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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.

Editor-in-chief of the Fertility and Sterility Journal
Dr. Alan H. DeCherney
American Society for Reproductive Medicine (ASRM)
1209 Montgomery Highway
Birmingham, AL 35216

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

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**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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2 **Capsule:** This study showed that couples who conceive with assisted
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4 reproduction are vulnerable to lack of agreement about their relationship and this
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6 negatively affects their quality of life during their transition to parenthood.
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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

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Introduction

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4 Many infertile couples use Assisted Reproductive Technologies (ART) to conceive
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6 (1) and the latest statistics show that more than two hundred thousand children are
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8 conceived with ART every year (2). It is thus not only important to understand if the use
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10 of ART is associated with worse wellbeing for parents during pregnancy and the
11
12 postpartum period, but also to identify risk factors for worse wellbeing during this
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14 period. The aim of the present study was to investigate if changes across the transition
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16 to parenthood in marital congruence (i.e. level of between-partners agreement about
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18 their relationship, 3) predicted changes in the quality of life (QoL) of couples who
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20 conceived spontaneously or with ART.
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25 Research has provided evidence that the emotional well-being of couples who
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27 conceive with ART, in terms of anxiety and depression, is similar to those of couples
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29 who conceive spontaneously (4). Nonetheless, when a more comprehensive approach to
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31 wellbeing was considered, some areas were identified as more problematic. For
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33 instance, couples who conceived with ART report higher anxiety about pregnancy and
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35 the survival of the fetus (5, 6) and less self-confidence during the first postpartum year
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37 (7, 8) than spontaneously conceiving couples. These results suggest that ART couples
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39 may idealize their future pregnancy and parenthood (9) and that this makes them more
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41 vulnerable to normative stressors related with the actual experience of parenthood (4).
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43 Because best practice should involve a holistic approach to patients' wellbeing (10), it is
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45 important to further investigate this hypothesis by considering outcomes other than
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47 anxiety and depression.
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54 One way to achieve this goal is to conceptualize wellbeing in terms of QoL . QoL
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56 encompasses the individual's physical, psychological and social health, incorporates
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58 dimensions of positive and negative functioning and integrates objective and subjective
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1 assessments of wellbeing (11). Because of this comprehensive approach to wellbeing,
2 QoL has emerged as a relevant outcome in complex health conditions (12), including
3 infertility (10, 13). However, studies focusing on the QoL of parents who conceived
4 with ART are practically nonexistent. Based on the sample analyzed in the present
5 study, Gameiro et al. (14) found that the psychological QoL of parents who conceive
6 with ART (e.g. positive and negative feelings, self-esteem) decreased from pregnancy to
7 postpartum but remained stable for couples who conceived spontaneously. Changes
8 observed in physical and social QoL were similar for parents conceiving with ART and
9 spontaneously. Thus, there are specific dimensions of ART couples' QoL that seem to
10 be affected by the experience of parenthood. What is not known yet is which specific
11 couple vulnerabilities contribute to decreases in QoL.
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27 Because partners turn to each other for assistance with the everyday tasks of
28 parenting (15), the marital relationship has been identified as one of the most important
29 predictors of the partners' individual wellbeing during transition to parenthood (16).
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31 Many couples report that their experience of infertility and associated treatments
32 strengthened their marriage and brought them closer together, a phenomenon named
33 marital benefit (17, 18). When they manage to conceive, these couples also show
34 stronger feelings of cohesion (19) than couples who conceived spontaneously.
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36 However, it was also found that, from pregnancy to the postpartum period, ART
37 couples experience decreases and overall lower agreement in their perceptions of their
38 marital relationship that are not experienced by couples who conceive spontaneously
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54 The sense of agreement between two partners within a couple in their appraisal of the
55 severity of a stressor (in this case, the birth of their child) is referred to as marital
56 congruence (3). Lack of marital congruence is expected to be associated with worse
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1 wellbeing because, if partners disagree on their perception of a stressor, they may be
2 less willing or able of reaching consensus about how to deal with it. Indeed, high levels
3 of disagreement between partners decrease their ability to cope with stressful or
4 demanding events (21). Consistently, research showed that couples who disagree about
5 how to deal with their fertility problem tend to report higher stress (22). A study with
6 248 married couples showed that lack of marital congruence was related to negative
7 affect, associations being stronger for women than men (23). Another study with
8 infertile couples showed that lack of marital congruence over relationship concerns was
9 negatively related to depression in women but not men (24).

10
11 In sum, although previous research findings suggest that parents who conceive with
12 ART experience decreases in marital congruence across the transition to parenthood,
13 there is no empirical research investigating if these changes negatively affect their
14 wellbeing. The present longitudinal study uses the couple as the unit of analysis to
15 investigate the relationship between changes in congruence concerning the marital
16 relationship from pregnancy to the postpartum period and changes in QoL of couples
17 who conceived spontaneously and with ART. Moderation effects of method of
18 conception and gender on these associations were also investigated. We expected
19 decreases in marital congruence to be associated with decreases in QoL. This
20 association was expected to be stronger for women than for men and for couples who
21 conceived with ART than for those who conceived spontaneously.

22 **Methods**

23 *Procedure*

24 This study was conducted at a large university based hospital in Portugal. The
25 hospital's Ethics Committee approved the study. Consecutive couples (ART or
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1 spontaneous conception, SC) attending for their obstetrical consultation at the hospital
2 were invited to participate. Inclusion criteria were being married or cohabiting, more
3 than 18 years of age and nulliparous, experiencing a singleton pregnancy and having
4 sufficient literacy level to complete questionnaires. Participants who agreed to
5 collaborate filled a consent form and were instructed to complete self-report
6 questionnaires at their 24th pregnancy week (Time 1, T1) and at four months postpartum
7 (Time 2, T2). T2 questionnaires were sent by mail together with a preaddressed
8 envelope and parents were instructed to post them back to the research team.
9

10 A total of 66 ART and 70 SC couples were invited. For the ART group, 44 couples
11 completed the questionnaires at T1 (refusal rate 33.33%). Of these, 39 women and 35
12 men completed the questionnaires at T2 (attrition rate 14.77%). In the SC group, 50
13 couples completed the questionnaires at T1 (refusal rate 28.57%). Of these, 33 women
14 and 32 men completed the questionnaires at T2 (attrition rate 35%). Women who did
15 not complete questionnaires at T2 were younger, $t(64) = 5.92, P < .001$, than those who
16 did. Only couples in which both partners completed questionnaires at both assessment
17 points were included.
18

19 *Measures*

20 Marital relationship and QoL were assessed at T1 and T2. Obstetrical and perinatal
21 data were collected from the women's medical records.
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23 Marital relationship was assessed with the satisfaction (ENRICH-Satisfaction,
24 assesses satisfaction with different aspects of the relationship, e.g. the sexual
25 relationship), communication (ENRICH-Communication, focuses on the level of
26 comfort felt in sharing and receiving emotional and cognitive information from the
27 partner), and conflict resolution (ENRICH-Conflict, assesses perceptions of the
28 existence and resolution of conflict in the relationship) subscales of the ENRICH
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1 marital inventory (25). The Portuguese version of this scale has shown to be reliable and
2 valid (26). Scores vary between 1 and 5 with higher scores indicating better marital
3 relationship.
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6 QoL was assessed with the physical (Physical-QoL; e.g. energy and fatigue, sleep,
7 pain and discomfort, mobility), psychological (Psychological-QoL; e.g. positive and
8 negative feelings, self-esteem, body image) and the social relationships (Social-QoL;
9 i.e. interpersonal relationships, social support and sexual life) domains of the World
10 Health Organization QoL brief instrument (27). Several studies have shown the
11 WHOQOL-bref adequacy to assess QoL in several health conditions, including
12 infertility (28). The European Portuguese version of the instrument presents sound
13 psychometric properties (29). Scores vary between 1 and 100 with higher scores
14 indicating better QoL.
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29 *Data analysis*

30 Using the absolute values for the difference between men and women scores for each
31 of the ENRICH subscales, three difference scores were obtained regarding the couples'
32 lack of congruence: DIF-Satisfaction, DIF-Communication and DIF-Conflicts. Higher
33 difference values reflect lower couple congruence.
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42 MLwiN (30) was used to analyze the data with multilevel models (MLM). A three-
43 level hierarchical structure was considered for the data, with assessment times (T1 and
44 T2) nested within individuals (mother and fathers) nested within couples. This analytic
45 approach captures the dependence between repeated measurements from the same
46 subjects and between two members of the same couple.
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54 The dependent variables in the current study were the three QoL domains and the
55 independent variables were the three marital difference scores, time (Pregnancy,
56 Postpartum), gender (Female, Male) and method of conception (SC, ART). We
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1 conducted preliminary univariate analyses made to investigate the necessity for
2 controlling for obstetric and perinatal variables (problems in pregnancy, baby age and
3 weight at birth and mode of delivery). No significant associations with QoL were found
4 and these variables were not included in the models. Further, the three scores of the
5 marital relationship dimensions were entered as independent variables in the models, so
6 that we could evaluate the influence of the couple's marital difference in QoL after
7 accounting for individual perceptions of the marital relationship. Interactions of marital
8 difference with time and gender were investigated. Models significance was ascertained
9 with Chi-squared statistics and the significance of each independent variable with the
10 Wald criterion.

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

36 Results

37 *Sample*

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

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

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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 ($b = 0.915, SE = 3.850, p = .812$)

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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

1 levels, in relation to an idealized pregnancy and parenthood scenario (9). It is significant
2 to note that decreases in congruence predicted decreases in wellbeing even when both
3 partners were satisfied with their relationship (all means superior to 3.5). Thus, even in
4 the context of satisfying marital relationships, decreases in congruence can have a
5 detrimental influence on wellbeing.
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11 Contrary to predictions, changes in congruence did not affect women and men
12 differently. This may be because, contrary to the revised studies, the dyadic approach
13 adopted in this study accounted for the interdependence in partners' individual
14 wellbeing scores. Indeed, it has been noted that when such approaches are used gender
15 differences tend to fade or disappear (e.g. 28).
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24 Marital satisfaction and congruence contributed to explain both differences between
25 couples and changes across time in QoL. Some researchers claim that the birth of a
26 child does not create new marital difficulties but amplifies already existing difficulties
27 (37). However, our finding suggests that it is important to attend not only to the
28 couples' relationship before birth but also to how it changes across time. This is
29 consistent with results from a recent meta-analysis that showed that interventions that
30 are held during both pregnancy and the postpartum produce better results at promoting a
31 positive couple relationship during this period (38).
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44 This study had some limitations. The sample was collected at a single, although
45 nationally representative, hospital in Portugal, and some attrition was observed, with
46 younger women being less likely to complete post-partum questionnaires. However, the
47 achieved sample size ensured sufficient power to detect medium to large effect sizes.
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1 To conclude, this study highlighted the need to adopt couple-based approaches in
2 both research and clinical practice directed at promoting wellbeing during transition to
3 parenthood. By accounting for the interdependence that exists in two person
4 relationships, such approaches provide a more reliable perspective of couple based
5 phenomenon. Results showed that although couples who conceive with ART are usually
6 satisfied with their marital relationship, they may still disagree in their perceptions of
7 this relationship and this may negatively impact on each partner's wellbeing. Thus,
8 health professionals should attend to the degree to which these couples agree about
9 conflict resolution in their relationship.
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Table I. Mean (SD) or frequencies (%) for sample socio-demographic, clinic and obstetrical and perinatal characteristics (N=66 couples)

	SC (n = 31 couples)				ART (n = 35 couples)			
	Women n=31		Men n=31		Women n=35		Men n=35	
Socio-demographic								
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Age ^a	26.52	4.816	28.90	4.721	33.09	2.853	35.11	3.802
Years in current relationship ^a	2.94	1.808	2.94	1.808	7.67	2.337	7.67	2.337
	n	%	n	%	n	%	n	%
Education								
Primary	5	16.1	5	16.1	2	5.7	5	14.3
Secondary Junior	4	12.9	11	35.5	5	14.3	5	14.3
Secondary Senior	11	35.5	9	29.0	9	25.7	16	45.7
University	11	35.5	6	19.4	19	54.3	9	25.7
Socioeconomic status								
Medium low	15	48.4	16	51.6	10	28.6	10	28.6
Medium	8	25.8	7	22.6	10	28.6	10	28.6
Medium high	8	25.8	8	25.8	15	42.9	15	42.9
Employment status (four months postpartum) - Working	10	33.3			8	25.9		
Clinic								
					Mean	SD		
Duration of infertility					5.18	2.61		
Number of previous unsuccessful treatments					1.16	1.08		
					n	%		
Cause of infertility								
Female					12	34.3		
Male					8	22.9		
Mixed					10	28.6		
Idiopathic					3	8.6		
Obstetrical and perinatal								
	n	%	n	%				
Baby gender - Male ^b	22	71.0	16	45.7				
Problems in pregnancy	4	12.9	9	26.5				
Mode of delivery								
Vaginal delivery	19	61.3	20	57.1				
Caesarean section	5	16.1	3	8.6				
Urgent caesarean section	7	22.6	12	34.3				
	Mean	SD	Mean	SD				
Gestational age (weeks)	38.68	1.14	38.40	1.58				
Birth weight (grams)	3279.84	423.46	3135.43	386.38				

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)

	Pregnancy				Postpartum			
	SC n=31 couples		ART n=31 couples		SC n=35 couples		ART n=35 couples	
Marital relationship [ENRICH]	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Women								
ENRICH-Satisfaction	4.21	0.41	4.09	0.58	3.97	0.51	3.80	0.60
ENRICH-Communication	3.83	0.53	3.89	0.57	3.75	0.55	3.61	0.54
ENRICH-Conflict	3.89	0.53	3.83	0.55	3.75	0.53	3.52	0.65
Men								
ENRICH-Satisfaction	4.12	0.53	4.13	0.44	3.94	0.51	3.96	0.61
ENRICH-Communication	3.72	0.52	3.96	0.47	3.74	0.41	3.74	0.57
ENRICH-Conflict	3.73	0.45	3.76	0.58	3.74	0.47	3.75	0.52
Couple								
DIF - Satisfaction	0.28	0.30	0.31	0.24	0.35	0.35	0.46	0.41
DIF - Communication	0.24	0.23	0.42	0.41	0.34	0.27	0.43	0.31
DIF - Conflict	0.36	0.33	0.38	0.34	0.36	0.32	0.52	0.50
Quality of life [WHOQOL-Bref]	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Women								
Physical-QoL	70.07	15.66	70.31	11.41	73.27	11.66	75.20	10.82
Psychological-QoL	76.58	10.12	80.34	11.35	75.13	12.10	74.29	13.20
Social-QoL	75.57	12.16	69.62	14.93	71.24	11.15	64.76	16.55
Men								
Physical-QoL	83.50	8.91	78.68	15.51	76.38	11.62	74.89	16.10
Psychological-QoL	79.60	10.67	81.94	11.94	79.97	10.62	77.15	14.61
Social-QoL	78.33	11.51	75.00	10.88	70.97	9.59	66.42	19.44

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)

Predictors	Physical-QoL		Psychological-QoL		Social-QoL	
	<i>b</i>	<i>SE</i>	<i>b</i>	<i>SE</i>	<i>b</i>	<i>SE</i>
Time ^a	3.199	2.370	-1.445	1.912	-4.337	2.477†
Time x Gender ^b	-10.316	3.352***	1.821	2.704	-3.028	3.504
Time x Method of conception (MoC) ^c	1.693	3.255	-4.608	2.625†	-0.525	3.402
Time x Gender x MoC	1.638	4.603	-0.565	3.713	-0.689	4.811
Female slope	3.199	2.370				
Male slope	-7.117	2.370***				
SC slope			-1.445	1.912		
ART slope			-6.053	1.799***		

Note: *b* = unstandardized coefficient, *SE* = standard error, ^a assessment moments: 0= 24th 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)

Predictors	Physical-QoL		Psychological-QoL		Social-QoL	
	b	SE	b	SE	b	SE
Couple level						
Method of Conception (MoC) ^a	-0.948	1.900	1.461	1.804	-4.344	2.320†
Individual level						
Gender ^b	6.032	1.734***	3.061	1.564*	2.369	1.202*
Time level						
Time ^c	0.570	1.307	-1.161	1.034	-4.760	1.299***
ENRICH-Satisfaction	5.909	1.915***	5.502	1.600***	6.766	1.888***
ENRICH-Communication	0.368	1.992	-0.394	1.654	-0.026	1.927
ENRICH-Conflict	1.645	2.076	1.531	1.898	0.901	2.028
DIF-Satisfaction	1.543	4.539	-1.609	3.754	-1.289	4.537
DIF-Communication	5.144	5.429	-5.136	4.516	0.984	5.495
DIF-Conflict	-2.917	4.607	0.915	3.850	-1.056	4.607
DIF-Satisfaction x Gender	-4.734	4.801	1.863	3.924	-2.488	4.039
DIF-Communication x Gender	-7.412	5.093	1.047	4.196	3.231	4.184
DIF-Conflict x Gender	3.928	4.692	2.629	3.909	3.159	3.764
DIF-Satisfaction x MoC	4.675	5.038	-1.826	4.170	7.539	5.292
DIF-Communication x MoC	3.001	5.850	6.810	4.885	-6.354	6.192
DIF-Conflict x MoC	-2.095	5.121	-7.939	4.312†	-7.487	5.458
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	0.5	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.

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Running Title: Marital Congruence and Quality of Life

1 **Changes in Marital Congruence and Quality of Life across the Transition to**
2 **Parenthood in Couples who Conceived Spontaneously or with Assisted Reproductive**
3 **Technologies**

4
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2 **Capsule:** This study showed that couples who conceive with assisted reproduction
3 are vulnerable to lack of agreement about their relationship and this negatively affects
4 their quality of life during their transition to parenthood.

5

1 **Abstract**

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

6 **Design:** Prospective longitudinal cohort design using multilevel modeling.

7 **Setting:** Portuguese large public university based hospital.

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

9 **Interventions:** None.

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

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

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

22

23

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

26

1 **Introduction**

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

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

21 One way to achieve this goal is to conceptualize wellbeing in terms of QoL . QoL
22 encompasses the individual's physical, psychological and social health, incorporates
23 dimensions of positive and negative functioning and integrates objective and subjective
24 assessments of wellbeing (11). Because of this comprehensive approach to wellbeing, QoL
25 has emerged as a relevant outcome in complex health conditions (12), including infertility

1 (10, 13). However, studies focusing on the QoL of parents who conceived with ART are
2 practically nonexistent. Based on the sample analyzed in the present study, Gameiro et al.
3 (14) found that the psychological QoL of parents who conceive with ART (e.g. positive and
4 negative feelings, self-esteem) decreased from pregnancy to postpartum but remained stable
5 for couples who conceived spontaneously. Changes observed in physical and social QoL
6 were similar for parents conceiving with ART and spontaneously. Thus, there are specific
7 dimensions of ART couples' QoL that seem to be affected by the experience of parenthood.
8 What is not known yet is which specific couple vulnerabilities contribute to decreases in
9 QoL.

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

20 The sense of agreement between two partners within a couple in their appraisal of the
21 severity of a stressor (in this case, the birth of their child) is referred to as marital congruence
22 (3). Lack of marital congruence is expected to be associated with worse wellbeing because, if
23 partners disagree on their perception of a stressor, they may be less willing or able of
24 reaching consensus about how to deal with it. Indeed, high levels of disagreement between
25 partners decrease their ability to cope with stressful or demanding events (21). Consistently,

1 research showed that couples who disagree about how to deal with their fertility problem tend
2 to report higher stress (22). A study with 248 married couples showed that lack of marital
3 congruence was related to negative affect, associations being stronger for women than men
4 (23). Another study with infertile couples showed that lack of marital congruence over
5 relationship concerns was negatively related to depression in women but not men (24).

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

17 **Methods**

18 *Procedure*

19 This study was conducted at a large university based hospital in Portugal. The hospital's
20 Ethics Committee approved the study. Consecutive couples (ART or spontaneous conception,
21 SC) attending for their obstetrical consultation at the hospital were invited to participate.
22 Inclusion criteria were being married or cohabiting, more than 18 years of age and
23 nulliparous, experiencing a singleton pregnancy and having sufficient literacy level to
24 complete questionnaires. Participants who agreed to collaborate filled a consent form and

1 were instructed to complete self-report questionnaires at their 24th pregnancy week (Time 1,
2 T1) and at four months postpartum (Time 2, T2). T2 questionnaires were sent by mail
3 together with a preaddressed envelope and parents were instructed to post them back to the
4 research team.

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

12 *Measures*

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

15 Marital relationship was assessed with the satisfaction (ENRICH-Satisfaction, assesses
16 satisfaction with different aspects of the relationship, e.g. the sexual relationship),
17 communication (ENRICH-Communication, focuses on the level of comfort felt in sharing
18 and receiving emotional and cognitive information from the partner), and conflict resolution
19 (ENRICH-Conflict, assesses perceptions of the existence and resolution of conflict in the
20 relationship) subscales of the ENRICH marital inventory (25). The Portuguese version of this
21 scale has shown to be reliable and valid (26). Scores vary between 1 and 5 with higher scores
22 indicating better marital relationship.

23 QoL was assessed with the physical (Physical-QoL; e.g. energy and fatigue, sleep, pain
24 and discomfort, mobility), psychological (Psychological-QoL; e.g. positive and negative
25 feelings, self-esteem, body image) and the social relationships (Social-QoL; i.e. interpersonal

1 relationships, social support and sexual life) domains of the World Health Organization QoL
2 brief instrument (27). Several studies have shown the WHOQOL-bref adequacy to assess
3 QoL in several health conditions, including infertility (28). The European Portuguese version
4 of the instrument presents sound psychometric properties (29). Scores vary between 1 and
5 100 with higher scores indicating better QoL.

6 ***Data analysis***

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

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

16 The dependent variables in the current study were the three QoL domains and the
17 independent variables were the three marital difference scores, time (Pregnancy, Postpartum),
18 gender (Female, Male) and method of conception (SC, ART). We conducted preliminary
19 univariate analyses made to investigate the necessity for controlling for obstetric and
20 perinatal variables (problems in pregnancy, baby age and weight at birth and mode of
21 delivery). No significant associations with QoL were found and these variables were not
22 included in the models. Further, the three scores of the marital relationship dimensions were
23 entered as independent variables in the models, so that we could evaluate the influence of the
24 couple's marital difference in QoL after accounting for individual perceptions of the marital
25 relationship. Interactions of marital difference with time and gender were investigated.

1 Models significance was ascertained with Chi-squared statistics and the significance of each
2 independent variable with the Wald criterion.

3 Power calculations for MLM are similar to multiple regression (31), thus Cohen's (32)
4 estimates were used to assess the statistical power of the models. With a significance level of
5 $p < .10$ the achieved sample size allowed for the detection of medium to large effects ($N = 66$
6 couples, 15 predictors, .80 power, G * Power,33). Thus, the significance level used was .05
7 but trends ($p < .10$) were also presented.

8 **Results**

9 ***Sample***

10 The final sample consisted of 35 ART (IVF and ICSI, using the couples' own gamete) and
11 31 SC couples. Table 1 presents sample characteristics. ART women and men were
12 significantly older than SC women and men, respectively, and were with their partner for a
13 longer time. There was a higher probability for the occurrence of problems during ART
14 pregnancies and the frequency of SC male babies was significantly higher than that of ART
15 male babies.

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

17 Table 2 presents mean scores for the study variables at T1 and T2. Table 3 presents
18 findings from the MLM models of changes across time in QoL. It indicates that Physical-
19 QoL changed differently across time for men and women: for women no change was
20 observed ($b = 3.199, SE = 4.603, p = .518$) but men experienced a decrease ($b = -7.117, SE =$
21 $2.370, p = .003$). Psychological-QoL changed differently across time for couples who
22 conceived with ART and spontaneously: for the former it decreased ($b = -6.053, SE = 1.799,$
23 $p < .001$), but for the latter it did not change ($b = -1.445, SE = 1.912, p = .450$). Finally,
24 Social-QoL tended to decrease across time for everyone.

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

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

17 Discussion

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

1 marital relationship of ART couples that affects their psychological wellbeing across the
2 transition to parenthood.

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

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

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

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

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

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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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