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Title

Relationships in IVF couples 20-years after treatment.

Running title: Relationships in IVF couples

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Abstract

BACKGROUND Involuntary childlessness is a psychological and social dilemma for at least one but usually both members of the childless couples and is thought to have a lifelong impact on many of these couples. Studies of the long-term effects are scarce and the participation rate in published studies is generally very low. We therefore aimed at analyzing relationships and family structure in couples 20-23 years after the women in these couples had received IVF treatment. **METHOD** The data are drawn from answers from 788 individuals - 81 % of the individuals treated. ENRICH has been used to analyse the relationships in those couples who stated that they have remained a couple since their IVF-treatment. In total 412 men and women (206 couples) answered the ENRICH inventory. Fourteen men and 137 women answered the ENRICH without their spouse answering the inventory. **RESULTS** We found that the majority of all couples show a stable relationship 20 years or more after the date of IVF treatment. However, the group of couples who remained childless (9.2% of the total study population) during the 20 years following the IVF treatment differ from the majority on the subscale "*Children and Parent*" measuring aspects on attitudes and feelings about having and raising children. Another difference seen in the couples that were childless was that men scored significantly higher on "*Conflict resolution*" and the couples had a higher average score on positive agreement on the issues on "*Communication*" indicating a skill in communication in the relationship and also an agreement that they are communicating well. **CONCLUSION** We found that the majority of IVF couples (90.8%) that had been treated 20 years or more before the follow up had added at least one biological or adopted child to the family during that time. The relationships in couples who had continued to stay together during that period were generally described as being good, whether the couples had become parents or not.

Keywords

Infertility, couples relationship, long term effect

Introduction

The short and long-term physical and psychological effects that childlessness may have on one or both members of a couple have been extensively discussed by researchers in many different countries. Wirtberg and colleagues (Wirtberg, et al., 2007) interviewed 14 Swedish women 20 years after their infertility treatment to learn about their experience and about the long-term effects of their involuntary childlessness. They found that the childlessness had had a strong impact on the women's lives. Half of the women were separated, and all but one reported that their sexual life had been affected in negative and long-lasting ways. The effects of childlessness were seen to have increased over time and in relation to life events such as their friends becoming grandparents.

A Norwegian study (Sundby, et al., 2007) of IVF couples collected data on outcomes of treatment, satisfaction after treatment, and the perceived consequences of IVF treatment by means of a questionnaire given to a random sample of 66 women (response rate 42%; N = 66). It was found that 10 years post-treatment, the majority of the women (82%) had children as a result of adoption, spontaneous pregnancy or IVF. Although most of the women said that they regarded the treatment period as painful, they also said that it was now in the past and no longer affected their lives in a devastating way; they had found a way to cope with this difficult period in their life.

In a Swedish study (Johanson, et al., 2010) investigating couples five years after treatment, the authors were surprised to find that 76.7% had been living with or still lived together with their children. They also reported that the group with children assessed their quality of life as being better than did those without children. Of the other approximately 24%, 13.5% of the women and 10.5 % men were not living with the same partner with whom they had been living when the women were treated with IVF. The authors concluded, however, that there were no difference in separation rates between the groups with children and those without. Owen and Golombok (2009) assessed relationships in couples who had undergone IVF treatment more than 18 years earlier and compared them with three types of families: those who had children conceived through donor insemination, those with an adopted child, and those with a naturally conceived child. No differences were found in marital satisfaction between these groups.

Results from long-term follow-ups depend on the methods used in the studies; results will depend in part on when the individual or the couples were assessed, what kind of treatment they received and what the outcome of treatment was. We have shown in earlier studies that

IVF couples display a stable relationship over time (five years) both in couples who have children after treatment and those who do not have children (Sydsjö, et al., 2005, 2008). In clinical settings, couples express during treatment or in the period shortly after unsuccessful treatment that they worry about their life and relationship in the future and the impact on their lives of facing a childless future.

The aim of the present study was to assess relationships in an unselected population of IVF treated men and women. We approached this group, 20 years after the first IVF-treatment cycle was performed. We also wanted to learn about the family structure that had evolved during these 20 years.

Materials and Methods

All couples who had been given treatment with at least one IVF cycle at the RMC University clinic in Linköping between 1986 and 1989 were sent an introductory letter asking the individuals in these couples to participate in the study. A total of 980 individuals were asked to participate in the follow up. Thirty five letters were returned with address unknown because the person had moved abroad. One hundred seven did not respond after one reminder and 33 responded with a letter stating that they did not want to participate. Eleven men and six women were deceased.

The data are drawn from answers from 788 individuals - 81 % of the individuals treated. A total of 257 couples (514 individuals) answered the questionnaire about their relationship. ENRICH has been used to analyse the relationships in those couples who stated that they have remained a couple since their IVF-treatment.

Fourteen men and 137 women answered the ENRICH without their partner answering the ENRICH inventory.

The study was approved by the Regional Ethical Review Board in Linköping.

Treatment procedures 1986-1989

The couples were given three or more publically funded IVF treatments during this time period. Couples who had children previously were allowed to be given treatment during this time period. The women could not be older than 38 when they were to receive treatment.

Measures

ENRICH inventory

The Swedish version of the ENRICH marital inventory, originally created by Olson and co-workers (Fournier, Olson, & Druckman, 1983), was used in order to describe marital dynamics. The instrument provides scores of the women's and men's evaluation of their relationship as they assessed their present relationship in 10 categories comprising 10 items each. The scales are briefly described as follows:

Personality Issues: Examines an individual's satisfaction with his or her partner's behaviours.

Communication: Is concerned with an individual's feelings and attitudes toward communication in the marriage. Items focus on the level of comfort felt by the respondent sharing and receiving emotional and cognitive information from the partner.

Conflict Resolution: Assesses the partner's perception of the existence and resolution of conflict in the relationship. Items focus on how openly issues are recognized and resolved, as well as the strategies used to end arguments.

Financial Management: Focuses on attitudes and concerns about the way economic issues are managed within the marriage. Items assess spending patterns and the manner in which financial decisions are made.

Leisure activities: Assesses preferences for spending free time. Items reflect social vs. personal activities, shared vs. individual preferences, and expectations about spending leisure time as a couple.

Sexual Relationship: Examines the partner's feelings about the affectionate and sexual relationship. Items reflect attitudes about sexual issues, sexual behaviour, and sexual fidelity.

Children and parenting: Assesses attitudes and feelings about having and raising children. Items focus on decisions regarding discipline, goals for the children, and the supposed impact of children on the couple's relationship.

Family and Friends: Assesses feelings and concerns about relationships with relatives, in-laws, and friends. Items reflect expectations for and comfort with spending time with family and friends.

Egalitarian Roles: Focuses on an individual's feelings and attitudes about various marital and family roles. Items reflect occupational, household, sex, and parental roles. High scores indicate a preference for more egalitarian roles.

Conception of Life: Examines the meaning of values, religious beliefs and practice, and conception of life within the marriage

Each category scale can vary between 10 and 50 points, 50 points being the most positive outcome. There are six alternatives for each item ranging from “in totally agreement” to “do not agree at all”. The summed category scale scores provide a global assessment of marital satisfaction varying between 100 and 500 points.

In addition, we used the Positive Couple Agreement (PCA) scale, which was derived from the ENRICH subscales. This PCA scale score is obtained by measuring the couples’ agreement in describing their relationship in positive terms on each question for each scale. This results in a measurement ranging from 0% to 100% agreement, depending on the number of agreements and the total number of questions in each subscale.

The ENRICH subscales have shown good internal consistency (alpha, range=.69-97) and test-retest reliability (r_{tt} , range=.65-.94) as well as content and construct validity (Fournier, Olson, & Druckman, 1983). The discriminate and concurrent validities of these scales have been established (Fowers & Olson, 1989). The Swedish version of the inventory has been evaluated (Wadsby, 1998), whereby the reliability and the validity of the instrument have been established to be satisfactory.

Statistics

The ENRICH scores (i.e. the ten factors as well as the total scores on both occasions) for the study group were tested for normality by use of the Kolmogorov-Smirnov test. The data were also examined visually by scatter-plots to identify possible extreme values. As the assumption of normality could not be met in all of the studied variables, we chose to use a non-parametric approach when analysing the data. The Kruskal-Wallis test as well as the Mann-Whitney U test was used to examine differences between the three study groups, “no children”, “at least one biological child” and “adoptive children”. The group “at least one biological child” includes cases with only biological children as well as cases with both biological and adopted children.

Results

Couple status 20 years and later

In total 514 of the respondents could be matched as couples. Among the 257 couples (514 individuals) where both partner responded we have investigated how many had been and are still co-habiting with their partner since their first IVF-treatment. Of these 418 replied that they are still co-habiting with their original partner. Further analyses revealed that 6 of these

individuals had replied differently to their partners who had replied that they were no longer living together. Therefore we have 206 couples remaining (412 individuals) to be included in the analyses.

The women were on average 47 years old and the men were 49 years old when answering the questionnaires, see table I for age distribution among the three groups. The men were born between 1932 and 1969 and the women were born between 1952 and 1969.

Nineteen couples (9.2%) stated that they were childless, 119 (57.8%) that they had at least one biological child (1 - 5) and 44 (21.4%) couples that they had adopted at least one child (24 couples did not answer this question). For the men and women who answered the ENRICH without their partner the corresponding numbers for having at least one biological child were six for the men and 83 for the women, while one man and one woman reported only adopted children. Hence there were no differences between the groups.

Table I. Mean age and corresponding SD by gender and child status.

	Men			Women		
	Mean	SD	p-value	Mean	SD	p-value
No children	48.7	5.4	0.500 ¹	47.7	3.3	0.005 ¹
At least one biological child	47.8	5.6	0.731 ²	45.1	3.9	0.205 ²
Adoptive children	48.2	4.52	0.612 ³	46.4	4.0	0.069 ³

¹ comparison between no children and at least one biological child

² comparison between no children and adoptive children

³ comparison between at least on biological child and adoptive children

The couples where both had answered the ENRICH had been through 1-10 IVF treatments including both publically funded treatments and treatments in private settings. For 33 couples (8%) no complete IVF cycle was performed since there were no embryos to transfer. There was a difference between the groups concerning number of treatments the couples without children had fewer treatments ($p=0.001$) than the couples with adopted or at least one biological child.

Among the couples, 49% stated that they had experienced between one and seven miscarriages after IVF treatments. No difference could be seen between the three groups concerning miscarriages.

The corresponding numbers for those who did not have a matching spouse answering the ENRICH inventory were that 13 men reported one to five completed IVF treatments and 124 of the women had been through 1-10 IVF treatments. Eight men reported the wife experiencing one to five miscarriages while 67 of the women reported one to seven miscarriages. No difference between this group of men and women answering the ENRICH without their partner and the couples where both answered the inventory.

See table II for detailed information on background variables.

Table II. Background variables for those who answered the ENRICH questionnaire arranged by gender and whether couples could be matched.

	Matching couples who answered		No matching spouse who answered	
	Men	Women	Men	Women
	202	202	14	137
Age (mean, SD)	47.9 (5.2)	45.7 (4.1)	52.2 (9.7)	45.7 (4.1)
No. of treatments (mean, SD)	2.3 (1.7)	2.5 (1.7)	2.2 (1.6)	2.3 (1.7)
Biological children	182	182	13	127
Miscarriage	97	103	8	67
Adoptive children	62	59	7	54
Separated/divorced	3	3	12	49

The Couple's assessment of their relationship.

The mean scores on the ENRICH scale for the men and women in the follow up are displayed in table III. Women with without matching partner scored lower on *Sexual relationship* compared to women with a partner (p=0.022) as well as on *Egalitarian roles* compared to the women with a partner (p=0.014).

In table IV and V the ENRICH results for men and women respectively, with biological children, adopted children and no children are displayed. Men with no children have significantly higher scores on "*Conflict resolution*" compared to men with children. Men and women with no children have significantly lower scores on the scale "*Children and Parenting*" than those with children. There is no difference between those with biological

children and those with adopted children. There was a high positive agreement for the participating couples on most of the factors conceptualising their relationship (Table VI). For women and men living without children there was a lower level of agreement on “*Children and parenting*” but on the other hand they were more in agreement on issues concerning “*Communications*”.

Table III. Mean scores on ENRICH for men and women.

	Matched couples				No matching spouse			
	Men		Women		Men		Women	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Personality Issues	41	6.2	40.9	6.1	36	9.2	40	6.9
Communication	40	6.8	40.7	7.2	36	7.9	40	7.3
Conflict resolution	37	6.1	38.5	6.0	35	7.1	38	6.4
Financial management	42	5.5	42.3	4.7	38	7.6	42	5.3
Leisure activities	36	6.5	37.9	6.2	35	5.3	38	6.3
Sexual relationship	41	7.3	42.1	6.8	39	6.5	40*	7.6
Children and parenting	39	5.8	39.5	5.9	38	4.9	38	5.9
Family and friends	41	5.2	42.3	5.3	40	5.4	41	5.8
Equalitarian roles	38	4.5	38.1	4.6	38	4.5	37**	5.0
Conception of life	38	5.9	38.2	5.6	37	6.5	37	5.7
Total score	392	47.4	399	45.1	369.4	52.4	390.9	50.3

* Women with without matching partner scored lower on Sexual relationship compared to women with a partner ($p=0.022$).

** Women with without matching partner scored lower on egalitarian roles compared to the women with a partner.($p=0.014$).

Table IV. Mean and standard deviation scores for *men* with no children, at least one biological child or adoptive children

	Mean	SD	p*
Personality Issues			0.313
No children	40.5	6.1	
At least one biological child	40.9	6.4	
Only adopted children	39.6	6.0	
Communication			0.392
No children	41.8	5.6	
At least one biological child	39.6	7.0	
Only adopted children	39.8	7.3	
Conflict resolution			0.007
No children	39.8	4.5	
At least one biological child	35.9	6.4	
Only adopted children	35.8	5.9	
Financial management			0.772
No children	41.2	6.05	
At least one biological child	41.57	5.4	
Only adopted children	41.1	5.3	
Leisure activities			0.944
No children	36.7	6.2	
At least one biological child	36.2	6.6	
Only adopted children	36.3	6.0	
Sexual relationship			0.510
No children	41.8	5.6	
At least one biological child	40.5	8.2	
Only adopted children	39.8	6.6	
Children and parenting			0.010
No children	34.6	6.9	
At least one biological child	39.1	5.2	
Only adopted children	39.0	5.7	
Family and friends			0.737
No children	41.1	5.6	

At least one biological child	41.0	5.3	
Only adopted children	41.8	4.8	
Equalitarian roles			0.791
No children	38.8	3.8	
At least one biological child	38.2	4.6	
Only adopted children	38.1	4.7	
Conception of life			0.941
No children	37.7	4.8	
At least one biological child	37.6	6.3	
Only adopted children	37.3	5.9	
Total score			0.641
No children	399	36.1	
At least one biological child	391	50.5	
Only adopted children	388	44.5	

* Kruskal-Wallis test

Table V. Mean and standard deviation scores for *women* with no children, at least one biological child or adoptive children.

	Mean	SD	p*
Personality Issues			0.806
No children	40.7	6.6	
At least one biological child	41.0	5.8	
Only adopted children	39.9	7.2	
Communication			0.401
No children	40.7	6.8	
At least one biological child	40.7	7.1	
Only adopted children	38.8	8.0	
Conflict resolution			0.672
No children	38.5	6.6	
At least one biological child	38.5	6.1	
Only adopted children	37.6	6.1	
Financial management			0.872
No children	41.7	5.2	

At least one biological child	42.3	4.7	
Only adopted children	41.9	4.7	
Leisure activities			0.858
No children	37.2	7.5	
At least one biological child	37.8	5.9	
Only adopted children	37.5	5.9	
Sexual relationship			0.367
No children	41.5	6.3	
At least one biological child	42.4	6.8	
Only adopted children	40.6	7.7	
Children and parenting			0.000
No children	33.2	6.4	
At least one biological child	40.1	5.5	
Only adopted children	40.2	4.8	
Family and friends			0.626
No children	42.4	5.1	
At least one biological child	42.0	5.4	
Only adopted children	41.4	5.2	
Equalitarian roles			0.867
No children	38.2	3.7	
At least one biological child	38.1	4.9	
Only adopted children	37.8	4.7	
Conception of life			0.159
No children	36.0	5.2	
At least one biological child	38.3	5.6	
Only adopted children	38.2	6.1	
Total score			0.279
No children	386	40.6	
At least one biological child	399	45.2	
Only adopted children	393	47.9	

* Kruskal-Wallis test

Table VI. Positive Couples Agreement (PCA) for all 206 couples with no children, at least one biological child or adoptive children.

	Mean	SD	p*
Personality Issues			0.076
No children	60.3	24.0	
At least one biological child	56.5	27.5	
Only adopted children	49.8	28.2	
Communication			0.029
No children	66.9	28.0	
At least one biological child	57.9	31.0	
Only adopted children	52.8	32.6	
Conflict resolution			0.071
No children	55.3	23.9	
At least one biological child	47.0	26.1	
Only adopted children	45.6	25.3	
Financial management			0.564
No children	66.9	19.9	
At least one biological child	66.2	22.8	
Only adopted children	62.7	25.4	
Leisure activities			0.339
No children	50.0	26.3	
At least one biological child	46.0	26.1	
Only adopted children	42.8	23.1	
Sexual relationship			0.321
No children	67.2	27.3	
At least one biological child	61.5	32.4	
Only adopted children	58.3	33.5	
Children and parenting			0.000
No children	26.0	34.4	
At least one biological child	58.4	24.0	
Only adopted children	58.5	24.9	
Family and friends			0.579
No children	66.7	24.1	

At least one biological child	63.7	24.2	
Only adopted children	61.3	27.9	
Equalitarian roles			0.131
No children	57.4	19.1	
At least one biological child	50.6	23.4	
Only adopted children	49.1	24.0	
Conception of life			0.439
No children	53.6	23.5	
At least one biological child	57.0	24.6	
Only adopted children	55.7	27.1	

* Kruskal-Wallis test

Discussion

We found that the majority of the couples show a stable relationship 20 years or more after their IVF treatment both for parent and childless couples where the total scores were around 400. We have earlier showed that parents of a child who had been conceived after IVF as well as women and men who had no children after IVF treatment had scores around 400 on the ENRICH. In general a total point score around 400 is considered a stable and good relationship (Wadsby & Sydsjö, 2001).

The couples that have remained childless during the 20 years differ from those with children on the subscale “*Children and Parents*”, which is not surprising since the items that are assessed are feelings about having and raising children and the impact children will or would have had or did have on the couple’s relationship. Another difference seen in the couples that were childless was that men scored higher on *Conflict resolution* meaning that they experience that they had strategies to recognize and resolve upcoming conflicts, and the childless couples had higher scores on positive agreement on the issues in *Communication*.

One recent study concluded that good communication, the individuals’ reactions and thoughts about how they as a couple manage their communication in their relationship, is vital in a relationship (Markman, et al., 2010). Therefore a possible explanation for our result is that childless couples must make a greater effort to deal with this issue and may even get more training to deal with this with the end result being that they benefit from this challenge.

Surprisingly the couples did not differ in their assessments of experience with sexual matters; men and women scored equally on these factors and having children or not having children did not affect the scores. That women who had answered the inventory without a matching

partner scored lower might indicate a negative factor for their relationship. Sundby et al (2007) found in their follow up study 10 years after IVF treatment that 53% of the couples remembered that the infertility investigation had negatively affected their sexuality and 10% stated that their sex life was not back to a satisfactory level at the time of the follow up (Sundby, et al. 2007). We cannot compare the present findings with these results since different methods were used, but clinically this is an interesting issue often raised by infertile couples and also among professionals working with family therapy. Sexual dysfunction as a cause of infertility is rather unusual but women more often have temporary sexual disorders because of infertility investigation/treatment than men (Wischmann, 2010). In our other studies on the long-term effects on sexual relationships, IVF couples were more stable than controls, i.e. spontaneously conceived couples' at the five year follow up (Sydsjö, et al., 2008).

We have earlier reported that IVF couples were very satisfied with their relationships directly after the successful IVF treatment and continued to be so when the child/children reached five years of age (Sydsjö, et al., 2005, 2008) . For couples that had conceived spontaneously there was a decline in their perceived relationship when the child was five years old. Our conclusion concerning this result was that the majority of the couples conceiving spontaneously had become parents to a second child during the five year follow up and that having the additional child is a well known strain on parenthood and relationships (Sydsjö, et al., 2008).

An interesting finding in common with results from other studies with a long term focus is that we found that of the couples still remaining as couples after the IVF treatment the vast majority had children; only 9% were still childless, 91% lived with children who were either their biological children or adopted or both. Making plans for adoption is often discussed and seen as a solution for many couples but legal issues, economy and health rule out some couples. In a study from Sweden with a five year perspective, 23% of previously treated IVF couples stated that they were childless. These couples had chronic diseases and financial problems to a higher degree than controls and IVF treated couples that had children (Johansson, et al., 2009, 2010)

One limitation with our study might be that we have based our results on self-reported quality of relationship so a possibility exists of a bias towards positive self-reporting. In this study both men and women were advised to answer their questionnaires separately - but of course we were not able to control this. We have no relationship data or information on if the couples or individuals that refrained from participating had or did not have children that

would of course have added to our knowledge. Since the number of childless couples participating in this study is small, the results must be viewed with some caution.

The results from the men and women assessing their relationship without a matching partner must be interpreted with caution as well since we have no information on why the partner chose to decline participating.

The divorce rate for married couples in Sweden is rather high, 50% of all marriages ends in divorce (Statistic Sweden, 2008). No true official statistics about the separation rate for couples who cohabitating is available but separations are considered to be twice as common among cohabitants with children as among married couples (Statistic Sweden, 2007).

The men and women who assessed their relationship without a matching spouse were more often separated or divorced.

A strength of this study is the longitudinal approach and the low dropout rate and that both the men and women answered all the questions.

During the time period when the present study sample received IVF treatment it was acceptable for people who already had biological children to request IVF. The situation has changed since then, and in 2010 most publically funded clinics do not offer treatment for couples that already have children. A rather strict policy has also been in effect in most clinics in Sweden specifying that IVF couples should have had a stable relationship for at least two years before treatment.

We conclude that the majority of IVF couples treated 20 years or more before follow up had children who were either biological or adopted. The long term relationships were good for couples who continued their relation after treatment and who were still living without children or with biological/adopted children.

Authors' roles

Gunilla Sydsjö Research idea, design, preparation of the manuscript, responsible for the final preparation of the manuscript

Claudia Lampic Design, preparation of the manuscript,

Agneta Skoog Svanberg Design, preparation of the manuscript,

Barbara Jablonowska Analysis of data, preparation of the manuscript

All authors were involved in discussion and interpretation of results. GS is the guarantor for the study.

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