Coimbra Hospitals.

The final sample consisted of 39 women and 35 men (39 couples) that conceived through ART and 33 women and 32 men (34 couples) that conceived spontaneously.

Couples that conceived through ART and spontaneously were recruited during their first month of pregnancy while attending their obstetrical consultation at the Genetics and Human Reproduction Service and at the Dr. Daniel de Matos Maternity, respectively, both in the University of Coimbra Hospitals. When recruiting participants, a full explanation of the research objectives, the participants' role and the researchers' obligations were given. Inclusion criteria were age (18 years or older), nulliparity, singleton pregnancy and literacy skills to complete the assessment protocol.

If participants agreed to collaborate, they filled a consent form and were later contacted prior to their twenty-fourth pregnancy week (first assessment point), while attending their obstetric consultation. Questionnaires were then delivered with the instructions that they should complete them separately during the following week and bring them to the next consultation. One week before the second assessment point (four months postpartum), questionnaires were sent by mail together with a preaddressed envelope, and parents were instructed to complete them separately and post them back to the research team. Within a week, a phone text message was sent requesting parents to return the questionnaires and within two weeks a phone call was made with the same goal.

A total of 136 couples (66 that conceived through ART and 70 with a SC) were initially contacted. From the ART group, 11 couples never delivered the questionnaires, 8 couples had multiple pregnancies and 3 lost their pregnancies prior to the assessment moment. From the remaining 44 couples, only 39 women and 35 men also completed the questionnaires at 4 months (participation rate of 66.66%, attrition rate from pregnancy to post-

partum assessment points of 14.77%). From the SC group, 20 couples never delivered the questionnaires and, from the remaining 50, only 33 women and 32 men also completed the questionnaires at 4 months postpartum (participation rate of 71.43%, attrition rate from pregnancy to postpartum assessment points of 35%). Women that did not deliver questionnaires after the partum were younger ($t(1, 89) = -2.36, p = .021$) than those who did. No differences were found between those men that did and did not deliver the questionnaires 4 months after the partum.

Sample socio-demographic characteristics are presented in Table 7.1. Women that conceived with ART were older than women that conceived spontaneously ($t(1, 70) = 7.36, p < .001$) and were with their partner for a longer time ($t(1, 70) = 9.23, p < .001$). Men that conceived with ART were also older than men that conceived spontaneously ($t(1, 65) = 5.95, p < .001$) and were with their partner also for a longer time ($t(1, 65) = 10.28, p < .001$). No significant differences were found between the ART and SC groups regarding education, socioeconomic status and women's employment status after the partum.

Couples that conceived through ART were trying to achieve pregnancy for an average of 5 years (mean = 5.45, sd = 2.88, range 1-15) and had done on average one in vitro fertilization treatment (mean = 1.19, sd = 1.09, range 0-4). Thirteen (35.1%) couples were diagnosed with female infertility, 10 (27.0%) with mixed infertility, 9 (24.3%) with male infertility and 5 (13.5%) with idiopathic infertility.

The two groups were also compared regarding obstetrical and perinatal data. There was a slight higher probability for the occurrence of problems during pregnancies achieved by ART ($\chi^2(1, 71) = 2.62, p = .089$) and the frequency of male babies conceived spontaneously was significantly higher than that of male babies conceive by ART ($\chi^2(1, 72) = 2.62, p = .038$). There were no significant group differences concerning mode of delivery and the baby's gestational age and birth weight.

Materials

At the first assessment point, at the twenty-fourth week of pregnancy, sociodemographic data were collected and depression, satisfaction with marital relationship and perceived social support were assessed. After the birth, obstetrical and perinatal data were collected from the women's medical records (occurrence of obstetrical complications during pregnancy; mode of delivery; gender, gestational age and birth weight of the baby). Parental investment in the child was assessed at the second assessment point, four months after the partum.

Parental investment in the child was assessed with the Portuguese version of the Parental Investment in the Children – PIC (Bradley, Whiteside-Mansell, & Brisby, 1997) scale, a 4-point Likert scale (from 1 to 4) with 19 items, designed to assess parents' socioemotional investment in their children. It comprises three different subscales: acceptance of parental role, ranging from 6 to 24, delight, ranging from 6 to 32, and knowledge and sensitivity, ranging from 6 to 24, with higher scores indicating higher investment in the child. The Portuguese version of the scale revealed moderate to good indexes of internal consistency for its subscales, good test-retest reliability and internal consistency (Gameiro et al., 2008a). In the present sample Cronbach alpha coefficients for the three subscales were between .61 and .75 for women and from .66 to .77 for men.

Depression was assessed with the depression subscale of the Brief Symptom Inventory – BSI (Derogatis, 1993), that ranges from 0 to 3, with higher scores indicating the presence of more depressive symptoms. The Portuguese version of this scale presents good levels of internal consistency for this subscale (.73), test-retest coefficient (.81) and construct and discriminant validity (Canavarro, 2007). In the present sample Cronbach alpha coefficients were of .80 for women and of .87 for men.

Table 7.1. Sample socio-demographic characteristics (N=139)

	Women						Men					
	ART			SP			ART			SP		
	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n
Age	33.56	3.119	33	26.55	4.671	33	35.11	3.802	35	28.91	4.645	32
Years in current relationship	7.62	2.650		2.99	1.543		7.71	2.198		2.96	1.557	
	n	%		n	%		n	%		n	%	
Education												
Primary	3	7.7	5	15.2		5	14.3		5	16.1		
Secondary Junior	6	15.4	4	12.1		5	14.3	.186 ^a	11	35.5		4.58
Secondary Senior	9	23.1	11	33.3		16	45.7		9	29.0		
University	21	53.8	13	39.4		9	25.7		6	19.4		
Socioeconomic status												
Medium low	11	28.2	15	45.5		10	28.6		16	51.6		
Medium	12	30.8	10	30.3		10	28.6	2.99	7	22.6		3.82
Medium high	16	41.0	8	24.2		15	42.9		8	25.8		
Employment status (four months postpartum)												
Working	9	25.7	10	31.2								
Childbirth leave /unemployment/vacations	26	74.3	22	68.8				.252				

Note: *p < .001. ^a Cramer's V. SD = standard deviation. ART = Assisted Reproductive Technologies, SC = spontaneous conception

The marital relationship was assessed with the Satisfaction dimension of the ENRICH marital inventory (Olson, Fournier, & Druckman, 1983; Portuguese Version by Lourenço, 2006), a 5-point Likert scale (from 1 to 5) with 109 items that provides scores of the women's and men's evaluation of their relationship in term of eleven dimensions. The Portuguese version of the scale has been evaluated, whereby the reliability and the validity of the instrument have been established to be satisfactory (Lourenço, 2006). The Satisfaction subscale ranges from 1 to 5, with higher scores indicating higher satisfaction with the marital relationship. In the present sample Cronbach alpha coefficients for this scale were of .69 for women and of .61 for men.

Social support was assessed with the Convoy Model (Kahn & Antonucci, 1980). First, network information was obtained by asking individuals to map their relations hierarchically onto a concentric circle diagram. Participants were asked to place in the innermost circle (C1) those individuals who are "so close that it's hard to imagine life without them", in the second circle (C2) "those that are not quite as close, but are still very important" and in the third circle (C3) those that are "not quite as close, but still important". After completing the Convoy diagram, participants were asked to rate, from 0 (minimum) to 5 (maximum), perceived support regarding eight different support functions (e.g., confiding about important things, helping with household tasks) for each person included in C1 and C2 of the convoy (to a total maximum of 12 persons). In the present study a simple global average support score that included the eight perceived support items was calculated, ranging from 0 (no relations included in the convoy and/or no perceived support from included relations) to 40 (maximum perceived support). In the present sample Cronbach alpha coefficients for this support score were of .86 for women and .87 for men.

Socioeconomic status was measured considering five categories (low, e.g. house maids; medium-low, e.g. non-specialized workers; medium, e.g. small companies' owners; medium-high, e.g. high school and university professors; and high, e.g. government or private companies administrators), defined in terms of achieved education level and current profession (Neves, 2007). Education referred to the highest education level partici-

pants had achieved (primary, secondary junior, secondary senior, university).

Statistical Analyses

We used MLwiN (Rasbash, Steele, Browne, & Prosser, 2004) to analyse the data with multilevel regression analysis (Hox, 2002) and a total of three regression models were tested concerning the three dimensions of parental investment in the child: acceptance of parental role, delight and knowledge and sensitivity.

This approach was chosen as the most appropriate one because it captures the dependence of the mother and father outcome data (the mother's investment in the child is likely to influence the father's investment in the child and vice versa), thereby increasing the precision of the standard errors and the calculation of correct significance tests. Additionally, because multilevel regression models were especially designed to simultaneously analyze variables from different contextual levels (Hox, 2002), they make it possible to test individual and shared parent factors as predictors of parental investment in the child. Finally, in the specific context of this research, they also enable the testing of gender differences in parental investment in the child.

As such, a two-level hierarchical structure was considered for the data, with individuals (mother and fathers; level one) nested within couples (level two). Each independent variable considered in the model varies only at one specific level. Gender, depression, satisfaction with the marital relationship and perceived network support vary at the individual level (level one) and method of conception is the same for both parents in a couple but varies between couples (level two).

Preliminary analyses were made to investigate the necessity for controlling for socio-demographic and child related variables (age at level one and years in current relationship, gender of the baby and the occurrence of complication during pregnancy at level two). These were done by considering each of these variables as a single predictor of each of the parental investment dimensions considered and testing its significance. If their effect

was statistically significant they were included in the corresponding regression model to be tested.

Each of the three models were developed starting from a null single level model. After, a null two level random intercept model was implemented, its adequacy was tested (based on the examination of the statistical significance of the observed decrease in the badness of fit of this model, comparing to the null single level model) and intraclass correlations were calculated in order to investigate the proportion of variance at each specific level. After that, all independent variables (i.e. the main and interaction effects that corresponded to the hypotheses to test) were put in the multi-level regression model and its significance was tested, based on the examination of the statistical significance of the observed decrease in the badness of fit of this final model, comparing to the null two level model. Finally, the significance of each independent variable was checked by t tests, and the part of the variance that was explained at each specific level was calculated.

Models were estimated using the Iterative Generalised Least Squares (IGLS) procedure because it is considered the most suitable when only fixed effects are being analysed (Morrell, 1998), as is the case in this study.

Methods for assessing statistical power in multilevel modelling analyses are still being developed. Kreft and deLeeuw (1998), however, suggest that multilevel modelling power calculations are similar to multiple regression. Therefore, Cohen's (1992) estimates were used to assess the statistical power of the models. Post hoc power calculations demonstrated that the achieved sample size was sufficient to detect medium to large effects (effect size = .13, $p < .05$, power = .82, G * Power, Faul et al., 2007).

Because multilevel analyses have advantages with respect to dealing with missing data (Hox, 2002), these were not substituted. Significance was defined as $p < .05$ but marginally significant effects are also reported ($p < .10$).

Table 7.2. Mean and standard deviation scores of study variables for women and men (N=139)

	Women				Men			
	ART n = 39		SC n = 35		ART n = 33		SC n = 32	
	M	SD	M	SD	M	SD	M	SD
Predictor variables (pregnancy)								
Depression	.560	.590	.636	.555	.397	.557	.359	.454
Marital relationship	3.92	0.50	3.97	0.39	3.91	0.40	3.91	0.47
Network support	21.06	6.73	22.22	6.76	21.49	6.74	22.05	4.90
Parental Investment in the child (postpartum)								
Acceptance of parental role	17.74	2.44	18.36	2.00	18.31	2.77	18.24	2.06
Delight	21.85	3.48	22.36	2.55	21.26	3.57	22.21	2.47
Knowledge/sensitivity	15.38	2.77	14.94	1.95	15.34	2.68	14.48	2.06

Note: M = mean, SD = standard deviation, ART = Assisted Reproductive Technologies, SC = spontaneous conception.

Results

Table 7.2 presents women's and men's mean and standard deviation scores of depression, satisfaction with the marital relationship, perceived network support and parental investment in the child.

Adequacy of the Two-level Models

For the three dependent variables the total of variance was divided into two parts, referring to the individual and couple levels (see Table 7.3).

Table 7.3. Estimated variance and explained variance at the individual and couple level

Level	Acceptance of parental role		Delight		Knowledge and sensitivity	
	Variance	Explained	Variance	Explained	Variance	Explained
Couple	.45	.23	.33	.13	.59	.00
Individual	.55	.00	.67	.02	.41	.4
Total explained variance		.23		.15		.4

Comparing with the single level model, the two level model for acceptance of parental role has significantly decreased the badness of fit (decrease in badness of fit = 14.342; $p < .001$). The major part of the variance was found at the individual level (55%) and another 45% was found at the couple level.

Compared with the single level model, the two level model for delight also significantly decreased the badness of fit (decrease in badness of fit = 7.302; $p < 0.01$). The major part of the variance was found at the individual level (67%) and another 33% was found at the couple level.

Finally, when compared to the single level model, the two level model for knowledge and sensitivity also significantly decreased the badness of fit (decreased in badness of fit = 28.168; $p < .001$). The major part of the vari-

ance was found at the couple level (59%) and another 41% was found at the individual level.

Predictors of Parental Investment in the Child

Table 7.4 presents the three two level random intersect models developed concerning the three dimensions of parental investment in the child.

Acceptance of Parental Role

Preliminary analyses made to investigate the necessity for controlling for socio-demographic and child related variables showed that none of these variables were statistically associated with acceptance of parental role and were thus not considered in the final model.

This final model was significant (decrease in badness of fit = 50.527; $p < .001$), explaining 23% of the variance at the couple level, but none at the individual level. The only significant predictor found was satisfaction with the marital relationship ($p = .040$).

Delight

Preliminary analyses made to investigate the necessity for controlling for socio-demographic and child related variables showed that age was statistically associated with delight and it was thus included in the final model.

The final model for delight was significant (decrease in badness of fit = 56.798; $p < .001$) and it explained 13% of the variance at the couple level and 2% at the individual level. The marital relationship was the only significant predictor found ($p = .039$), but age ($p = .076$) and perceived network support ($p = .093$) were also marginally associated with delight.

Knowledge and Sensitivity

Preliminary analyses made to investigate the necessity for controlling for socio-demographic and child related variables also showed that none of these variables were statistically associated with knowledge and sensitivity and were thus not considered in the final model.

Table 7.4. Predictors of parental investment in the child (N=73 couples)

Predictors	Acceptance of parental role		Delight		Knowledge and sensitivity	
	β	SE	β	SE	β	SE
Constant	18.123	.343***	25.547	1.832***	14.770	.395***
Couple level						
Method of conception ^a	-0.223	0.414	0.106	0.703	0.741	0.507
Individual level						
Age			-0.117	0.066 †		
Gender ^b	0.394	0.334	-0.002	0.472	-0.125	0.278
Depression	0.067	0.530	0.215	0.722	0.669	0.509
Satisfaction marital relationship	1.183	0.577 *	1.602	0.777 *	0.603	0.575
Network support	0.021	0.049	0.111	0.066 †	0.089	0.045 *
Gender x Satisfaction marital relationship	-0.058	0.776	-1.025	1.058	0.241	0.666
Gender x Network support	-0.027	0.057	-0.066	0.077	-0.004	0.050
Method of conception x Depression	-0.856	0.671	-1.417	0.909	-1.348	0.643 *
Method of conception x Network support	0.014	0.061	-0.036	0.083	-0.072	0.059
Decrease in badness of fit	50.527 ***		56.798 ***		41.188 ***	

Note: † $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$ ^a 0=spontaneous conception, 1 = Assisted Reproductive Technologies, ^b 0 = Female, 1 = Male., SE = standard error

This final model was significant (decrease in badness of fit = 41.188; $p < .001$) but no variance was explained at the couple level and the amount of explained variance at the individual level was only of 4%. Perceived network support was found to be a significant predictor of knowledge and sensitivity ($p = .048$) and a significant interaction between method of conception and depression was also found ($p = 0.36$).

Although the interaction effect indicated that the association between depression and knowledge and sensitivity varied significantly as a function of method of conception, since a positive association was found when conception was spontaneous and a negative one was found when conception was achieved through ART, posterior analyses showed that these associations were not statistically significant (SC: $\beta = .669$, $p = 0.189$; ART: $\beta = -.679$, $p = 0.115$).

Discussion

The main finding from this prospective study was that couples that conceived spontaneously or through ART did not differ in their parental investment in their child. This finding was consistent across the three dimensions of parental investment in the child investigated. Additionally, method of conception was also not found to function as a buffer in the context of increased depression or lack of social network support, as was previously hypothesized.

These are relevant results since it has been repeatedly suggested that previously infertile couples that used assisted reproduction to conceive would make a stronger investment in their child (Gibson et al., 2000a; Repokari et al., 2006). Our results contradict this idea and thus imply that these parents' higher investment in their child does not seem to be the reason for their observed parental resilience. Other mechanisms may be at work to explain why these parents' parenting is not affected by negative perinatal and neonatal factors (as is the parenting of parents that conceived spontaneously) that need to be further investigated. Examples of alternative explanations previously advanced in the ART field literature were these parents' older age, the absence of risk factors for poor parenting (Colpin, 2002) and different expectations regarding their infants' behaviours, as

McMahon and colleagues (1999) observed that parents that conceived through ART anticipated more difficult infants than parents with a spontaneously conceived child. A auto-selective mechanism may also be at work, as those couples who start and sustain in ART treatments (and thus are more likely to achieve parenthood) are expected to be more resilient than those who do not (Olivious, Friden, Borg, & Bergh, 2004; Repokari et al., 2005), and are thus also expected to present more positive functioning across different areas, including parenting.

Results further indicated that men and women also did not differ in their investment in their child, showing that, currently, at least at an attitudinal level, both members of the couple seem to dedicate themselves equally to the well-being of their child. What may happen, thus, and in spite of the pressure imposed by occidental cultures, is that this investment translates differently according to gender. Women are known to be highly dedicated to childbearing issues, while men tend to increase their dedication to work, as they primarily identify with the role of economic provider for the family (Corwyn & Bradley, 1999). In other words, the fact that men don't dedicate as much as women to childcare chores may not imply that they invest less in their child but only that they may be less willing to comply with non-traditional gender role definitions. Indeed, a recent review documented that although men and women are progressively shifting towards an equal level of participation in routine caregiving, this is happening slowly (Pleck & Masciadrelli, 2004).

Results from this study also showed that there was a high resemblance between both members of the couple in their parental investment in their child. This was especially true concerning knowledge and sensitivity, as the variance at the individual level was only of 41%, and less true concerning delight, which presented 67% of variance at the individual level. These results suggest that parental investment in the child is, to a considerable degree, a parent shared feature.

As such, it is not surprising that the parents' satisfaction with their marital relationship was strongly related to it. Satisfaction with the marital relationship was the only found predictor for acceptance of the parental role, explaining 23% of its total variance at the couple's level, and was also the

main predictor of the delight parents experience in being with their child. This finding is strongly consistent with a broader literature that documented the strong effect of marriage on parenting (e.g. Belsky et al., 1991; Cummings & Watson O'Reilly, 1997).

However, concerning parents' knowledge and sensitivity to their child's needs, which include the practicalities of dealing with the newborn, social support was found to be the only significant predictor, and it was also marginally associated with the parents' delight in being with their child.

This fact is consistent with the field literature that highlights the strong beneficial role of support from other intimate relationships beyond the marital relation (Belsky, 1984; Bost, Cox, & Payne, 2002). During this early postpartum period, when both members of the couple are still adjusting to the demands of parenthood, the help of significant others such as close family members and intimate friends (e.g. provision of practical help in child related chores, information on how to take care of the child, reinforcement of positive parental behaviour) has proved to be of assistance (e.g. Crnic & Greenberg, 1990; Leinonen, Solantaus, & Punamäki, 2003; Levitt, Weber, & Clark, 1986).

Nonetheless, perceived support from the parents' social network members explained only 4% of the total variance of the parents' knowledge and sensitivity towards their child's needs. Furthermore, the other significant predictors found only explained part of the total variance of parents' acceptance of their parental role and their delight in being with the child (cf. Table 7.3). Together, these facts call our attention for the possible influential role of other variables not considered in this study, such as the parents' own developmental history and work and other child-related variables (e.g. temperament).

Contrary to what was expected, parental depression did not interfere with parents' investment in their child. Not all studies have found this expected relation, and it has been suggested that the inconsistency of findings regarding depression and parenting may be due to the fact that depression varies in terms of type, severity, chronicity and timing and to the fact that different studies use quite different samples (e.g. Campbell, Cohn, & Myers, 1995; Cox et al., 2004). It may be that parents in this sample did not

evidence severe enough depression for it to reflect in their parental investment (cf. that sample mean scores presented in Table 7.2 are below mean scores found for the general population in Portugal, 0.893 +/- 0.722, Canavarro, 2007).

Of interest is also the fact that most of the variance was explained at the couple's level and not at the individual level. This may be because the marital relationship is more likely to influence parents as a unit than each member of the couple individually. Nonetheless, social support did explain some of the individual variance of the parents' knowledge and sensitivity to their child's needs and, together with age, it may have also accounted for the 2% of the explained variance of the parents' delight in being with their child at the individual level. This suggests that predictor variables may have a different value in explaining individual versus couple parenting characteristics, that is, while some factors may only affect the parenting of one of the members of the couple, others affect both members simultaneously. One could expect that those factors most likely to influence parenting at the couple level would be those that are equally shared by both members of the couple (e.g. the marital relationship, as observed, child related characteristics). However, caution is needed because no direct assumptions can be made.

The strengths of the present study were its prospective nature, inclusion of both members of the couple, and the use of multilevel regression analyses, which increase the precision of the standard errors and, hence, also of the calculation of significance tests. Another major improvement from usage of these more sophisticated statistical analyses was that they allowed for the observation of variance at the individual and couple's level. The high intraclass correlations found suggest that parental investment in the child is to a significant degree a couple-shared feature. The major drawback of this study was its small sample size, as power analyses showed that only medium and large effects could be detected, which means that smaller effects may have been ignored.

In summary, the present study showed that parents that conceive spontaneously or through ART do not differ in the investment they make in their child, contradicting the generalized idea in the infertility and ART field that

previously infertile couples are more aware of the importance of parenthood and more strongly committed to parenting. Furthermore, results indicate that mother and father resemble in the investment they make in their child and that this is associated with their satisfaction with their marital relationship and with the amount of support they perceive from their social network members.

The strong dependence observed between the mother's and the father's investment in the child has both implications for research and clinical practice. First, it suggests that valuable information may be lost when strong couple shared phenomenon are analysed only at the individual level. Research exploring factors that impact parenting at the individual versus couple level is important, as these two kinds of factors should probably be addressed differently in the clinical setting. Second, it points to the importance of treating the couple as a unit when developing preventive and/or intervention strategies directed at the promotion of adequate parental care. The fact that the marital relationship had a central role in explaining parental investment in the child strengthens this idea.

Part III

Discussion

Theoretical and methodological considerations

The present doctoral dissertation focused on the relational contexts of the transition to parenthood in couples that conceived spontaneously or through ART.

We started by proposing a developmental ecological theoretical framework that we regard as useful in guiding empirical research. Theories are fundamental tools to understand the phenomenon being studied. They provide a conceptual framework that minimizes the chances that researcher's efforts will lead to the generation of a multitude of unrelated facts by guaranteeing that a meaningful question is asked and that that question translates into testable hypotheses. Furthermore, empirical observations that result from the test of hypotheses can then be interpreted at the light of the proposed theoretical principles and these can be, on its side, further (re)defined and (re)described according to results found, in a grounded circular process that ensures that utility is blended with conceptualization (Strong, 1991).

In the light of the large amount of parenting related theoretical and research literature in existence, one cannot stop from wondering why it has only been adopted to such a limited extent by researchers focusing on parenting after assisted reproduction. As already argued (cf. Chapter 3), we believe that such literature not only allows for a deeper understanding of the parenting process and outcomes, but also that it helps to better differentiate between universal parenting phenomena and the specificities of parenting after an infertility and ART experience.

Within this line of thinking, we made several theory driven recommendations for future research and, coherently, in the context of the present doctoral dissertation, we tried to follow these recommendations. As such,

the adoption of the proposed theoretical framework reflected in an effort to expand research beyond the dyadic level, considering how an infertility and ART experience may change the more distal parenting ecology and how these changes may feedback into the parenting system; and in an effort to go beyond simply comparative purposes to investigate the interactive effects (and underlying mechanisms) of different parenting determinants located at different contextual levels.

Additionally, it also reflected in the adoption of a unified theoretical framework (i.e. attachment theory) for the conceptualization and operationalization of the relational contexts investigated (parental investment in the child and close relationships), and in the use of data regarding both groups of parents that conceived spontaneously or through ART to better understand the transition to parenthood as a universal phenomenon versus its specificities when conception is achieved through ART.

At the empirical level, we set out to investigate how a different and harder pathway to parenthood, that is, one that implies undergoing assisted reproduction treatments, impacts on the parents' psychosocial adjustment, on their social relationships and on their socioemotional investment in their child during transition to parenthood.

In order to fulfil these research goals, we implemented a longitudinal study, following 39 couples that conceived through ART and 34 couples that conceived spontaneously²⁷ from their last pregnancy trimester (twenty-fourth pregnancy week), through birth and until their child was four months old.

This longitudinal prospective study proved to be appropriate for the fulfilment of our research goals, as it provided the necessary information so

²⁷ The total sample size varied across the different empirical studies. As the general rule, we always considered only those couples for whom data regarding both members of the couple were available (cf. Studies I and III). Nonetheless, in Study II we relaxed this rule because otherwise sample size would be too small. In Study IV we did the same because multilevel analysis has advantages with respect to dealing with unbalanced data (Hox, 2002) and so we did not need to have data on both members of the couple.

that a detailed characterization of the transition to parenthood period could be made for both groups of parents that conceived spontaneously or through ART. Specific methodological choices contributed for this to be the case. In Study I, for the investigation of the individual and dyadic adjustment of these parents across the transition to parenthood, following recommendations in the field (Jomeen, 2004), we tried to carry out a multidimensional assessment, investigating several different dimensions that are expected to characterize individual and relational adjustment during this period. In Studies II and III, we expanded this investigation from the individual and dyadic level to the social level, and in order to do this, we implemented an in-depth analysis of the close social relationships of men and women across the transition to parenthood that, not only considered the types and amount of perceived support, but also considered different categories of support providers and even the different degrees of intimacy or closeness parents' had in relation to these providers. Finally, in Study IV, when focusing on parental investment in the child, instead of carrying out separate single level regression analyses for men and women, we chose to implement multilevel regression analyses that enabled us to investigate parents as a unit.

Although participants were recruited in a single major public hospital and attrition analyses showed that younger and less educated (only in Study II) women were more likely to drop out of the follow-up assessment point, our sample socio-demographic characteristics and child characteristics (except in what concerns the gender of the baby, which we regard as a random effect due to the small sample size) are in line with those of most samples in this research field, which brings confidence to the validity and generalization of data reported. The fact that results from our empirical studies were consistent with the current field literature also reinforces this idea.

However, the achieved sample size was small and there is the possibility that small but significant effects may have been ignored. We consider this to be the major drawback of the study, but there are other limitations, such as an exclusive reliance on self-report instruments and on the parents, excluding other informants, or the short assessment period considered. Fur-

thermore, the study could also have been strengthened by taking into account other relevant factors. One example is culture-based issues, as these could have been particularly useful to explain results found concerning quality of life. Another example is the participants' reproductive history, as individual variability in previous adverse reproductive events is hypothesized to contribute to the delineation of different adjustment trajectories during the transition to parenthood (Hammarberg, Fisher, & Wynter, 2008).

Main results

The findings from this longitudinal research are described and discussed in detail in the four studies presented (cf. Chapters 4 to 7). Therefore, only main results are presented here and the discussion that follows will try not to be redundant regarding the studies' discussions. Rather, it is intended to add to these previous discussions, both by integrating the different results found in the different studies and by expanding on those particular issues that we consider to be the main contributions of this dissertation to the field state-of-the-art.

The main findings from this prospective research were that:

- Portuguese men and women that recurred to assisted reproduction were older than men and women that conceived spontaneously and were with their partner for a longer time. They resembled in what concerned their educational and socioeconomic status and the women's employment status after the partum;
- Children conceived through ART did not differ from children conceived spontaneously regarding their birth weight, gestational age, and mode of delivery. Nonetheless, there was a higher percentage of girls conceived by ART than spontaneously and the use of ART proved to be associated with a slightly higher incidence of obstetrical complications during pregnancy;
- The transition to parenthood and parenting context of Portuguese men and women that conceived through ART or spontaneously proved to be similar: they showed similar adjustment levels and changes across the

transition to parenthood, they presented a similar social context (i.e. similar structural and functional network changes across the transition to parenthood and similar associations between social network support and adjustment to parenthood and parental care) and they did not show differences in the investment they make in their child;

- However, some differences were also found: (1) parents' that conceived through ART (especially women) perceived their pregnancy as being of higher risk and more demanding, but also more rewarding than parents that conceived spontaneously; (2) fathers that conceived through ART considered themselves to be more competent fathers than those fathers that conceived spontaneously; (3) parents that conceived through ART reported a decrease in their psychological well-being from pregnancy to the postpartum period that was not reported by parents that conceived spontaneously; (4) women that conceived through ART perceived higher levels of emotional and instrumental support from their less intimate (i.e. located in C2 of the convoy) nuclear family members and less from their friends than mothers that conceived spontaneously; and (5) compared to men that conceived spontaneously, men that conceived through ART perceived more support from less intimate (i.e. located in C2 of the convoy) than from more (i.e. located in C1 of the convoy) intimate nuclear family members;
- For both parents that conceived spontaneously or through ART, the transition to parenthood was characterized by (1) stability in (the in-existence of) psychological distress from pregnancy to the postpartum; (2) a decrease in their marital relationship from pregnancy to the postpartum; (3) several gender based differences in the overall levels and changes in their quality of life from pregnancy to the postpartum; (4) low levels of parenting stress four months after the partum; (5) a strong social nesting movement that consisted in drawing towards them their nuclear family members (from whom they perceived increasing levels of emotional and instrumental support across the transition) and that proved to be similar for both men and women; (6) significant associations between perceived network support in pregnancy and parental well-being and their socioemotional investment in their child four

months after the partum, that varied as a function of the parents' gender, of the type of relationship involved and of the type of perceived support; and (7) a high resemblance between maternal and paternal investment in the child, four months after the partum, these being influenced by how satisfied parents were with their marital relationship and by the amount of support they perceived from their social network members.

The transition to parenthood after successful assisted reproduction

The results obtained in the context of the present research indicate that those parents that only manage to conceive through ART experience their transition to parenthood in a remarkable similar way to those parents that are able to conceive spontaneously. Although their pathway towards parenthood may be considered non-normative, as it is usually longer and more demanding, when these previously infertile couples achieve conception and thus face transition to parenthood, their developmental pathway seems to converge with that of most parents and their experience of this particular life course transition is lived in a notably similar way. These similarities were found not only at the individual and dyadic (marital and parent-child relationships) level, but also regarding the way all parents relate with their social network members.

Once that adaptation is continuously (re)negotiated in relation to the surrounding environment (Cummings, Davies, & Campbell, 2000), the fact that the close social environment of previously infertile couples changes in a similar way to that of couples that conceive spontaneously, as our study demonstrated for the first time, is yet another important factor (besides others factors previously advanced by the field literature such as their strong marital relationship or the fact that their parenthood is so strongly desired) to understand their overall positive adjustment across the transition to parenthood. Indeed, this means that no differences are expected in the provision of the variety of functions that network members usually serve, from which social support is but one (Berkman et al., 2000). Our results are very clear in that they also showed that, compared with women

that conceive spontaneously, women that conceive through ART even experience more support from their nuclear family members across the transition to parenthood and that this support is associated with increased maternal investment in the child.

This observed pathway convergence of previously infertile couples is, nonetheless, not immediate, as pregnancy is lived with increased worries and anxieties about its viability and about the health of the baby, especially in the case of women. We claim that these increased anxiety and worries result from a realistic assessment of the situation (e.g. higher incidence of multiple birth, short gestation, low birth weight babies and operative birth, Helmerhorst et al., 2004) and are thus largely reality-based concerns (Gibson et al., 2000a). They may therefore be adaptive in the sense that they may increase parents' awareness to possible obstetric complications and thus make them adopt increased preventive behaviours during this period. It could be of clinical relevance to empirically investigate if this is indeed the case.

On the other hand, this more demanding experience of pregnancy, following a usually also demanding period of infertility treatment(s), seems to reflect on higher feelings of reward and gratification from pregnancy, and may also increase expectations regarding parenthood, contributing to a more difficult adjustment to its realities (Hammarberg, Fisher, & Wynter, 2008).

The fact that the psychological well-being of parents that conceive through ART seems to decrease across the transition to parenthood while it remains stable for parents that conceive spontaneously is consistent with this idea. As such, our data not only contradict previous findings that suggested that the experience of parenthood is associated with an increase in global well-being for previously infertile women but not for men (Abbey, Andrews, & Halman, 1994), but also show that it may even associate with decreases in the parents' well-being for both genders.

Results concerning the parents' quality of life also reinforce the importance of assessing psychological adjustment across the transition to parenthood as a multidimensional construct (Jomeen, 2004), but especially of using more positive measures of adjustment, as health is more than the

simple absence of disease or psychological distress (Muldoon, Barger, Flory, & Manuck, 1998).

Some authors argue that more specific measures designed for the ART context are needed (Hahn, 2001; McMahon et al., 1997a). We do not agree so much with this idea, as it implicitly assumes that these parents' experience of the transition to parenthood has to be different from that of parents that conceive spontaneously, but instead favour an extensive and comprehensive assessment of all negative and positive valued dimensions expected to contribute to all parents' psychosocial adjustment during pregnancy, childbirth and the postpartum period. We consider that this position is also more consistent with the notion that parenting is a complex and multiply determined phenomenon that, as such, requires a holistic approach (Pereira, 2008).

Another expected effect of a usually longer and more demanding path to parenthood was a higher appreciation of the value of children and parenthood that would reflect on higher parental investment in the child. This higher parental investment, on its side, was proposed to explain the higher resilience previously infertile parents seem to exhibit in different areas of functioning across the transition to parenthood (Colpin, 2002; Gibson et al., 2000a; Golombok et al., 1995; Repokari et al., 2006; van Balen, 1998). Our results, however, demonstrated for the first time that this is not the case, as they showed that parental investment in the child does not vary as a function of method of conception. Although these results do not question the role of method of conception as a protective factor for effective parenting, they do question the role of the parents' investment in their child as the underlying process and, as such, call for the importance of exploring other possible mediating mechanisms.

In conclusion, despite small differences found, results are reassuring for both parents and professionals alike in that they show that Portuguese men and women that use ART to achieve parenthood adjust just as well as those men and women that don't need to undergo fertility treatments and that ART does not seem to impair these parents' ability to form healthy relationships with their children.

The overall positive adjustment of the ART group also contradicts gen-

eral research suggesting that earlier hardship and trauma make people more vulnerable in the face of new stress (Cicchetti, Rogoshci, & Toth, 1998). The idea that the negative affective states developed during infertility treatments may linger on into the transition to parenthood (Klock & Greenfeld, 2000) is a clear corollary of this assumption that has served as rationale for most of the implemented research focusing on the psychosocial adjustment of families created by ART. Empirical results, nonetheless, oppose portraying formerly infertile couples as psychological vulnerable and even suggest positive consequences of the infertility and ART experience (Repokari et al., 2005). Alternatively (or simultaneously), a selective mechanism may be at work: those who start and sustain in the ART treatments are more resilient than those who do not (Olivious et al., 2004; Repokari et al., 2005).

Results are also reassuring in that they describe an overall scenario similar to the one described in the international scientific field literature concerning other developed western countries (e.g. Belgium, U.K., Denmark, The Netherlands, Australia, among others).

Portuguese families that may need to use ART to conceive may thus be reassured that this method of conception is not expected to have negative repercussions neither on the parents' well-being nor on those aspects of parenting that matter most for the children's optimal psychosocial development. Moreover, it is generally assumed that a positive parent-child relationship in early childhood leads to good relationships in adulthood (Bowlby, 1969). As such, it is not expected that extra problems in the parent-child relationship of families created by ART will arise during the child's transition to adolescence (van Balen, 1998). In summary, when assisted reproduction is used, the parents' well-being and the welfare of the child seem to be assured.

The individual, dyadic and social contexts of the transition to parenthood

The transition to parenthood has been described as a near universal experience for individuals and families that, although being a normative event, is associated with changes that occur in different areas and at different

ecological levels (Cowan & Cowan, 2000) and, as such, can also be a period of disequilibrium and reorganization for many individuals (Michaels & Goldberg, 1988).

In general, results from the present study are consistent with this definition, as several changes were observed regarding all parents and across different contextual levels during this transition period.

At the individual level, although no increased distress was reported, as expected, a decrease in the parents' well-being was observed that proved to be different regarding men and women. Results indicate that women's psychological well-being is more negatively affected by the experience of pregnancy and early postpartum than men's. Also, women's physical well being is clearly affected by the experience of pregnancy, and during the postpartum period, women seem to be less satisfied with environmental conditions that may impact on their well-being. This increased subjective dissatisfaction may be associated with gender-based role divisions, as women tend to stay at home taking care of the household and parental tasks, reducing their opportunity for external reinforcements, such as leisure and learning opportunities. Then again, some environmental conditions (e.g. transports, physical environment, and accessibility) may be reassessed as women have to deal with their daily routines in the company of their child.

In general, these results suggest that women experience somewhat more adjustment difficulties than men across the transition to parenthood, although the scenario found is not as accentuated as the literature suggests. For instance, literature indicates that, compared to men, women experience more depressive symptoms (e.g. Cox, Holden, & Sagovsky, 1987; Cowan & Cowan, 1995) and increasing stress levels across the transition to parenthood (e.g. Levy-Shiff, 1999). In our study, however, no gender differences were found regarding psychological distress and parenting stress. Additionally, men even seem to experience a higher decrease in their social relationship quality of life than women.

At the couple's level, a decrease in satisfaction with the marital relationship was observed, as was already documented by several empirical studies in the field (e.g. Belsky & Rovine, 1990; Cowan et al., 1985; Shapiro, Gottman, & Carrère, 2000).

The marital relationship also proved to be related to the quality of parenting. Results showed that those parents that are more satisfied with their marital relationship are more likely to report a higher acceptance of their parental role and to experience higher delight in being with their child, thus showing that feelings of satisfaction and love that emanate from the marital relationship promote a positive parenting environment and adequate parenting practices (Grych, 2002). Indeed, several studies had already documented what has been named as a “spillover” effect from the marriage to the parent-child relationship (Grych, 2002), in the form of positive associations between marital quality, skilful parenting and child functioning (cf. Erel & Burman, 1995; Gable, Belsky, & Crnic, 1992; Krishnakumar & Buehler, 2000).

This relation between the couples’ marital relationship and the care they provide to their child may, nonetheless, be more complex than it seems, as the investment mothers and fathers do on their child, besides being related to their marital relationship, also proved to be highly interrelated. In other words and as already suggested, the investment parents do in their child seems to be a couple-shared feature. This means that mothers and fathers influence each others’ parenting and that there are factors that, by affecting the parental investment of one of the members of the couple, are also affecting the parental investment of the other. Indeed, this interdependence was observed considering all the three dimensions of parental investment in the child investigated (intraclass correlations varied between .33 and .59, but was especially significant regarding knowledge and sensitivity to the child’s needs, in which the variation observed at the couple’s level was even higher than the variation observed at the individual level; cf. Study IV).

Future research should further investigate this couple interdependence. First, those factors that influence parental investment at the individual versus the couple’s level should be identified. Previous studies investigating the determinants of maternal and paternal investment have concluded that these are differently determined (Bradley, Whiteside-Mansell, & Brisby, 1997; Bradley, 1998; Corwyn & Bradley, 1999), but this scenario may prove to be misleading when the couple is studied as a unit. Our own results provide some indication that it may be indeed the case. Although there was a

considerable variation in parental investment in the child observed at the individual level, the variation observed at the couple's level suggests that some factors also influence the couple as a unit. Multilevel analyses proved to be particularly useful to differentiate between these two types of factors.

Second, it is also of importance to investigate if this couple interdependence exists regarding behavioural parenting measures. It may be that mothers and fathers influence each other's parenting attitudes to a significant degree but that their mutual influence regarding actual parental behaviour is smaller.

Finally, regarding the broader social context, our results demonstrated for the first time that, independently of the method of conception, during the transition to parenthood all parents show a strong social nesting movement towards their nuclear family members.

The fact that this nesting movement proved to be also similar for men and women, as already found by other researchers (e.g. Belsky & Rovine, 1984), suggests that it is not merely the consequence of the increased demands of parenthood, but that it may also result from a desire shared by both parents to build a protective social environment for the newborn. The fact that although both men and women reported a strong social nesting movement, social support from their nuclear family members only proved to be beneficial for mothers (i.e. associated positively with maternal investment in the child) is consistent with this claim.

In that sense, the social nesting movement can be conceptualized as the parents' attempt to create an optimal environment for the child to develop and progressively build other significant relationships beyond the attachment relationships he or she has with them.

Thus, parents try to facilitate, but also constrain (as they are the ones that decide which people to bring into their innermost circle of the convoy) the development of their child's own social network. As Cochran and Niego (1995) put it, the way parents introduce network members to their child is related in part to the parent's visions for his or her future. Levitt claimed that the Convoy Model offers a framework for explaining how multiple attachment relationships are formed across the life span (Levitt, 2005). We

add to this by suggesting that during their child's early infancy period, parents play a significant role in defining who their children will form attachment relationships with, that is, in defining how their child's multiple attachment relationships are formed in infancy.

Responsiveness, support, and warmth foster the child's trust in adults and, by extension, in the social world that he or she is beginning to explore (Bowlby, 1969). We predict that more sensitive and responsive parents, besides allowing for their child to develop secure attachment relationships with them, would also facilitate the development of intimate ties between the child and other adult network members, with implications that go beyond the child's emotional development, as interactions between children and adult network members can also foster gains in cognitive development, especially through task oriented activities (Cochran & Brassard, 1979; *cit. Cochran & Niego, 1995*).

Within this line of thinking, the social nesting movement could be regarded as an evolutionary mechanism contributing for the creation of social ties, with obvious adaptive advantages for the child. If so, the availability of adequate social resources or network connections should influence women's reproductive outcome and indeed, data from the evolutionary psychology field of research provides some evidence of this (e.g. Saksena & Srivastava, 1980; Wasser & Isenberg, 1986).

It thus seems important to further research this social nesting phenomenon as to clarify these issues. More specifically, it seems important to investigate (1) how and to what degree do parents function as intermedia-tors in the formation of their child's own relationships; (2) if the social nesting phenomenon is consistent across cultures; and (3) if it is more strongly associated with sensitive and responsive parenting.

Nevertheless, considering the strong social nesting phenomenon documented regarding nuclear family members, one could expect stronger associations between perceived support from these network members and parental adjustment and care. It could be argued that stronger associations were not found (only instrumental support from the nuclear family was found to predict maternal investment in the child, explaining only 7% of its total variance; *cf. Study III*) because support was assessed during preg-

nancy and not at postpartum and, as such, it is not representative of the social nesting phenomenon. We consider that this can indeed be true, at least to a certain degree, as the social nesting phenomenon is characterized by a significant increase in perceived support levels from pregnancy to the postpartum. However, empirical research has shown that there is a considerable stability in the structural and functional features of social networks across the transition to parenthood (Belsky & Rovine, 1984; Bost, Cox, & Payne, 2002; Larner, 1990). That is, men and women who report larger networks and more perceived support during pregnancy are also more likely to report larger networks and more perceived support after the partum. As such, associations between perceived support during pregnancy or postpartum and other variables are likely to be similar.

Furthermore, it should also be noticed that when a single global index of perceived network support was used, it associated positively with both maternal and paternal investment in the child, more specifically, with the delight parents experience in being with their child and with their knowledge and sensitivity towards their child's needs (cf. Study IV).

Empirical findings also suggest that the social nesting movement concerns essentially the parents' nuclear family members, and that it has, as a secondary effect, a withdrawal from friends. This hypothesis could not be tested regarding men as their data could not be analysed (cf. Study II). However, it was also observed that men (but not women) do benefit from their friends' emotional and instrumental support, which indicates that, even if friends do not play a central role in the social nesting phenomenon, as previous research suggests (e.g. Belsky & Rovine, 1984; Bost, Cox, & Payne, 2002), they can still provide adequate support during men's transition to parenthood.

As associations found regarding friends were stronger for perceived emotional support than instrumental, we suggested that it is the emotional component of support perceived from friends, more than their practical help, which is beneficial to men (cf. Study III, Discussion). However, a more detailed investigation of the specific supportive behaviours/functions fulfilled by the three different categories of providers considered in studies II and III could be useful, not only to test this hypothesis, but also to better

explain why support from nuclear and extended family and friends relate differently to parental adjustment and care. In other words, a multidimensional view of social support could be helpful to identify which specific behaviours have beneficial versus deleterious effects on the mothers' and fathers' adjustment and on the care they provide to their children. We thus suggest an even deeper level of analysis than the one already carried out. Qualitative methodologies should be useful, at least during a first phase of such research, in order to identify and describe the kinds of behaviours that should be quantitatively assessed at a subsequent research phase.

In summary, the parents' social network proved to be an important source of support for parents, having a direct effect on parental functioning. This was documented in several different ways, more specifically, through the increases observed in perceived support across the transition to parenthood period, through the investigation of its associations with parental adjustment and care and, finally, through the investigation of its relative value regarding other factors also known to influence the parenting process (i.e. depression and satisfaction with the marital relationship). Previous research had already highlighted that support from social network members becomes especially important during critical transition times such as the birth of a child (Bost, Cox, & Payne, 2002). Even if more proximal actors, in particular, the parents' partner, have a stronger role in influencing the parenting process and outcomes (Belsky, Robins, & Gamble, 1984; Simons & Johnson, 1996), as was observed regarding parental investment in the child (cf. Study IV), network support, and particularly nuclear family support, cannot and should not be underestimated.

Implications for theory, research and clinical practice

The results obtained in the context of the present doctoral dissertation have important theoretical, research and clinical implications.

On the theoretical level, results provide innovative evidence that all parents, regardless of the method of conception used to achieve pregnancy, seem to exhibit a social nesting movement in which their nuclear family members play a central role. This social nesting phenomenon was presented as an evolutionary mechanism that fosters the creation of an optimal

environment for child development and contributes to the development of intimate ties between the child and other significant others (that are part of the parents' social network).

Our results also add to the field state-of-the-art by demonstrating that parents that conceive spontaneously or through ART do not differentiate in the investment they do in their child, more specifically, in the degree to which they commit to their parental role, in the joy and delight they experience with their child and in their sensitivity and responsiveness to their child's needs.

Additionally, this study documented, also for the first time, the high interdependence mothers and fathers experience in the investment they make in their child, suggesting that parental investment is, to a large degree, a couple-shared feature.

Results also contribute to an already vast empirical literature that describes the transition to parenthood as a demanding period during which both members of the couple experience significant changes at the individual, dyadic and social levels. Moreover, results also add to empirical evidence that indicates that, regardless of the method of conception, there are more similarities than differences in the way parents live this transition period. Nonetheless, they add to this literature by showing that these similarities do not only exist at the individual and dyadic level, but also at a broader social level.

Finally, our results also add to empirical evidence that validates Kahn and Antonucci's (1980) Convoy Model of human development (cf. Study II).

At the research level, several suggestions were presented that are regarded as useful in guiding future empirical research in the infertility and ART field. These suggestions were presented in detail in Chapter 3 and will not be further discussed here, but it should be noticed that they all result from an unifying argument presented throughout this work, which is that a developmental and ecological perspective of parenting is of added value for research conducted on the psychosocial aspects of parenting after an infertility and ART experience.

In a way, our theory-research circular process has now come to an end

and it has further reinforced the theoretical framework proposed, by showing that it is equally valid in the specific context of parenting after assisted reproduction, that is, that those principles said to describe and explain parenting as a universal phenomenon are still applicable when parenthood is achieved through assisted reproduction.

Additionally, several new specific questions that need to be addressed empirically emerged from this study, namely (1) if the experience of more pregnancy-related worries and anxieties by parents that conceive through ART is associated with an increase in the adoption of preventive behaviours during pregnancy, which could ultimately positively impact their obstetrical and perinatal outcomes; (2) the social nesting phenomenon, considering larger and multicultural samples and longer postpartum periods, so as to try to understand to what degree parents function as mediators in the formation of their child's own social relationships and if this mediation role is associated with more positive parenting; (3) which specific supportive behaviours from the social network members have beneficial versus deleterious effects on parental adjustment and care; (4) the high interdependence mothers and fathers present on the investment they make in their child, in order to understand which factors influence it at the individual versus couple level, and if this mutual influence is not only observed at the attitudinal level but also at the behavioural level; and finally, (5) what other possible mechanisms can explain the buffering effect of assisted conception on effective parenting.

At the methodological level, results found, namely concerning quality of life, also highlight the importance of assessing psychological adjustment across the transition to parenthood as a multidimensional construct and, in the specific context of parenthood after assisted reproduction, of the importance of favouring an extensive and comprehensive assessment of all negative and positive valued dimensions expected to contribute to all parents' psychosocial adjustment (independently of method of conception), in detriment of using ART specific measures.

Finally, results from this study also have implications for clinical practice.

If, on the one side, results point to the challenges presented to all par-

ents that are inherent to the transition to parenthood period, on the other side they suggest that these are not significantly different for parents that conceive spontaneously or through ART.

As such, the main clinical implication deriving from the results presented is that healthcare professionals should be available to assist all couples in their efforts to adapt to the changes associated to this life transition. This is not an innovative suggestion, as previous researchers have already claimed that there is enough data to provide a solid justification of the need for preventive intervention programs designed to ease the transition to parenthood (Cowan & Cowan, 1995). Nonetheless it seems that until recently, research into systematic couple interventions during the transition to parenthood has been very limited and that virtually no specific treatment guidelines exist for this population (cf. Glade, Bean, & Vira, 2005).

It is not within the scope of the present work to provide such intervention guidelines (for a brief description on the domains these interventions should address see Glade, Bean, & Vira, 2005), nonetheless, our results do suggest specific topics that should be taken into consideration.

Generally speaking, preventive or intervention programmes should be directed at the couple instead of just the women or the men. Besides the fact that parenthood is a couple's project, our data supports this idea in several different ways. First, by describing a decrease in the parents' satisfaction with their marital relationship across the transition to parenthood that could be addressed in the context of these interventions. Second, by suggesting that parental investment in the child is a couple-shared feature, it is also pointing to the importance of treating the couple as a unit when addressing parenting issues. Third, the fact that the marital relationship proved to be associated with parental investment in the child further reinforces this idea.

Nonetheless, these therapeutic services should take into account gender differences in the experience of the transition to parenthood. More specifically, these interventions should prepare both men and women for the way they will differently experience this transition, for instance by describing which areas are expected to be most affected for each gender. Our data suggests that women experience higher decreases in their physical

(only during pregnancy), psychological and environmental well-being than men, but that for the latter, the transition to parenthood seems to have a stronger negative impact on their social relationships.

Within this line of thinking, in order to decrease marital dissatisfaction, it can also be beneficial for couples to examine their expectations regarding their role as “father” and “mother” and how these will mesh with the role expectations of their partner, as it seems that these expectations have implications for the quality of the marital relationship (Glade, Bean, & Vira, 2005).

Finally, our results also point to the important role social network members play during this life transition and, as such, interventions should evaluate the parents’ social network and encourage parents to elicit more support from their social network members during this life transition, especially from their nuclear family members.

In a more general way, health professionals should be aware of the identified risk (e.g. low prenatal marital satisfaction) and protective factors (e.g. support from the social network) for the parents’ positive adjustment during the transition to parenthood and for effective parenting. These should be carefully assessed and any intervention should maximise protective factors while eliminating or minimizing the deleterious impact of risk factors (Rutter, 1990).

The empirical literature on the transition to parenthood after an infertility and ART experience and our own data are consistent in indicating that there is no need for specific intervention programmes directed at parents that conceive through ART. These parents could benefit from the same therapeutic services as all parents, regardless of the way conception was achieved.

However, empirical research and results from this study also suggest that sensitivity is required in addressing these parents’ unique experience of the transition to parenthood and the subtle ways in which adjustment may differ for these families (Gibson et al., 2000b). This implies that health professionals involved in the care of parents during pregnancy and after birth should be aware of the parents’ reproductive history, including fertil-

ity status and method of conception.

Additionally, our results indicate that health professionals should be available to provide information about the obstetrical and perinatal risks associated with pregnancy after assisted reproduction. Also, these parents' concerns about their pregnancy viability and the health of the foetus could be alleviated by supportive counselling and a greater awareness of the fact that their concerns are not unique but are in fact shared by other parents that went through a similar reproductive experience (McMahon et al., 1997a).

Our results also suggest that parents that conceive through ART may be so focused on the positive aspects of being a parent that they may be unprepared for the disruption that a young child brings into a home. Health care providers need to help these parents to develop realistic expectations towards parenthood and their child, by providing information on the challenges associated with the birth and parenting of a child.

In conclusion, in a society where ART treatments are becoming increasingly used, it is encouraging to verify that successful ART treatments do not have significant detrimental effects on families or the health and social care system. However, practitioners working with families created by ART need to remain aware of the particular issues that surround these families. This seems to be especially important because, as ART will continue to evolve and to be more and more used by traditional and non-traditional families, so too the challenges confronting families and practitioners will evolve (Gibson & McMahon, 2004).

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