Abstract: Objective: To investigate the relationship between changes in marital congruence (i.e. level of agreement between partners about their relationship) and quality of life across the transition to parenthood in couples who conceived spontaneously and with assisted reproduction.

Design: Prospective longitudinal cohort design using multilevel modeling.

Setting: Portuguese large public university based hospital.

Patients: Pregnant couples who conceived spontaneously and with assisted reproduction.

Interventions: None.

Main outcome measure(s): ENRICH Marital Inventory and the World Health Organization brief Quality of Life instrument (WHOQOL-bref).

Results: For all couples, an increase in satisfaction with the marital relationship was associated with increases in all quality of life domains. For couples who conceived with assisted reproduction only, a decrease from pregnancy to the postpartum period in congruence about the existence of conflicts in their relationship was associated with a decrease in psychological quality of life.

Conclusions: Couples who conceive with assisted reproduction are usually very satisfied with their marital relationship but they may still disagree in their perceptions of this relationship and this may negatively impact on their wellbeing. These results reinforce the role of couple-based interventions to prevent intra-couple disagreement across the transition to parenthood, especially when conception is achieved with ART.
Dear Dr. Alan H. DeCherney,

Thank you for the thoughtful review of our manuscript entitled “Changes in Marital Congruence and Quality of Life across the Transition to Parenthood in Couples who Conceived Spontaneously or with Assisted Reproductive Technologies” and for considering it for publication by the journal *Fertility and Sterility*.

We have received acceptance of the manuscript for publication and in this review we are only submitting a style revision.

Kind regards, Sofia Gameiro.

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Running Title: Marital Congruence and Quality of Life
Changes in Marital Congruence and Quality of Life across the Transition to Parenthood in Couples who Conceived Spontaneously or with Assisted Reproductive Technologies

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Acknowledgements
This study is part of a research project “Transition to Parenthood in Families That Recurred to Assisted Reproductive Technologies”. It has been integrated into the Relationships, Development & Health research line of the R&D Unit Institute of Cognitive Psychology, Vocational and Social Development of the University of Coimbra (FEDER/POCTI– SFA–160–192). Sofia Gameiro, Bárbara Nazaré, Ana Fonseca and Mariana Moura-Ramos are recipients of Scholarships from the Portuguese Foundation for Science and Technology (FCT-SFRH/BPD/63063/2009, FCT–SFRH/BD/43204/2008, FCT–SFRH/BD/47053/2008, FCT–SFRH/BD/23152/2005, respectively). We thank all families that collaborated with this research project.
**Capsule:** This study showed that couples who conceive with assisted reproduction are vulnerable to lack of agreement about their relationship and this negatively affects their quality of life during their transition to parenthood.
Abstract

Objective: To investigate the relationship between changes in marital congruence (i.e. level of agreement between partners about their relationship) and quality of life across the transition to parenthood in couples who conceived spontaneously and with assisted reproduction.

Design: Prospective longitudinal cohort design using multilevel modeling.

Setting: Portuguese large public university based hospital.

Patients: Pregnant couples who conceived spontaneously and with assisted reproduction.

Interventions: None.

Main outcome measure(s): ENRICH Marital Inventory and the World Health Organization brief Quality of Life instrument (WHOQOL-bref).

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Marital Congruence and Quality of Life

**Keywords:** Infertility; Assisted Reproductive Technologies; transition to parenthood; marital congruence; quality of life; marital relationship
Introduction

Many infertile couples use Assisted Reproductive Technologies (ART) to conceive (1) and the latest statistics show that more than two hundred thousand children are conceived with ART every year (2). It is thus not only important to understand if the use of ART is associated with worse wellbeing for parents during pregnancy and the postpartum period, but also to identify risk factors for worse wellbeing during this period. The aim of the present study was to investigate if changes across the transition to parenthood in marital congruence (i.e. level of between-partners agreement about their relationship, 3) predicted changes in the quality of life (QoL) of couples who conceived spontaneously or with ART.

Research has provided evidence that the emotional well-being of couples who conceive with ART, in terms of anxiety and depression, is similar to those of couples who conceive spontaneously (4). Nonetheless, when a more comprehensive approach to wellbeing was considered, some areas were identified as more problematic. For instance, couples who conceived with ART report higher anxiety about pregnancy and the survival of the fetus (5, 6) and less self-confidence during the first postpartum year (7, 8) than spontaneously conceiving couples. These results suggest that ART couples may idealize their future pregnancy and parenthood (9) and that this makes them more vulnerable to normative stressors related with the actual experience of parenthood (4). Because best practice should involve a holistic approach to patients’ wellbeing (10), it is important to further investigate this hypothesis by considering outcomes other than anxiety and depression.

One way to achieve this goal is to conceptualize wellbeing in terms of QoL. QoL encompasses the individual’s physical, psychological and social health, incorporates dimensions of positive and negative functioning and integrates objective and subjective
assessments of wellbeing (11). Because of this comprehensive approach to wellbeing, QoL has emerged as a relevant outcome in complex health conditions (12), including infertility (10, 13). However, studies focusing on the QoL of parents who conceived with ART are practically nonexistent. Based on the sample analyzed in the present study, Gameiro et al. (14) found that the psychological QoL of parents who conceive with ART (e.g. positive and negative feelings, self-esteem) decreased from pregnancy to postpartum but remained stable for couples who conceived spontaneously. Changes observed in physical and social QoL were similar for parents conceiving with ART and spontaneously. Thus, there are specific dimensions of ART couples’ QoL that seem to be affected by the experience of parenthood. What is not known yet is which specific couple vulnerabilities contribute to decreases in QoL.

Because partners turn to each other for assistance with the everyday tasks of parenting (15), the marital relationship has been identified as one of the most important predictors of the partners’ individual wellbeing during transition to parenthood (16). Many couples report that their experience of infertility and associated treatments strengthened their marriage and brought them closer together, a phenomenon named marital benefit (17, 18). When they manage to conceive, these couples also show stronger feelings of cohesion (19) than couples who conceived spontaneously. However, it was also found that, from pregnancy to the postpartum period, ART couples experience decreases and overall lower agreement in their perceptions of their marital relationship that are not experienced by couples who conceive spontaneously (20).

The sense of agreement between two partners within a couple in their appraisal of the severity of a stressor (in this case, the birth of their child) is referred to as marital congruence (3). Lack of marital congruence is expected to be associated with worse
wellbeing because, if partners disagree on their perception of a stressor, they may be
less willing or able of reaching consensus about how to deal with it. Indeed, high levels
of disagreement between partners decrease their ability to cope with stressful or
demanding events (21). Consistently, research showed that couples who disagree about
how to deal with their fertility problem tend to report higher stress (22). A study with
248 married couples showed that lack of marital congruence was related to negative
affect, associations being stronger for women than men (23). Another study with
infertile couples showed that lack of marital congruence over relationship concerns was
negatively related to depression in women but not men (24).

In sum, although previous research findings suggest that parents who conceive with
ART experience decreases in marital congruence across the transition to parenthood,
there is no empirical research investigating if these changes negatively affect their
wellbeing. The present longitudinal study uses the couple as the unit of analysis to
investigate the relationship between changes in congruence concerning the marital
relationship from pregnancy to the postpartum period and changes in QoL of couples
who conceived spontaneously and with ART. Moderation effects of method of
conception and gender on these associations were also investigated. We expected
decreases in marital congruence to be associated with decreases in QoL. This
association was expected to be stronger for women than for men and for couples who
conceived with ART than for those who conceived spontaneously.

**Methods**

**Procedure**

This study was conducted at a large university based hospital in Portugal. The
hospital’s Ethics Committee approved the study. Consecutive couples (ART or
spontaneous conception, SC) attending for their obstetrical consultation at the hospital were invited to participate. Inclusion criteria were being married or cohabiting, more than 18 years of age and nulliparous, experiencing a singleton pregnancy and having sufficient literacy level to complete questionnaires. Participants who agreed to collaborate filled a consent form and were instructed to complete self-report questionnaires at their 24th pregnancy week (Time 1, T1) and at four months postpartum (Time 2, T2). T2 questionnaires were sent by mail together with a preaddressed envelope and parents were instructed to post them back to the research team.

A total of 66 ART and 70 SC couples were invited. For the ART group, 44 couples completed the questionnaires at T1 (refusal rate 33.33%). Of these, 39 women and 35 men completed the questionnaires at T2 (attrition rate 14.77%). In the SC group, 50 couples completed the questionnaires at T1 (refusal rate 28.57%). Of these, 33 women and 32 men completed the questionnaires at T2 (attrition rate 35%). Women who did not complete questionnaires at T2 were younger, \( t (64) = 5.92, P < .001 \), than those who did. Only couples in which both partners completed questionnaires at both assessment points were included.

**Measures**

Marital relationship and QoL were assessed at T1 and T2. Obstetrical and perinatal data were collected from the women’s medical records.

Marital relationship was assessed with the satisfaction (ENRICH-Satisfaction, assesses satisfaction with different aspects of the relationship, e.g. the sexual relationship), communication (ENRICH-Communication, focuses on the level of comfort felt in sharing and receiving emotional and cognitive information from the partner), and conflict resolution (ENRICH-Conflict, assesses perceptions of the existence and resolution of conflict in the relationship) subscales of the ENRICH
Marital Congruence and Quality of Life

marital inventory (25). The Portuguese version of this scale has shown to be reliable and valid (26). Scores vary between 1 and 5 with higher scores indicating better marital relationship.

QoL was assessed with the physical (Physical-QoL; e.g. energy and fatigue, sleep, pain and discomfort, mobility), psychological (Psychological-QoL; e.g. positive and negative feelings, self-esteem, body image) and the social relationships (Social-QoL; i.e. interpersonal relationships, social support and sexual life) domains of the World Health Organization QoL brief instrument (27). Several studies have shown the WHOQOL-bref adequacy to assess QoL in several health conditions, including infertility (28). The European Portuguese version of the instrument presents sound psychometric properties (29). Scores vary between 1 and 100 with higher scores indicating better QoL.

Data analysis

Using the absolute values for the difference between men and women scores for each of the ENRICH subscales, three difference scores were obtained regarding the couples’ lack of congruence: DIF-Satisfaction, DIF-Communication and DIF-Conflicts. Higher difference values reflect lower couple congruence.

MLwiN (30) was used to analyze the data with multilevel models (MLM). A three-level hierarchical structure was considered for the data, with assessment times (T1 and T2) nested within individuals (mother and fathers) nested within couples. This analytic approach captures the dependence between repeated measurements from the same subjects and between two members of the same couple.

The dependent variables in the current study were the three QoL domains and the independent variables were the three marital difference scores, time (Pregnancy, Postpartum), gender (Female, Male) and method of conception (SC, ART). We
conducted preliminary univariate analyses made to investigate the necessity for controlling for obstetric and perinatal variables (problems in pregnancy, baby age and weight at birth and mode of delivery). No significant associations with QoL were found and these variables were not included in the models. Further, the three scores of the marital relationship dimensions were entered as independent variables in the models, so that we could evaluate the influence of the couple’s marital difference in QoL after accounting for individual perceptions of the marital relationship. Interactions of marital difference with time and gender were investigated. Models significance was ascertained with Chi-squared statistics and the significance of each independent variable with the Wald criterion.

Power calculations for MLM are similar to multiple regression (31), thus Cohen’s (32) estimates were used to assess the statistical power of the models. With a significance level of $p < .10$ the achieved sample size allowed for the detection of medium to large effects ($N = 66$ couples, 15 predictors, .80 power, G * Power,33). Thus, the significance level used was .05 but trends ($p < .10$) were also presented.

Results

Sample

The final sample consisted of 35 ART (IVF and ICSI, using the couples’ own gamete) and 31 SC couples. Table 1 presents sample characteristics. ART women and men were significantly older than SC women and men, respectively, and were with their partner for a longer time. There was a higher probability for the occurrence of problems during ART pregnancies and the frequency of SC male babies was significantly higher than that of ART male babies.

Relationship between changes in marital congruence and quality of life
Table 2 presents mean scores for the study variables at T1 and T2. Table 3 presents findings from the MLM models of changes across time in QoL. It indicates that Physical-QoL changed differently across time for men and women: for women no change was observed ($b = 3.199, SE = 4.603, p = .518$) but men experienced a decrease ($b = -7.117, SE = 2.370, p = .003$). Psychological-QoL changed differently across time for couples who conceived with ART and spontaneously: for the former it decreased ($b = -6.053, SE = 1.799, p < .001$), but for the latter it did not change ($b = -1.445, SE = 1.912, p = .450$). Finally, Social-QoL tended to decrease across time for everyone.

Table 4 presents the three-level models developed to test our research hypotheses, with predictor summary statistics and percentage of estimated (i.e. the amount of variance that occurs at each level: time, individual and couple) and explained variance (i.e. the amount of variance that is explained by predictor variables included in the model at each level).

The design of the multivariate analysis is similar to multiple regressions with one dependent variable and a set of predictor variables, providing unstandardized estimates (b values) and standard errors (SEs) for each predictor. The significant decreases observed in the badness of fit indicate that all three level models were a good fit to the data. The significant gender effects indicate that men presented better QoL than women across all domains. The significant method of conception effect indicates that ART couples tended to present worse Social-QoL than SC couples. Time level variables predict changes across time in QoL. Increases in ENRICH-Satisfaction were associated with increases in all QoL domains. Finally, a marginally significant interaction of DIF-Conflict by method of conception was found for Psychological-QoL. For SC couples an increase in DIF-Conflict produced no changes in QoL ($b = 0.915, SE = 3.850, p = .812$).
but for ART couples it was associated with a significant decrease in QoL ($b = -7.024$, $SE = 3.306$, $p = .034$).

**Discussion**

Findings from this prospective study highlight the centrality of marital satisfaction to explain the different aspects of couples’ wellbeing across transition to parenthood (34). However, they also point towards the need to go beyond individual perceptions of the marital relationship to look at the couple as a unit. By doing this, the present study showed that, for couples who conceived with ART, a decrease from pregnancy to the postpartum period in congruence about the existence of conflicts and how to solve them was associated with a decrease in psychological QoL. Thus, there seems to be a couple shared component of the marital relationship of ART couples that affects their psychological wellbeing across the transition to parenthood.

These results suggest that the marital benefit ART couples experience during their infertility treatment period will not protect them once they achieve conception and have to face the challenges associated with transition to parenthood. For these couples, who feel that their efforts to achieve parenthood contributed to strengthen their partnership (17, 18), a decrease in marital congruence may be perceived as especially threatening and may thus affect their self-esteem and generate negative feelings. This explanation is in line with previous findings that women who underwent IVF acted less openly in interviews and expressed less negative feelings about parenthood than spontaneously conceiving women (35). These avoidance behaviors may reflect the incapacity to acknowledge and/or deal with negative experiences typically associated with parenthood but that come as unexpected to ART couples (36). Therefore, the decrease in psychological wellbeing reported by ART parents may not necessary reflect actual poorer functioning levels but only their subjective perceptions of these functioning
Marital Congruence and Quality of Life

levels, in relation to an idealized pregnancy and parenthood scenario (9). It is significant to note that decreases in congruence predicted decreases in wellbeing even when both partners were satisfied with their relationship (all means superior to 3.5). Thus, even in the context of satisfying marital relationships, decreases in congruence can have a detrimental influence on wellbeing.

Contrary to predictions, changes in congruence did not affect women and men differently. This may be because, contrary to the revised studies, the dyadic approach adopted in this study accounted for the interdependence in partners’ individual wellbeing scores. Indeed, it has been noted that when such approaches are used gender differences tend to fade or disappear (e.g. 28).

Marital satisfaction and congruence contributed to explain both differences between couples and changes across time in QoL. Some researchers claim that the birth of a child does not create new marital difficulties but amplifies already existing difficulties (37). However, our finding suggests that it is important to attend not only to the couples’ relationship before birth but also to how it changes across time. This is consistent with results from a recent meta-analysis that showed that interventions that are held during both pregnancy and the postpartum produce better results at promoting a positive couple relationship during this period (38).

This study had some limitations. The sample was collected at a single, although nationally representative, hospital in Portugal, and some attrition was observed, with younger women being less likely to complete post-partum questionnaires. However, the achieved sample size ensured sufficient power to detect medium to large effect sizes. The longitudinal design and the use of a dyadic and comprehensive approach to investigate wellbeing further guarantee confidence in the associations reported.
To conclude, this study highlighted the need to adopt couple-based approaches in both research and clinical practice directed at promoting wellbeing during transition to parenthood. By accounting for the interdependence that exists in two person relationships, such approaches provide a more reliable perspective of couple based phenomenon. Results showed that although couples who conceive with ART are usually satisfied with their marital relationship, they may still disagree in their perceptions of this relationship and this may negatively impact on each partner’s wellbeing. Thus, health professionals should attend to the degree to which these couples agree about conflict resolution in their relationship.

References


20. Gameiro S, Moura-Ramos M, Canavarro MC, Almeida Santos T, Dattilio FM. Congruence of the Marital Relationship during Transition to Parenthood: A Study
Marital Congruence and Quality of Life

with Couples who Conceived Spontaneously or through Assisted Reproductive Technologies. Contemporary Family Therapy 2011;33:91-106.


Marital Congruence and Quality of Life


Table I. Mean (SD) or frequencies (%) for sample socio-demographic, clinic and obstetrical and perinatal characteristics (N=66 couples)

<table>
<thead>
<tr>
<th></th>
<th>SC (n = 31 couples)</th>
<th>ART (n = 35 couples)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Women n=31</td>
<td>Men n=31</td>
</tr>
<tr>
<td><strong>Socio-demographic</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age a</td>
<td>26.52 4.816</td>
<td>28.90 4.721</td>
</tr>
<tr>
<td>Years in current relationship a</td>
<td>2.94 1.808</td>
<td>2.94 1.808</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>5 16.1 5</td>
<td>16.1 2</td>
</tr>
<tr>
<td>Secondary Junior</td>
<td>4 12.9 11</td>
<td>11 5.5 5</td>
</tr>
<tr>
<td>Secondary Senior</td>
<td>11 35.5 9</td>
<td>9 29.0 9</td>
</tr>
<tr>
<td>University</td>
<td>11 35.5 6</td>
<td>19.4 19</td>
</tr>
<tr>
<td><strong>Socioeconomic status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium low</td>
<td>15 48.4 16</td>
<td>51.6 10</td>
</tr>
<tr>
<td>Medium</td>
<td>8 25.8 7</td>
<td>22.6 10</td>
</tr>
<tr>
<td>Medium high</td>
<td>8 25.8 8</td>
<td>25.8 15</td>
</tr>
<tr>
<td><strong>Employment status (four months postpartum) - Working</strong></td>
<td>10 33.3</td>
<td>8 25.9</td>
</tr>
<tr>
<td><strong>Clinic</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Duration of infertility</td>
<td>5.18 2.61</td>
<td></td>
</tr>
<tr>
<td>Number of previous unsuccessful treatments</td>
<td>1.16 1.08</td>
<td></td>
</tr>
<tr>
<td><strong>Cause of infertility</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>12</td>
<td>34.3</td>
</tr>
<tr>
<td>Male</td>
<td>8</td>
<td>22.9</td>
</tr>
<tr>
<td>Mixed</td>
<td>10</td>
<td>28.6</td>
</tr>
<tr>
<td>Idiopathic</td>
<td>3</td>
<td>8.6</td>
</tr>
<tr>
<td><strong>Obstetrical and perinatal</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baby gender - Male b</td>
<td>22 71.0</td>
<td>16 45.7</td>
</tr>
<tr>
<td>Problems in pregnancy</td>
<td>4 12.9</td>
<td>9 26.5</td>
</tr>
<tr>
<td>Mode of delivery</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vaginal delivery</td>
<td>19 61.3</td>
<td>20 57.1</td>
</tr>
<tr>
<td>Caesarean section</td>
<td>5 16.1</td>
<td>3 8.6</td>
</tr>
<tr>
<td>Urgent caesarean section</td>
<td>7 22.6</td>
<td>12 34.3</td>
</tr>
<tr>
<td><strong>Gestational age (weeks)</strong></td>
<td>38.68 1.14</td>
<td>38.40 1.58</td>
</tr>
<tr>
<td><strong>Birth weight (grams)</strong></td>
<td>3279.84 423.46</td>
<td>3135.43 386.38</td>
</tr>
</tbody>
</table>

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

a Significant group differences for both women and men (P < .01)
b Significant group differences (P < .05)
Table 2. Mean (SD) for sample marital relationship, marital difference and quality of life (N=66 couples)

<table>
<thead>
<tr>
<th></th>
<th>Pregnancy</th>
<th>Postpartum</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SC n=31</td>
<td>ART n=31</td>
</tr>
<tr>
<td>Marital relationship [ENRICH]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Women</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENRICH-Satisfaction</td>
<td>4.21 0.41</td>
<td>4.09 0.58</td>
</tr>
<tr>
<td>ENRICH-Communication</td>
<td>3.83 0.53</td>
<td>3.89 0.57</td>
</tr>
<tr>
<td>ENRICH-Conflict</td>
<td>3.89 0.53</td>
<td>3.83 0.55</td>
</tr>
<tr>
<td>Men</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENRICH-Satisfaction</td>
<td>4.12 0.53</td>
<td>4.13 0.44</td>
</tr>
<tr>
<td>ENRICH-Communication</td>
<td>3.72 0.52</td>
<td>3.96 0.47</td>
</tr>
<tr>
<td>ENRICH-Conflict</td>
<td>3.73 0.45</td>
<td>3.76 0.58</td>
</tr>
<tr>
<td>Couple</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DIF - Satisfaction</td>
<td>0.28 0.30</td>
<td>0.31 0.24</td>
</tr>
<tr>
<td>DIF - Communication</td>
<td>0.24 0.23</td>
<td>0.42 0.41</td>
</tr>
<tr>
<td>DIF – Conflict</td>
<td>0.36 0.33</td>
<td>0.38 0.34</td>
</tr>
<tr>
<td>Quality of life [WHOQOL-Bref]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Women</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical-QoL</td>
<td>70.07 15.66</td>
<td>70.31 11.41</td>
</tr>
<tr>
<td>Psychological-QoL</td>
<td>76.58 10.12</td>
<td>80.34 11.35</td>
</tr>
<tr>
<td>Social-QoL</td>
<td>75.57 12.16</td>
<td>69.62 14.93</td>
</tr>
<tr>
<td>Men</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical-QoL</td>
<td>83.50 8.91</td>
<td>78.68 15.51</td>
</tr>
<tr>
<td>Psychological-QoL</td>
<td>79.60 10.67</td>
<td>81.94 11.94</td>
</tr>
<tr>
<td>Social-QoL</td>
<td>78.33 11.51</td>
<td>75.00 10.88</td>
</tr>
</tbody>
</table>

Note: ART : Assisted Reproductive Technologies, SC : Spontaneous conception, SD = standard deviation
Table 3. Multilevel models of changes in quality of life across time (N = 66 couples)

<table>
<thead>
<tr>
<th>Predictors</th>
<th>Physical-QoL</th>
<th>Psychological-QoL</th>
<th>Social-QoL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(b)  (SE)</td>
<td>(b)  (SE)</td>
<td>(b)  (SE)</td>
</tr>
<tr>
<td>Time (^a)</td>
<td>3.199  2.370</td>
<td>-1.445  1.912</td>
<td>-4.337  2.477†</td>
</tr>
<tr>
<td>Time x Gender (^b)</td>
<td>-10.316 3.352***</td>
<td>1.821  2.704</td>
<td>-3.028  3.504</td>
</tr>
<tr>
<td>Time x Method of conception (MoC) (^c)</td>
<td>1.693 3.255</td>
<td>-4.608 2.625†</td>
<td>-0.525  3.402</td>
</tr>
<tr>
<td>Time x Gender x MoC</td>
<td>1.638 3.603</td>
<td>-0.565 3.713</td>
<td>-0.689  4.811</td>
</tr>
<tr>
<td>Female slope</td>
<td>3.199  2.370</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male slope</td>
<td>-7.117 2.370***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SC slope</td>
<td>-1.445 1.912</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ART slope</td>
<td>-6.053 1.799***</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: \(b\) = unstandardized coefficient, \(SE\) = standard error, \(^a\) assessment moments: 0= 24\(^{th}\) pregnancy week (T1), 1= four months postpartum (T2); \(^b\) 0 = Female, 1 = Male; \(^c\) 0 = spontaneous conception (SC), 1 = Assisted Reproductive Technologies (ART); † \(P < .10\), * \(P < .05\), ** \(P < .01\), *** \(P < .001\). Significance for bold entries is \(P < 0.10\).

Time main effects provide an estimate of the slope of growth curves for the overall sample. Interaction effects indicate if growth curves differed according to Gender and Method of Conception. Female and Male slopes provide estimates of the slope of growth curves for women and men. SC and ART slopes provide estimates of the slope of growth curves for SC and ART couples.
Table 4. Predictors of change in Quality of Life and percentage (%) of variance estimated and explained at each level (N=66 couples)

<table>
<thead>
<tr>
<th>Predictors</th>
<th>Physical-QoL</th>
<th>Psychological-QoL</th>
<th>Social-QoL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>b</td>
<td>SE</td>
<td>b</td>
</tr>
<tr>
<td>Couple level</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Method of Conception (MoC) a</td>
<td>-0.948</td>
<td>1.900</td>
<td>1.461</td>
</tr>
<tr>
<td>Individual level</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender b</td>
<td>6.032</td>
<td>1.734***</td>
<td>3.061</td>
</tr>
<tr>
<td>Time level</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time c</td>
<td>0.570</td>
<td>1.307</td>
<td>-1.161</td>
</tr>
<tr>
<td>ENRICH-Satisfaction</td>
<td>5.909</td>
<td>1.915***</td>
<td>5.502</td>
</tr>
<tr>
<td>ENRICH-Communication</td>
<td>0.368</td>
<td>1.992</td>
<td>-0.394</td>
</tr>
<tr>
<td>ENRICH-Conflict</td>
<td>1.645</td>
<td>2.076</td>
<td>1.531</td>
</tr>
<tr>
<td>DIF-Satisfaction</td>
<td>1.543</td>
<td>4.539</td>
<td>-1.609</td>
</tr>
<tr>
<td>DIF-Communication</td>
<td>5.144</td>
<td>5.429</td>
<td>-5.136</td>
</tr>
<tr>
<td>DIF-Conflict</td>
<td>-2.917</td>
<td>4.607</td>
<td>0.915</td>
</tr>
<tr>
<td>DIF-Satisfaction x Gender</td>
<td>-4.734</td>
<td>4.801</td>
<td>1.863</td>
</tr>
<tr>
<td>DIF-Communication x Gender</td>
<td>-7.412</td>
<td>5.093</td>
<td>1.047</td>
</tr>
<tr>
<td>DIF-Conflict x Gender</td>
<td>3.928</td>
<td>4.692</td>
<td>2.629</td>
</tr>
<tr>
<td>DIF-Satisfaction x MoC</td>
<td>4.675</td>
<td>5.038</td>
<td>-1.826</td>
</tr>
<tr>
<td>DIF-Communication x MoC</td>
<td>3.001</td>
<td>5.850</td>
<td>6.810</td>
</tr>
<tr>
<td>DIF-Conflict x MoC</td>
<td>-2.095</td>
<td>5.121</td>
<td>-7.939</td>
</tr>
</tbody>
</table>

| Percentage (%) of variance                     | Estimated    | Explained         | Estimated  | Explained  | Estimated  | Explained  |
|                                                |              |                   |            |            |            |            |
| Couple level                                   | 10.7         | 6.4               | 16.2       | 8          | 43.9       | 13.2       |
| Individual level                               | 34.2         | 6.6               | 39.2       | 0.8        | 0          | 0          |
| Time level                                     | 55.1         | 6.6               | 44.6       | 5.4        | 56.1       | 11.3       |
| TOTAL                                          | 100          | 13.5              | 100        | 14.2       | 100        | 24.5       |

Decrease in Badness of fit: 35.2** 44.1*** 66.1***

Note: b = unstandardized coefficient, SE = standard error
* a 0 = spontaneous conception, 1 = Assisted Reproductive Technologies, b 0 = Female, 1 = Male, c assessment moments: 0= 24th pregnancy week (T1), 1= four months postpartum (T2).
† P ≤ .10, * P ≤ .05, ** P ≤ .01, *** P ≤ .001. Significance for bold entries is P < 0.10.
Changes in Marital Congruence and Quality of Life across the Transition to Parenthood in Couples who Conceived Spontaneously or with Assisted Reproductive Technologies

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Acknowledgements
This study is part of a research project “Transition to Parenthood in Families That Recurred to Assisted Reproductive Technologies”. It has been integrated into the Relationships, Development & Health research line of the R&D Unit Institute of Cognitive Psychology, Vocational and Social Development of the University of Coimbra (FEDER/POCTI– SFA–160–192). Sofia Gameiro, Bárbara Nazaré, Ana Fonseca and Mariana Moura-Ramos are recipients of Scholarships from the Portuguese Foundation for Science and Technology (FCT-SFRH/BPD/63063/2009, FCT–SFRH/BD/43204/2008, FCT–SFRH/BD/47053/2008, FCT–SFRH/BD/23152/2005, respectively). We thank all families that collaborated with this research project.
Capsule: This study showed that couples who conceive with assisted reproduction are vulnerable to lack of agreement about their relationship and this negatively affects their quality of life during their transition to parenthood.
Abstract

Objective: To investigate the relationship between changes in marital congruence (i.e., level of agreement between partners about their relationship) and quality of life across the transition to parenthood in couples who conceived spontaneously and with assisted reproduction.

Design: Prospective longitudinal cohort design using multilevel modeling.

Setting: Portuguese large public university based hospital.

Patients: Pregnant couples who conceived spontaneously and with assisted reproduction.

Interventions: None.

Main outcome measure(s): ENRICH Marital Inventory and the World Health Organization brief Quality of Life instrument (WHOQOL-bref).

Results: For all couples, an increase in satisfaction with the marital relationship was associated with increases in all quality of life domains. For couples who conceived with assisted reproduction only, a decrease from pregnancy to the postpartum period in congruence about the existence of conflicts in their relationship was associated with a decrease in psychological quality of life.

Conclusions: Couples who conceive with assisted reproduction are usually very satisfied with their marital relationship but they may still disagree in their perceptions of this relationship and this may negatively impact on their wellbeing. These results reinforce the role of couple-based interventions to prevent intra-couple disagreement across the transition to parenthood, especially when conception is achieved with ART.

Keywords: Infertility; Assisted Reproductive Technologies; transition to parenthood; marital congruence; quality of life; marital relationship
Introduction

Many infertile couples use Assisted Reproductive Technologies (ART) to conceive (1) and the latest statistics show that more than two hundred thousand children are conceived with ART every year (2). It is thus not only important to understand if the use of ART is associated with worse wellbeing for parents during pregnancy and the postpartum period, but also to identify risk factors for worse wellbeing during this period. The aim of the present study was to investigate if changes across the transition to parenthood in marital congruence (i.e. level of between-partners agreement about their relationship, 3) predicted changes in the quality of life (QoL) of couples who conceived spontaneously or with ART.

Research has provided evidence that the emotional well-being of couples who conceive with ART, in terms of anxiety and depression, is similar to those of couples who conceive spontaneously (4). Nonetheless, when a more comprehensive approach to wellbeing was considered, some areas were identified as more problematic. For instance, couples who conceived with ART report higher anxiety about pregnancy and the survival of the fetus (5, 6) and less self-confidence during the first postpartum year (7, 8) than spontaneously conceiving couples. These results suggest that ART couples may idealize their future pregnancy and parenthood (9) and that this makes them more vulnerable to normative stressors related with the actual experience of parenthood (4). Because best practice should involve a holistic approach to patients’ wellbeing (10), it is important to further investigate this hypothesis by considering outcomes other than anxiety and depression.

One way to achieve this goal is to conceptualize wellbeing in terms of QoL. QoL encompasses the individual’s physical, psychological and social health, incorporates dimensions of positive and negative functioning and integrates objective and subjective assessments of wellbeing (11). Because of this comprehensive approach to wellbeing, QoL has emerged as a relevant outcome in complex health conditions (12), including infertility.
(10, 13). However, studies focusing on the QoL of parents who conceived with ART are practically nonexistent. Based on the sample analyzed in the present study, Gameiro et al. (14) found that the psychological QoL of parents who conceive with ART (e.g. positive and negative feelings, self-esteem) decreased from pregnancy to postpartum but remained stable for couples who conceived spontaneously. Changes observed in physical and social QoL were similar for parents conceiving with ART and spontaneously. Thus, there are specific dimensions of ART couples’ QoL that seem to be affected by the experience of parenthood.

What is not known yet is which specific couple vulnerabilities contribute to decreases in QoL.

Because partners turn to each other for assistance with the everyday tasks of parenting (15), the marital relationship has been identified as one of the most important predictors of the partners’ individual wellbeing during transition to parenthood (16). Many couples report that their experience of infertility and associated treatments strengthened their marriage and brought them closer together, a phenomenon named marital benefit (17, 18). When they manage to conceive, these couples also show stronger feelings of cohesion (19) than couples who conceived spontaneously. However, it was also found that, from pregnancy to the postpartum period, ART couples experience decreases and overall lower agreement in their perceptions of their marital relationship that are not experienced by couples who conceive spontaneously (20).

The sense of agreement between two partners within a couple in their appraisal of the severity of a stressor (in this case, the birth of their child) is referred to as marital congruence (3). Lack of marital congruence is expected to be associated with worse wellbeing because, if partners disagree on their perception of a stressor, they may be less willing or able of reaching consensus about how to deal with it. Indeed, high levels of disagreement between partners decrease their ability to cope with stressful or demanding events (21). Consistently,
research showed that couples who disagree about how to deal with their fertility problem tend
to report higher stress (22). A study with 248 married couples showed that lack of marital
congruence was related to negative affect, associations being stronger for women than men
(23). Another study with infertile couples showed that lack of marital congruence over
relationship concerns was negatively related to depression in women but not men (24).
In sum, although previous research findings suggest that parents who conceive with ART
experience decreases in marital congruence across the transition to parenthood, there is no
empirical research investigating if these changes negatively affect their wellbeing. The
present longitudinal study uses the couple as the unit of analysis to investigate the
relationship between changes in congruence concerning the marital relationship from
pregnancy to the postpartum period and changes in QoL of couples who conceived
spontaneously and with ART. Moderation effects of method of conception and gender on
these associations were also investigated. We expected decreases in marital congruence to be
associated with decreases in QoL. This association was expected to be stronger for women
than for men and for couples who conceived with ART than for those who conceived
spontaneously.

Methods

Procedure

This study was conducted at a large university based hospital in Portugal. The hospital’s
Ethics Committee approved the study. Consecutive couples (ART or spontaneous conception,
SC) attending for their obstetrical consultation at the hospital were invited to participate.
Inclusion criteria were being married or cohabiting, more than 18 years of age and
nulliparous, experiencing a singleton pregnancy and having sufficient literacy level to
complete questionnaires. Participants who agreed to collaborate filled a consent form and
were instructed to complete self-report questionnaires at their 24th pregnancy week (Time 1, T1) and at four months postpartum (Time 2, T2). T2 questionnaires were sent by mail together with a preaddressed envelope and parents were instructed to post them back to the research team. A total of 66 ART and 70 SC couples were invited. For the ART group, 44 couples completed the questionnaires at T1 (refusal rate 33.33%). Of these, 39 women and 35 men completed the questionnaires at T2 (attrition rate 14.77%). In the SC group, 50 couples completed the questionnaires at T1 (refusal rate 28.57%). Of these, 33 women and 32 men completed the questionnaires at T2 (attrition rate 35%). Women who did not complete questionnaires at T2 were younger, \( t(64) = 5.92, P < .001 \), than those who did. Only couples in which both partners completed questionnaires at both assessment points were included.

**Measures**

Marital relationship and QoL were assessed at T1 and T2. Obstetrical and perinatal data were collected from the women’s medical records. Marital relationship was assessed with the satisfaction (ENRICH-Satisfaction, assesses satisfaction with different aspects of the relationship, e.g. the sexual relationship), communication (ENRICH-Communication, focuses on the level of comfort felt in sharing and receiving emotional and cognitive information from the partner), and conflict resolution (ENRICH-Conflict, assesses perceptions of the existence and resolution of conflict in the relationship) subscales of the ENRICH marital inventory (25). The Portuguese version of this scale has shown to be reliable and valid (26). Scores vary between 1 and 5 with higher scores indicating better marital relationship.

QoL was assessed with the physical (Physical-QoL; e.g. energy and fatigue, sleep, pain and discomfort, mobility), psychological (Psychological-QoL; e.g. positive and negative feelings, self-esteem, body image) and the social relationships (Social-QoL; i.e. interpersonal
relationships, social support and sexual life) domains of the World Health Organization QoL brief instrument (27). Several studies have shown the WHOQOL-bref adequacy to assess QoL in several health conditions, including infertility (28). The European Portuguese version of the instrument presents sound psychometric properties (29). Scores vary between 1 and 100 with higher scores indicating better QoL.

**Data analysis**

Using the absolute values for the difference between men and women scores for each of the ENRICH subscales, three difference scores were obtained regarding the couples’ lack of congruence: DIF-Satisfaction, DIF-Communication and DIF-Conflicts. Higher difference values reflect lower couple congruence.

MLwiN (30) was used to analyze the data with multilevel models (MLM). A three-level hierarchical structure was considered for the data, with assessment times (T1 and T2) nested within individuals (mother and fathers) nested within couples. This analytic approach captures the dependence between repeated measurements from the same subjects and between two members of the same couple.

The dependent variables in the current study were the three QoL domains and the independent variables were the three marital difference scores, time (Pregnancy, Postpartum), gender (Female, Male) and method of conception (SC, ART). We conducted preliminary univariate analyses made to investigate the necessity for controlling for obstetric and perinatal variables (problems in pregnancy, baby age and weight at birth and mode of delivery). No significant associations with QoL were found and these variables were not included in the models. Further, the three scores of the marital relationship dimensions were entered as independent variables in the models, so that we could evaluate the influence of the couple’s marital difference in QoL after accounting for individual perceptions of the marital relationship. Interactions of marital difference with time and gender were investigated.
Models significance was ascertained with Chi-squared statistics and the significance of each independent variable with the Wald criterion.

Power calculations for MLM are similar to multiple regression (31), thus Cohen’s (32) estimates were used to assess the statistical power of the models. With a significance level of \( p < .10 \) the achieved sample size allowed for the detection of medium to large effects \( (N = 66 \text{ couples, } 15 \text{ predictors, } .80 \text{ power, G*Power,33}) \). Thus, the significance level used was .05 but trends \( (p < .10) \) were also presented.

**Results**

**Sample**

The final sample consisted of 35 ART (IVF and ICSI, using the couples’ own gamete) and 31 SC couples. Table 1 presents sample characteristics. ART women and men were significantly older than SC women and men, respectively, and were with their partner for a longer time. There was a higher probability for the occurrence of problems during ART pregnancies and the frequency of SC male babies was significantly higher than that of ART male babies.

**Relationship between changes in marital congruence and quality of life**

Table 2 presents mean scores for the study variables at T1 and T2. Table 3 presents findings from the MLM models of changes across time in QoL. It indicates that Physical-QoL changed differently across time for men and women: for women no change was observed \( (b = 3.199, SE = 4.603, p = .518) \) but men experienced a decrease \( (b = -7.117, SE = 2.370, p = .003) \). Psychological-QoL changed differently across time for couples who conceived with ART and spontaneously: for the former it decreased \( (b = -6.053, SE = 1.799, p < .001) \), but for the latter it did not change \( (b = -1.445, SE = 1.912, p = .450) \). Finally, Social-QoL tended to decrease across time for everyone.
Table 4 presents the three-level models developed to test our research hypotheses, with predictor summary statistics and percentage of estimated (i.e. the amount of variance that occurs at each level: time, individual and couple) and explained variance (i.e. the amount of variance that is explained by predictor variables included in the model at each level).

The design of the multivariate analysis is similar to multiple regressions with one dependent variable and a set of predictor variables, providing unstandardized estimates (b values) and standard errors (SEs) for each predictor. The significant decreases observed in the badness of fit indicate that all three level models were a good fit to the data. The significant gender effects indicate that men presented better QoL than women across all domains. The significant method of conception effect indicates that ART couples tended to present worse Social-QoL than SC couples. Time level variables predict changes across time in QoL. Increases in ENRICH-Satisfaction were associated with increases in all QoL domains. Finally, a marginally significant interaction of DIF-Conflict by method of conception was found for Psychological-QoL. For SC couples an increase in DIF-Conflict produced no changes in QoL (b = 0.915, SE = 3.850, p = .812) but for ART couples it was associated with a significant decrease in QoL (b = -7.024, SE = 3.306, p = .034).

**Discussion**

Findings from this prospective study highlight the centrality of marital satisfaction to explain the different aspects of couples’ wellbeing across transition to parenthood (34). However, they also point towards the need to go beyond individual perceptions of the marital relationship to look at the couple as a unit. By doing this, the present study showed that, for couples who conceived with ART, a decrease from pregnancy to the postpartum period in congruence about the existence of conflicts and how to solve them was associated with a decrease in psychological QoL. Thus, there seems to be a couple shared component of the
marital relationship of ART couples that affects their psychological wellbeing across the
transition to parenthood.

These results suggest that the marital benefit ART couples experience during their
infertility treatment period will not protect them once they achieve conception and have to
face the challenges associated with transition to parenthood. For these couples, who feel that
their efforts to achieve parenthood contributed to strengthen their partnership (17, 18), a
decrease in marital congruence may be perceived as especially threatening and may thus
affect their self-esteem and generate negative feelings. This explanation is in line with
previous findings that women who underwent IVF acted less openly in interviews and
expressed less negative feelings about parenthood than spontaneously conceiving women
(35). These avoidance behaviors may reflect the incapacity to acknowledge and/or deal with
negative experiences typically associated with parenthood but that come as unexpected to
ART couples (36). Therefore, the decrease in psychological wellbeing reported by ART
parents may not necessary reflect actual poorer functioning levels but only their subjective
perceptions of these functioning levels, in relation to an idealized pregnancy and parenthood
scenario (9). It is significant to note that decreases in congruence predicted decreases in
wellbeing even when both partners were satisfied with their relationship (all means superior
to 3.5). Thus, even in the context of satisfying marital relationships, decreases in congruence
can have a detrimental influence on wellbeing.

Contrary to predictions, changes in congruence did not affect women and men differently.
This may be because, contrary to the revised studies, the dyadic approach adopted in this
study accounted for the interdependence in partners’ individual wellbeing scores. Indeed, it
has been noted that when such approaches are used gender differences tend to fade or
disappear (e.g. 28).
Marital satisfaction and congruence contributed to explain both differences between couples and changes across time in QoL. Some researchers claim that the birth of a child does not create new marital difficulties but amplifies already existing difficulties (37). However, our finding suggests that it is important to attend not only to the couples’ relationship before birth but also to how it changes across time. This is consistent with results from a recent meta-analysis that showed that interventions that are held during both pregnancy and the postpartum produce better results at promoting a positive couple relationship during this period (38).

This study had some limitations. The sample was collected at a single, although nationally representative, hospital in Portugal, and some attrition was observed, with younger women being less likely to complete post-partum questionnaires. However, the achieved sample size ensured sufficient power to detect medium to large effect sizes. The longitudinal design and the use of a dyadic and comprehensive approach to investigate wellbeing further guarantee confidence in the associations reported.

To conclude, this study highlighted the need to adopt couple-based approaches in both research and clinical practice directed at promoting wellbeing during transition to parenthood. By accounting for the interdependence that exists in two person relationships, such approaches provide a more reliable perspective of couple based phenomenon. Results showed that although couples who conceive with ART are usually satisfied with their marital relationship, they may still disagree in their perceptions of this relationship and this may negatively impact on each partner’s wellbeing. Thus, health professionals should attend to the degree to which these couples agree about conflict resolution in their relationship.

References


Revision notes

We have received acceptance of the manuscript for publication and in this review we are only submitting a requested style revision.

More specifically, we changed our references citation in the text to be numerically and in parentheses rather than brackets.
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