Social Nesting: Changes in Social Network and Support Across the Transition to Parenthood in Couples That Conceived Spontaneously or Through Assisted Reproductive Technologies

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Research showed that following the birth of a first child, parents increase contact with family members and diminish contact with friends, however, these changes may differ when conception is achieved through assisted reproductive technologies (ART). Based on the convoy model (Kahn & Antonucci, 1980) perspective of close relationships, we examined 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 spontaneous conception provided data on social network and support from nuclear family, extended family, and friends twice: at 24-weeks pregnancy and 4-months postpartum. Results demonstrated that, regardless of method of conception, during the transition to parenthood new parents showed a strong nesting movement towards their nuclear family, perceiving increasing levels of nuclear family support across time. Extended family seemed to have only a secondary role on the social nesting movement and a withdrawal from friends was also observed. Considering the primary role nuclear family members seem to have on providing effective support to child-rearing, a greater emphasis on the importance of parents' relationship with their own parents and siblings could be made and social and working policies that prevent the displacement of families geographically also should be considered.

Keywords: infertility, assisted reproductive technologies, transition to parenthood, social network, social support

Infertility is a reproductive health problem that affects 9% of the childbearing population worldwide (Boivin, Bunting, Collins, & Nygren, 2007). Many infertile couples will use assisted reproductive technologies (ART) to achieve parenthood and the latest statistics on ART show that more than 200,000 children are conceived every year with ART (de Mouzon et al., 2009). There is a large research base examining the transition to parenthood in couples conceiving with ART with the focus being mainly on the parents’ individual and marital adjustment and on the quality of their relationship with their child (cf. Hammarberg, Fisher, & Wynter, 2008). Comparatively less attention has been directed to parents’ social context despite evidence that previous infertility can have a negative effect on how parents-to-be experience and share with others their pregnancy and how they interact with their social environment during the transition to parenthood (Fisher, Hammarberg, & Baker, 2008; McMahon, Ungerer, Tennant, & Saunders, 1999). Given the importance of the social network for parenting and child adjustment (e.g. Bost, Cox, & Payne, 2002; Leinonen, Solantaus, & Punamäki, 2003), it is important to better document changes in social networks and support across the transition to parenthood (from the third trimester of pregnancy to 4 months postpartum) in couples that conceived through ART compared to those who
achieved a spontaneous conception. Findings from this research could be useful to better prepare previously infertile couples making their transition to parenthood.

Social Network and Support Across the Transition to Parenthood

Researchers interested in understanding the processes and outcomes of parenting advocate the need to examine the social ecologies in which parents-to-be are embedded (Belsky, 1984; Cowan, Cowan, Herring, & Miller, 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 et al., 2002). 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 social convoy is viewed as emerging developmentally from a core of attachment relationships in infancy and expanding to include other important relationships as the individual 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, Akiyama, & Takahashi, 2004). With no a priori assumptions regarding network members, the convoy structure is conceptualized empirically as a hierarchy of three concentric circles surrounding the individual, which represent different levels of perceived intimacy or closeness.

An example of a convoy diagram is presented in Figure 1. Relationships in the innermost circle (C1) are the most intimate and stable across age and time, providing high levels of support (i.e., attachment relationships), whereas the outer circles (C2 and C3) represent increasingly less intimate and stable relationships. The association between support provision and network membership position is not necessarily linear as it may vary across time and according to specific situational demands (Levitt, 2005). Kahn and Antonucci (1980) observed that the structural and functional properties of the network can be described at any given point in time and in terms of changes that occur during normative and nonnormative 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).

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 to meet their new support needs (Levitt, 2005). Research has shown that following the birth of a first child contact with parents and other family members tends to increase (Belsky & Rovine, 1984; Bost et al., 2002; Flaherty & Richman, 1989) and that more support is requested and perceived from them (Belsky & Rovine, 1984; Power & Parke, 1984). At the same time, the number of friends in the network decreases (Bost et al., 2002). It seems, therefore, that across the transition to parenthood parents-to-be move toward their kinships but withdraw from friends. This inward movement towards family members, a kind of social nesting, may result from the desire of parents-to-be to build a more appropriate environment for the provision of optimal childcare and from a need of extra support in the face of the new demands of caring for a newborn. Although family members may be seen as the appropriate people to fulfill these support functions due to their family affiliation ties with the baby, contact and support from friends may diminish because these may be (or parents may perceive them to be) less available to provide assistance with the everyday tasks and responsibilities of parenting (Simons & Johnson, 1996).

Given the consistent associations found between social network size and support and parenting and child outcomes (e.g., less depression, better marital relationship, sensitive maternal behavior, Bost et al., 2002; Leinonen et al., 2003), it seems important to better document the transition to parenthood of parents that conceive through ART in relation to that of couples without recourse to medical intervention.

The Impact of Infertility and ART on Parents’ Social Network and Support

Evidence from the infertility literature suggests that the social nesting of couples that use ART may be different because their pathway to parenthood is atypical. Although most of the time infertile couples inform their close friends and family of their difficulty conceiving and most perceive overall support from their significant others (Peronace, Boivin, & Schmidt, 2007), infertile people can also be the target of painful comments regarding their inability to conceive, of moral judgments and disapproval from their family regarding their choice to undergo ART (e.g., Ellison & Hall, 2003). As a result infertile couples tend to regulate what and to whom they tell about the medical and emotional aspects of their infertility treatment experience (Schmidt, 1996). Infertile couples’ social relationships may also be affected
because fertility treatments are often time consuming and require many clinic visits, diminishing opportunities for contact with friends and acquaintances. Further, there is much evidence that during the treatment period infertile couples avoid friends that have children because such contact is emotionally difficult for the couple still trying to conceive (Miall, 1985). Although successful ART represents the fulfillment of the parenthood dream (and end of infertility), the social relationships of parents that conceive through ART differ from the ones of couples with a spontaneous conception because their experience of pregnancy is different. As obstetrical risks are higher than in a spontaneous pregnancy, couples that conceive through ART have more worries about a miscarriage and consequently often delay telling others about their pregnancy (McMahon et al., 1999). Further, because previously infertile women typically have children at older ages, they tend to have fewer friends going through the same experience with whom they can confide (Rosenthal & Kingsberg, 1999). Finally, previously infertile women often feel reluctant to talk frankly of these worries and/or find it is inappropriate to express their mixed feelings and ambivalence about the realities of parenthood to others because of the significant effort made to achieve their pregnancy (Fisher et al., 2008).

In summary, it would seem that the social relations of ART parents-to-be may be disrupted by reactions and coping surrounding the long-awaited pregnancy. A few studies have focused on the social relationships of parents that conceived through ART. One study conducted with parents of 3-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 social integrated than parents with a spontaneous conception (Munro, Ironside, & Smith, 1992). More recent studies with parents of singletons (Gibson, Ungerer, Tennant, & Saunders, 2000) or twins (Vilska et al., 2009) conceived with ART or spontaneously revealed no differences in perceived social support, social dysfunction, or influence in social life. However, none of these studies prospectively monitored network and support changes across the transition to parenthood neither considered different types of support providers, which could allow for a better understanding of how the infertility experience impacts on the way parents relate to different significant persons during this specific life transition. This information could be useful when helping previously infertile couples preparing for their transition to parenthood.

### Study Aims and Hypotheses

In this prospective study we examined changes across the transition to parenthood in the social networks and support (i.e., the social nesting) of men and women that conceived through ART compared with men and women with a spontaneous conception. This study further aimed to investigate the validity of the convoy model.

We used the convoy model to map movement in social network and assess changes in social support during the transition to parenthood (from the 24th pregnancy week to 4-months postpartum), considering three categories of support providers: nuclear family (parents and siblings), extended family (in-laws and other relatives), and friends.

On the basis of the research reviewed, it was hypothesized that the social nesting would empirically manifest in an increase of extended family members and in a decrease of friends, both for couples that conceived spontaneously or through ART. However, in the case of couples that used ART the social nesting was expected to be modified by the experience of infertility, whereby there would be a smaller increase of extended family members and a greater decrease of friends. Finally, it was also expected that the social network size would be smaller for ART versus spontaneous conception groups. 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 but the decrease more pronounced. Couples that conceived through ART were expected to report lower levels of overall perceived support from nuclear and extended family and friends. Regarding the convoy model assumptions, we hypothesized that, for all parents, the number of nuclear family members would be higher in the first circle of the convoy than in the second, and stable across time. Also, changes in the number of extended family members and friends and in perceived support from these network members would be more pronounced in the second circle of the convoy than in the first. Finally, in general higher levels of perceived support were expected regarding members located in the first circle of the convoy than in the second.

### Method

#### Participants and Procedures

The final sample consisted of 22 couples and nine women (whose partners did not provide social data) that conceived through ART (in vitro fertilization - IVF and intracytoplasmic sperm injection - ICSI, using the couples’ own gamete) and 24 couples and four women (whose partners did not provide social data) with a spontaneous conception.

The Ethics Committee of the University of Coimbra Hospitals provided ethical review approval. Consecutive couples (ART or spontaneous conception) attending for their first 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, were invited to participate in the study. Inclusion criteria were age (18 years or older), nulliparous, singleton pregnancy and literacy level sufficient to complete the assessment protocol. If participants agreed to collaborate, they completed a consent form and were later contacted 1 week prior to their 24th pregnancy week (first assessment point), while attending their obstetric consultation. Questionnaires were then delivered with the instructions that spouses should complete them separately during the following week.

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and bring them to their next consultation. One week before
the second assessment point (4-months postpartum), ques-
tionnaires 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. As agreed with the participants at the time of consent,
a reminder phone text message was sent a week after and
within 2 weeks a reminder phone call was made.

A total of 136 couples (66 that conceived through ART
and 70 with a spontaneous conception) agreed to be con-
tacted about the study. From the ART group, 11 couples
never returned the questionnaires, eight couples had a
multiple pregnancy and three lost their pregnancies prior to
assessment. From the remaining 44 couples, 39 women and
35 men (35 couples) completed the questionnaires at 4
months. However, of these only 22 couples and nine
women completed the time-consuming convoy model (5
to 10 min to complete) and were therefore included in the
present study (participation rate of 40.15%). From the
spontaneous conception group, 20 couples never returned
the questionnaires and, from the remaining 50, only 33
women and 32 men completed the questionnaires at
4-months postpartum. Of these 24 couples and four
women completed the convoy and were included in the
present study (participation rate of 37.14%). Those
women that did not return questionnaires at Time 2 (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 returned them. No differences were found
between men that did and did not return questionnaires
at T2.

All individuals from our sample were Portuguese White.
Women that conceived with ART were older (\( M = 33.6,\)
\( SD = 3.2 \)) than women that conceived spontaneously (\( M =
27.5, SD = 4.3 \)), \( t(1, 57) = 6.34, p < .001 \), and were with
their partner for a longer time (\( M = 7.3, SD = 3.0 \) versus
\( M = 3.1, SD = 1.9 \)), \( t(1, 45) = 5.83, p < .001 \). Men that
conceived with ART (\( M = 34.1, SD = 3.3 \)) were also older
than men that conceived spontaneously (\( M = 30.1, SD =
5.0 \)), \( t(1, 44) = 3.38, p < .01 \), and were with their partner
also for a longer time (\( M = 7.2, SD = 2.6 \) versus \( M = 3.1,\)
\( SD = 1.9 \)), \( t(1, 26) = 5.57, p < .001 \). Most individuals had
senior or university education and medium or medium high
socioeconomic status. No significant differences were found
regarding education, socioeconomic status, and women’s
employment status after the partum (working versus child-
birth leave/unemployment/vacations) between the ART
and spontaneous conception groups. Women that conceived
through ART were trying to achieve pregnancy for an
average of 5 years (\( M = 5.00, SD = 2.56 \), range 1 to 12) and
men for 4 years (\( M = 4.48, SD = 2.03 \), range 1 to 8) and
both had done on average one in vitro fertilization treatment
cycle (IVF or ICSI, women: \( M = 1.07, SD = 1.07 \), range 0
to 4; men: \( M = 1.00, SD = 1.12 \), range 0 to 4).

Measures

Network information was obtained by asking individuals
to map their relations hierarchically into the convoy model
concentric circle diagram (Kahn & Antonucci, 1980). Par-
ticipants 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 (rather than name)
and this description was used to assign the member to the
nuclear, extended family or friends’ category (cf. Figure 1).
Based on this configuration a total of six 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 (minimum) to 5 (maximum), 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 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, 2008). In the present
sample, Cronbach’s 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 scores for the four items of
emotional and four items of instrumental perceived support
were calculated for each type of relationship (nuclear and
extended family and friends) in C1 and C2. These values
ranged from 0 (minimum) to 20 (maximum). No network
and support scores were computed regarding the third circle
of the convoy.

Socioeconomic status was rated according to five catego-
ries (low, e.g., house maids; medium-low, e.g., nonspecial-
ized workers; medium, e.g., small companies’ owners;
medium-high, e.g., high school and university professors;
and high, e.g., government or private companies adminis-
trators), 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).

Analyses

Distributions were examined for missing data. Demo-
graphic 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 substi-
tuted with the relevant group (ART, spontaneous concep-
tion) mean. Because the spouses’ social network and sup-
port data were not independent (significant canonical
correlations found were of .735, \( p < .001 \), and .672, \( p < .05 \),
for network size during pregnancy and the postpartum
period, respectively, and of .823, \( p < .001 \), and .759, \( p < .05 \),
for emotional and instrumental support during preg-
nancy), the use of hierarchical linear models or linear mixed
models was considered. However, in this research nine different dependent variables are investigated and, as such, it would imply the estimation of nine different four-level models (fourth level: dyad, third level: subject, second level: time, first level: circle of the convoy model), which would increase the risk of alpha inflation. In addition, several authors have warned against the rapid incorporation of complex multilevel models before their performance is adequately understood and evaluated, and especially when it is done with little regard to the adequacy of the data and the inferences that can be drawn from it (Dattalo, 2008, p. 36; see also Hox, 2002; Kreft, 1996).

Consequently, analyses were conducted separately for women and men and multivariate analysis of variance (MANOVA) was used to reduce the risk of alpha inflation from carrying out separate analyses of variance (ANOVAs). The MANOVAs on social network size and perceived emotional and instrumental support were performed with group (ART and spontaneous conception) as the between-subjects factor and time (pregnancy and postpartum) and circle of the convoy model (C1 and C2) as the within-subjects factor. Although significant differences were found between the two groups of parents regarding age and duration of relationship with partner, these variables were not controlled in the MANOVAs because they characterize the group of ART parents (i.e., association between age and fertility) and, as such, we would be removing an essential feature of what it means to be a parent conceiving with ART if we controlled for time factors. Significance was defined as \( p < .05 \), but marginally significant effects are also reported \( (p < .10) \). Effect size measures \( (\eta^2) \) are presented for all analyses. Post hoc power calculations demonstrated that the achieved sample size was sufficient to detect large effects \( (f = .40, p < .05, \text{power} = .80, G \ast \text{Power}, Faul, Erdfelder, Lang, \& Buchner, 2007) \). For men all measures concerning friends were not analyzed because men that conceived spontaneously did not include friends in C1 of the convoy 4-months postpartum (cf. Table 1). 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 1 shows extended family and friends network composition during pregnancy and postpartum for both men and women that conceived through ART and spontaneously. Table 2 presents follow-up ANOVA results for women for the MANOVA. \( F \) ratios are presented as a function of the type of factor in the ANOVA model and type of relationship of the convoy members. Only statistically significant results will be reported in the text. For women, the multivariate effect for time was significant. From pregnancy to postpartum, women reported an increase in the number of nuclear family members in their network (see Figure 2) and a decrease in the number of extended family members and friends. There was a multivariate main effect for circle. Women reported more nuclear family members and fewer extended family members and friends in C1 of the convoy than in C2. The time and circle main effects were qualified by a marginally significant multivariate interaction effect regarding friends. Although the number of friends located in C1 did not change from pregnancy to the postpartum period, the number of friends located in C2 of the convoy decreased.

Table 3 presents follow-up ANOVA results for men for the MANOVA. \( F \) ratios are presented as a function of the type of factor in the ANOVA model and type of relationship

#### Table 1

*Number of Extended Family Members and Friends Included in Each Circle of the Convoy*

<table>
<thead>
<tr>
<th>Variable</th>
<th>ART Pregnancy</th>
<th>SC Pregnancy</th>
<th>ART 4-months postpartum</th>
<th>SC 4-months postpartum</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( M )</td>
<td>( SD )</td>
<td>( M )</td>
<td>( SD )</td>
</tr>
<tr>
<td>Women C1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extended family</td>
<td>0.48</td>
<td>0.96</td>
<td>1.29</td>
<td>1.88</td>
</tr>
<tr>
<td>Friends</td>
<td>0.03</td>
<td>0.18</td>
<td>0.04</td>
<td>0.19</td>
</tr>
<tr>
<td>C2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extended family</td>
<td>1.94</td>
<td>1.73</td>
<td>2.18</td>
<td>2.36</td>
</tr>
<tr>
<td>Friends</td>
<td>1.06</td>
<td>1.31</td>
<td>0.93</td>
<td>1.12</td>
</tr>
<tr>
<td>Men C1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extended family</td>
<td>0.59</td>
<td>1.30</td>
<td>1.04</td>
<td>1.78</td>
</tr>
<tr>
<td>Friends</td>
<td>0.23</td>
<td>0.69</td>
<td>0.13</td>
<td>0.34</td>
</tr>
<tr>
<td>C2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extended family</td>
<td>2.32</td>
<td>1.46</td>
<td>1.83</td>
<td>2.30</td>
</tr>
<tr>
<td>Friends</td>
<td>0.73</td>
<td>1.32</td>
<td>0.75</td>
<td>1.22</td>
</tr>
</tbody>
</table>

*Note.* \( N = 105 \). Women: ART pregnancy and 4-months postpartum, \( n = 31 \); SC pregnancy and 4-months postpartum \( n = 28 \); men: ART pregnancy and 4-months postpartum \( n = 22 \); SC pregnancy and 4-months postpartum \( n = 24 \). Data on nuclear family consult figures. ART = assisted reproduction conception; SC = spontaneous conception; C1 = first/innermost circle of the convoy model; C2 = second circle of the convoy model.
Table 2
The Magnitude of Factor Effects for Women as a Function of the Type of Factor in the Analysis of Variance Model and Type of Relationship of the Convoy Members

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group</th>
<th>Time</th>
<th>Circle</th>
<th>Time × Group</th>
<th>Group × Circle</th>
<th>Time × Circle</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$F(3, 54) = 1.04, \eta^2 = .05$</td>
<td>$F(3, 55) = 9.39, \eta^2 = .34^{***}$</td>
<td>$F(3, 55) = 33.42, \eta^2 = .65^{***}$</td>
<td>$F(3, 55) = 1.48, \eta^2 = .08$</td>
<td>$F(3, 55) = 1.76, \eta^2 = .09$</td>
<td>$F(3, 55) = 2.55, \eta^2 = .12^{†}$</td>
</tr>
<tr>
<td>Network size</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nuclear family</td>
<td></td>
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<tr>
<td>Extended family</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Friends</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Emotional support</td>
<td>$F(3, 54) = 1.62, \eta^2 = .08$</td>
<td>$F(3, 55) = 6.28, \eta^2 = .26^{***}$</td>
<td>$F(3, 55) = 39.17, \eta^2 = .08^*$</td>
<td>$F(3, 55) = 0.77, \eta^2 = .40$</td>
<td>$F(3, 55) = 4.10, \eta^2 = .18^*$</td>
<td>$F(3, 55) = 0.63, \eta^2 = .03$</td>
</tr>
<tr>
<td>Nuclear family</td>
<td>$T1 &lt; T2: \eta^2 = .16^{**}$</td>
<td>$C1 &gt; C2: \eta^2 = .43^{***}$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extended family</td>
<td>$T1 &gt; T2: \eta^2 = .12^{**}$</td>
<td>$C1 &lt; C2: \eta^2 = .33^{***}$</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Friends</td>
<td>$T1 &gt; T2: \eta^2 = .07^{***}$</td>
<td>$C1 &lt; C2: \eta^2 = .47^{***}$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instrumental support</td>
<td>$F(3, 54) = 1.92, \eta^2 = .10$</td>
<td>$F(3, 55) = 3.47, \eta^2 = .16^{**}$</td>
<td>$F(3, 55) = 44.92, \eta^2 = .71^{***}$</td>
<td>$F(3, 55) = 1.14, \eta^2 = .06$</td>
<td>$F(3, 55) = 2.82, \eta^2 = .13^*$</td>
<td>$F(3, 55) = 0.46, \eta^2 = .02$</td>
</tr>
<tr>
<td>Nuclear family</td>
<td>$T1 &lt; T2: \eta^2 = .12^{**}$</td>
<td>$C1 &gt; C2: \eta^2 = .54^{***}$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extended family</td>
<td>$T1 = T2: \eta^2 = .01$</td>
<td>$C1 &lt; C2: \eta^2 = .19^{***}$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Friends</td>
<td>$T1 = T2: \eta^2 = .01$</td>
<td>$C1 &lt; C2: \eta^2 = .48^{***}$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. T1 = pregnancy; T2 = 4-months postpartum; C1 = first/innermost circle of the convoy model; C2 = second circle of the convoy model; ART = assisted reproduction conception; SC = spontaneous conception.

$^† p \leq .1$. $^* p \leq .05$. $^{**} p \leq .01$. $^{***} p \leq .001$. 
of the convoy members. For men, only data on nuclear and extended family members are reported because data regarding friends violates assumptions for ANOVA (see Method). The multivariate effect for time was significant. From pregnancy to postpartum, men reported an increase in the number of nuclear family members in their network (see Figure 3). There was a multivariate main effect for circle. Men included a greater number of nuclear family members and a smaller number of extended family members in C1 than in C2 of the convoy. The circle main effect was qualified by a marginally significant multivariate interaction effect between group and circle regarding nuclear family. Men that conceived through ART tended to include fewer nuclear family members located in C1 of the convoy than men that conceived spontaneously, but there was no difference between groups in C2. For women, a significant multivariate time effect was found. From pregnancy to postpartum, women reported an increase in perceived emotional support from nuclear family (see Figure 4) and a decrease in emotional support from extended family. A significant multivariate effect was found for circle. More support was perceived from nuclear family and less from extended family and friends 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 for nuclear family. Although in C1 no differences were found, in C2 women that conceived through ART perceived more emotional support from nuclear family than women that conceived spontaneously. For men, the multivariate effect for time was significant. From pregnancy to postpartum, men reported an increase in perceived emotional support from nuclear family (see Figure 5). There was a significant multivariate interaction effect between time and group regarding perceived emotional support from extended family. Men that conceived through ART reported a decrease in perceived emotional support from pregnancy to the postpartum period whereas this difference was not significant in men that conceived spontaneously. A multivariate main effect for circle was found. Men perceived more emotional support from nuclear family and less support from extended family 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, regarding emotional support perceived from nuclear family. In C1, men in the ART group perceived less emotional support from nuclear family than men in the spontaneous conception group. In C2, they perceived more emotional support from nuclear family (see Figure 5) than men in the spontaneous conception group.

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 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**

For women, a significant multivariate time effect was found. From pregnancy to postpartum, women reported an increase in perceived instrumental support from nuclear family (see Figure 6). A significant multivariate effect was found for circle. More support was perceived from nuclear family and less from extended family and friends located in C1 than in C2 of the convoy. The circle main effect was qualified by a significant interaction effect between group and circle regarding nuclear family and friends. Although in C1 no differences were found between groups regarding perceived instrumental support from nuclear family, in C2 women that conceived through ART tended to perceive
Table 3

The Magnitude of Factor Effects for Men as a Function of the Type of Factor in the Analysis of Variance Model and Type of Relationship of the Convoy Members

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group</th>
<th>Time</th>
<th>Circle</th>
<th>Time × Group</th>
<th>Group × Circle</th>
<th>Time × Circle</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F(2, 43) = 2.05, (\eta^2 = .09)</td>
<td>F(2, 43) = 6.8, (\eta^2 = .24^***)</td>
<td>F(2, 43) = 16.49, (\eta^2 = .43^***)</td>
<td>F(2, 43) = 0.74, (\eta^2 = .03)</td>
<td>F(2, 43) = 3.19, (\eta^2 = .13^*)</td>
<td>F(2, 43) = 0.05, (\eta^2 = 0)</td>
</tr>
</tbody>
</table>
| Nuclear family    | T1 < T2: \(\eta^2 = .21^***\) | C1 > C2: \(\eta^2 = .20^{**}\) | \multicolumn{3}{c|}{\multicolumn{3}{c|}{\multicolumn{3}{c|}}}
|                   | F(1, 44) = 5.55, \(\eta^2 = .11^*\) | C1: ART < SC: \(\eta^2 = .22^{**}\) | C2: ART = SC: \(\eta^2 = .03\) | F(1, 44) = 1.68, \(\eta^2 = .04\) |
| Extended family   | T1 = T2: \(\eta^2 = .01\) | C1 < C2: \(\eta^2 = .29^{***}\) | \multicolumn{3}{c|}{\multicolumn{3}{c|}{\multicolumn{3}{c|}}}
| Emotional Support | F(2, 43) = 0.05, \(\eta^2 = .00\) | F(2, 43) = 5.19, \(\eta^2 = .19^*\) | F(2, 43) = 18.12, \(\eta^2 = .46^{***}\) | F(2, 43) = 3.97, \(\eta^2 = .16^{**}\) | F(2, 43) = 4.07, \(\eta^2 = .16^{**}\) | F(2, 43) = 0.69, \(\eta^2 = .03\) |
| Nuclear family    | T1 < T2: \(\eta^2 = .17^{**}\) | C1 > C2: \(\eta^2 = .36^{***}\) | \multicolumn{3}{c|}{\multicolumn{3}{c|}{\multicolumn{3}{c|}}}
|                   | F(1, 44) = 7.11, \(\eta^2 = .14^{**}\) | C1: ART = SC: \(\eta^2 = .03\) | F(1, 44) = 3.63, \(\eta^2 = .08^*\) |
| Extended family   | T1 = T2: \(\eta^2 = .03\) | C1 < C2: \(\eta^2 = .17^{**}\) | \multicolumn{3}{c|}{\multicolumn{3}{c|}{\multicolumn{3}{c|}}}
| Instrumental support | F(2, 43) = 1.73, \(\eta^2 = .08\) | F(2, 43) = 7.03, \(\eta^2 = .23^{***}\) | F(2, 43) = 10.33, \(\eta^2 = .33^{***}\) | F(2, 43) = 1.98, \(\eta^2 = .08\) | F(2, 43) = 2.48, \(\eta^2 = .10\) | F(2, 43) = 0.41, \(\eta^2 = .10\) |
| Nuclear family    | T1 < T2: \(\eta^2 = .23^{***}\) | C1 > C2: \(\eta^2 = .26^{***}\) | \multicolumn{3}{c|}{\multicolumn{3}{c|}{\multicolumn{3}{c|}}}
|                   | C2: ART = SC: \(\eta^2 = .02\) | C2: ART = SC: \(\eta^2 = .04\) |
| Extended family   | T1 = T2: \(\eta^2 = .04\) | C1 < C2: \(\eta^2 = .11^{*}\) | \multicolumn{3}{c|}{\multicolumn{3}{c|}{\multicolumn{3}{c|}}}

Note. T1 = pregnancy; T2 = 4-months postpartum; C1 = first/innermost circle of the convoy model; C2 = second circle of the convoy model; ART = assisted reproduction conception; SC = spontaneous conception.
more instrumental support from nuclear family than women that conceived spontaneously. 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 tended to be stronger regarding C1 than C2. For men, a significant multivariate time effect was found. Perceived instrumental support from nuclear family increased from pregnancy to postpartum (see Figure 7). A significant multivariate effect was found for circle. More instrumental support was perceived from nuclear family located in C1 of the convoy than located in C2. On the contrary, less instrumental support was perceived from extended family members located in C1 than located in C2.

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 tended to perceive more instrumental support from their nuclear family members located in C2 of the convoy, but perceived less instrumental support from friends located in both circles, when compared to women in the spontaneous conception group. Men and women also perceived less instrumental support from extended family members located in C1 than located 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 their nuclear family members toward them, from whom they perceived increased emotional and instrumental support across the transition. Thus, independent 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). As such, results suggest that, contrary to what has been the tendency in the infertility and ART research field (cf. Hammarberg et al., 2008), the supportive value of nuclear family members across the transition to parenthood should not be underestimated.

It seems important to note that we had not hypothesized an increase 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 Rovine (1984) already reported a decrease in contact with other relatives that were not part of family of origin. 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 intimacy level. Thus, the participation of extended family members in the social nest may be role dependent. A secondary effect of this familial nesting may be a withdrawal from friends, as was hypothesized and as there were slight indications of (for women the number of friends decreased, and this decrease tended to be regarding friends located in the second circle of the convoy), but the fact that no analyses were made regarding men do not allow us to state this fact with full confidence for them.

Although gender was not systematically investigated, it could be observed that men and women showed a similar nesting pattern and this may reflect the nongendered function of nesting, which is to build a protective social environment for the newborn.

Few differences were found regarding the nesting of parents in the ART group when compared to spontaneous conception families. For women they concerned higher levels of perceived emotional and (marginally) instrumental support from nuclear family members located in the second circle of the convoy, and also lower levels of instrumental support from friends. For ART mothers the birth of the child may attract 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 long-desired child. Alternatively (or simultaneously) these mothers may simply be so enthusiastic about the newborn (Golombok et al., 1996) that they project their own feelings of happiness onto nuclear family members more than do those conceiving naturally. Another group difference found concerned ART mothers’ perception of lower support from
friends, as hypothesized, and this could be due to the late pregnancy being “out-of-synch” with that of friends. Indeed ART mothers were 5 to 6 years older than spontaneous conception mothers when they first conceived and such a time gap in the context of a friendship might impact on how friends could support each other in the transition to parenthood. Results also indicated that men in the ART group tended to have an impoverished first circle but enriched second circle of nuclear family members included the convoy. There is evidence in the fertility literature that men withdraw from social networks as they experience longer durations of childlessness (Peronace et al., 2007) and perhaps this distancing persists even after the fertility problem has been resolved. However, this finding should not be interpreted as indicating that men do not have support, only that support for ART fathers tends to be seen as coming from less intimate nuclear family members.

Finally, our results also provided evidence for the validity of the convoy model. The first circle of the convoy was mostly composed of nuclear family members, that is, attachment figures, whereas the second included, besides other nuclear family members, mainly extended family members and friends (Kahn & Antonucci, 1980). The highest scores of perceived support were for nuclear family members included in the first circle of the convoy. However, we did not find (as predicted) that changes across time were more noticeable in the second circle of the convoy than the first. Instead changes were observed in both the first and second circles of the convoy. This may be because the major changes observed concerned precisely nuclear family members, which are mainly located in the first circle of the convoy.

We also found that, generally, support from nuclear family was higher regarding members included in the first than the second circle of the convoy, but, contrary to what was predicted, support from extended family and friends was lower regarding members included in the first circle than the second circle of the convoy. These unexpected results may result from the fact that, as the model predicted, more nuclear family members were located in the first circle and more extended family and friends were located in the second circle of the convoy. At an extreme this could mean that

Table 4
Perceived Emotional and Instrumental Support From Extended Family and Friends by Each Circle of the Convoy

<table>
<thead>
<tr>
<th>Variable</th>
<th>ART Pregnancy</th>
<th>SC Pregnancy</th>
<th>4-months postpartum</th>
<th>ART</th>
<th>SC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>Women</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extended family</td>
<td>ES</td>
<td>3.46</td>
<td>6.58</td>
<td>5.93</td>
<td>7.35</td>
</tr>
<tr>
<td>Friends</td>
<td>IS</td>
<td>1.93</td>
<td>3.85</td>
<td>2.95</td>
<td>4.23</td>
</tr>
<tr>
<td></td>
<td>ES</td>
<td>0.45</td>
<td>2.51</td>
<td>0.61</td>
<td>3.21</td>
</tr>
<tr>
<td></td>
<td>IS</td>
<td>0.03</td>
<td>0.18</td>
<td>0.14</td>
<td>0.76</td>
</tr>
<tr>
<td>C2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extended family</td>
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<td>9.79</td>
<td>6.51</td>
<td>10.41</td>
<td>7.16</td>
</tr>
<tr>
<td>Friends</td>
<td>IS</td>
<td>4.48</td>
<td>4.14</td>
<td>4.18</td>
<td>4.06</td>
</tr>
<tr>
<td></td>
<td>ES</td>
<td>7.93</td>
<td>8.22</td>
<td>8.16</td>
<td>8.58</td>
</tr>
<tr>
<td></td>
<td>IS</td>
<td>2.48</td>
<td>3.23</td>
<td>3.06</td>
<td>4.30</td>
</tr>
<tr>
<td>Men</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extended family</td>
<td>ES</td>
<td>3.72</td>
<td>7.16</td>
<td>5.67</td>
<td>7.59</td>
</tr>
<tr>
<td>Friends</td>
<td>IS</td>
<td>1.97</td>
<td>4.45</td>
<td>2.56</td>
<td>3.72</td>
</tr>
<tr>
<td></td>
<td>ES</td>
<td>2.41</td>
<td>6.25</td>
<td>2.13</td>
<td>5.77</td>
</tr>
<tr>
<td></td>
<td>IS</td>
<td>0.77</td>
<td>2.51</td>
<td>0.88</td>
<td>2.58</td>
</tr>
<tr>
<td>C2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extended family</td>
<td>ES</td>
<td>11.75</td>
<td>6.26</td>
<td>6.38</td>
<td>6.74</td>
</tr>
<tr>
<td>Friends</td>
<td>IS</td>
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<td>4.55</td>
<td>3.00</td>
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<td>ES</td>
<td>4.64</td>
<td>7.24</td>
<td>5.62</td>
<td>7.77</td>
</tr>
<tr>
<td></td>
<td>IS</td>
<td>0.70</td>
<td>1.52</td>
<td>2.17</td>
<td>3.90</td>
</tr>
</tbody>
</table>

Note. N = 105. Women: ART pregnancy and 4-months postpartum, n = 31, SC pregnancy and 4-months postpartum n = 28; men: ART pregnancy and 4 months postpartum n = 22, SC pregnancy and 4 months postpartum n = 24. Data on nuclear family consult figures. ART = assisted reproduction conception; SC = spontaneous conception; C1 = first/innermost circle of the convoy model; ES = emotional support; IS = instrumental support; C2 = second circle of the convoy model.

*p ≤ .1. **p ≤ .05. ***p ≤ .01. ****p ≤ .001.
someone would report not having friends or extended family at all in the first circle (cf. in Tables 1 and 4 that many times standard deviation values are higher than mean values for extended family and friends) and that would skew support ratings (and produce a high coefficient of variation). We repeated analyses excluding participants who did not include any network members of a specific category in a given circle and found that generally mean values for support regarding that category were then as expected.

The main strength of this study was the use of the convoy model framework of close social relationships (Kahn & Antonucci, 1980), which allowed for analyses to be made with a significant level of complexity and, as such, for a deeper view of the social nesting. Other strengths were its prospective nature and the inclusion of both members of the couple in 87.6% of participants. However, the prospective design did not include a preconception assessment, and this could have provided useful information on how ART parents may begin to relate differently with their social network members when they finally achieve conception. Also, the use of such a complex social support measure had implications on sample size. Power analyses showed that only medium to large effects could be detected, meaning that smaller effects could have been missed. Participants were recruited in a single major public hospital and may not be representative of the ART or spontaneous conception populations in other clinics though the educational level and socioeconomic status reported here were similar to Portuguese national levels. Despite limitations the results produced expected associations; consequently we are confident that the associations reported here are valid.
In conclusion, results from this study show that all parents show a strong social nesting movement towards their nuclear family members, irrespective of how they achieved their pregnancy. Besides the strong provision of support, nuclear family sets the stage in which the newborn develops, functioning as secondary attachment figures (Cochran & Brassard, 1979). In the present study the social nesting seemed effective in that the postpartum configuration and support reported achieved the desired aim (ecological conditions favorable to child-rearing). However, social nesting may sometimes be disrupted and this may have consequences for the well-being of parent(s) and child. As such, in future research it would be important to better describe the social nesting phenomenon and to investigate how do parents’ support variables predict parents’ and child adjustment when accounting for the other partner’s support. Complex measures such as the convoy model seem adequate for the purpose, but other methodological approaches that consider bidirectional effects within close relationships (e.g. the actor-partner interdependence model, Kenny, Kashy, & Cook, 2006) should be carried out on more diverse samples (e.g., age, culture, planned–unplanned pregnancy, longer follow-up).

It would be premature to use findings from this study for clinical ends. However, results point to the importance of the social environment in which the parents-to-be are embedded and a greater emphasis on the importance of parents’ relationship with their own parents and siblings could be made. Considering the primary role nuclear family members have on parents’ social nesting, social and working policies that prevent the displacement of families geographically should also be considered.

References


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**Call for Papers for a Special Section of the *Journal of Family Psychology:*

**New Perspectives and Approaches in Understanding Parenting at Risk**

**Editors:** Douglas Teti and Ernest Jouriles

The *Journal of Family Psychology* invites manuscripts for a special section on parenting at risk. Faulty parenting is frequently cited as a major causal factor in the development of child psychopathology. At the same time, parenting at risk has most often been studied with respect to static psychiatric (e.g., maternal depression), medical (e.g., low birth weight), or “social address” (e.g., poverty) conditions. Whereas this approach has been invaluable in emphasizing the overall impact of specific risk factors on parenting and child development, it does not address parenting as an ongoing, dynamic process. Nor does it address the origins and impact of individual differences in parents’ ability to regulate behavior and emotions during interactions with their children. The intent of this special section is to provide a conceptual framework for understanding parenting at risk as a dynamic, transactional process that is affected by multiple, ongoing influences and to showcase with empirical papers new developments in the study of parenting at risk.

The deadline for receipt of papers for this special section is **July 31, 2010**. Please follow the journal’s Instructions to Authors for information about how to prepare an article, which can be found on the journal’s web page (www.apa.org/pubs/journals/fam). Manuscripts must be submitted electronically through the Manuscript Submission Web Portal of the *Journal of Family Psychology* (www.apa.org/pubs/journals/fam). Please be sure to specify in the cover letter that the submission is intended for the special section on parenting at risk. All papers will be initially screened by the editors, and papers that fit well with the theme of this special section will be sent out for blind peer review.