Linköping University Postprint

Relationship and parenthood in IVF couples with twin and singleton pregnancies compared with pontaneous singleton primiparous couples—a prospective 5-year follow-up study

Gunilla Sydsjö, Marie Wadsby, Adam Sydsjö and Katarina Ekholm Selling

N.B.: When citing this work, cite the original article.

Original publication:

Gunilla Sydsjö, Marie Wadsby, Adam Sydsjö and Katarina Ekholm Selling, Relationship and parenthood in IVF couples with twin and singleton pregnancies compared with pontaneous singleton primiparous couples—a prospective 5-year follow-up study, 2008, Fertility and Sterility, (89), 3, 578-585.

<http://dx.doi.org/10.1016/j.fertnstert.2007.03.064>.

Copyright: Elsevier B.V., <http://www.elsevier.com/>

Postprint available free at:

Linköping University E-Press: <http://urn.kb.se/resolve?urn=urn:nbn:se:liu:diva-11656>

Relationship and parenthood in IVF couples with twin and singleton pregnancies compared with spontaneous singleton primiparous couples—a prospective 5-year follow-up study

Gunilla Sydsjö^a, Marie Wadsby^b, Adam Sydsjö^a and Katarina Ekholm Selling^a

^aDivision of Obstetrics and Gynaecology, University of Linköping, Linköping, Sweden

^bDivision of Child and Adolescent Psychiatry, Faculty of Health Sciences, University of Linköping, Linköping, Sweden

ABSTRACT

Objective

To analyze relationship and parenthood in IVF twin couples, IVF singleton couples, and spontaneously pregnant primiparous couples.

Setting

Southeast region of Sweden.

Design

Prospective case-control study.

Patient(s)

In total, 24 women and men who became pregnant with twins, consecutively, and expected their first child in 1997–98 were studied. A control IVF group of 94 singleton primiparous IVF couples were used. A group of spontaneous primiparous pregnant women were selected out of the total pregnant population as a control group.

Main Outcome Measure(s)

Relationship and parenthood measured by questionnaires and interviews.

Result(s)

The IVF singleton couples were most stable in their relationship during the whole study period, and the IVF twin parents also seemed more stable and satisfied compared with the control group of spontaneous conception couples. In the control group, 88% had a second child during the study period. In the singleton IVF group the corresponding number was 9%, and none of the twin parents had another child during the study period.

Conclusion(s)

We conclude that the stresses associated with IVF treatment and becoming first-time parents of twins did not have a negative impact on the couples' appreciation of their relationship and parenthood as stated by both men and women.

How many embryos to transfer in an IVF cycle has been a controversy in assisted reproductive technologies for several years. A focus of the debate has been to reduce multiple births, with the current focus on one embryo transfer to eliminate twin births (1-4). Studies on the physical health of the IVF-treated mother and the child during pregnancy, delivery, and neonatal period shows high rates of cesarean section, premature births, children small for gestational age, and an increased risk for congenital malformations (2-5). The interpretation of these results show that the high frequency of multiple births and maternal age were the contributing factors; not the IVF technique itself. Of concern has also been the fact that having twins puts great strain on the parents, the parent-child relationship, and on the couple's relationship.

There are few studies on twin families created by IVF. Cook et al. (6) followed 12 twin parents when the children were between 4–8 years old, focusing on parental stress and psychosocial well-being. They found that compared with spontaneously conceived twins there were no differences in child behavior or parenting quality, but the IVF twin parents experienced more parental stress. Colpin et al. (7) found, in their study of 103 families with 1-year-old twins either conceived spontaneously, with IVF, with artificial insemination by donor, or spontaneously with hormone treatment, no difference between the groups in parent-child relationship or in the parents' psychosocial well-being.

We have recently shown that IVF couples are generally well adjusted and stable in their relationships and psychologic well-being when the child is 1 year old (8). In that study only couples expecting their first child were included and compared with spontaneous first-child couples. We hypothesized that the IVF couples might have been “delayed” in the reaction and strain that follow the birth of the first child. It was also predicted that, over the long term, the IVF couples with twins had more strain and were more negatively affected in their relationship than IVF couples with one child. There is no study, to our knowledge, that has followed IVF couples from early pregnancy until the child/children turn(s) 5 years old and focused only on the first-time parents. The aim of the present study is therefore to compare couples' relationships and parenthood in primiparous couples after IVF treatment, both twins and singletons, with couples who had become spontaneously pregnant with their first child (singletons).

METHODS

Sample and Procedure

The initial sample comprised all couples at the Reproductive Center at Linköping University Hospital who, during September 1997 to December 1998, became pregnant and did not have previous children: in total 130 couples. Ten were not able to communicate in the Swedish language, and ten of the women had a spontaneous abortion and were therefore not included in this stage of the study. The study group thus comprised 110 couples. The IVF unit did not conduct IVF treatment with donated gametes at the time in the study. None of these couples were identified as having psychosocial problems such as drug/alcohol problems, psychiatric problems, and/or social problems according to defined criteria of relevance for pregnancy and parenthood (9).

The couples were sent an introduction letter explaining the purpose of the study and a request from the author, G. Sydsjö, to contact them by phone to explain more about the study and ask for permission to send the Enrich inventory. This was done in approximate gestational week 15–20. The next stage of the study was carried out when the child had reached 12 months of age and is published elsewhere (8). The present follow-up took place when the children were 5 years old. The couples were again approached by mail and they were again asked to take part in the study. During follow-up there was one couple who did not want to participate because they had recently divorced. Of the IVF couples, 79 (85%) men and 86 (91%) women with one child participated in the follow-up. Fourteen couples had twins, and one of those couples declined participation in the follow-up (Table 1).

Control Group

The control group comprised 157 women and 144 men with spontaneous pregnancies from a prospective longitudinal study of a population-based sample of primiparous couples in the city of Linköping (Table 1). The men and women were studied in the same manner as the IVF couples. For further details about this group, see Wadsby and Sydsjö (10).

Table 1: Number of respondents participating in the study during pregnancy and when the children were aged 5 years.

	Men (fathers)		Woman (mothers)	
	n	% ^a	n	% ^a
During pregnancy				
IVF singleton	93	100	94	100
IVF twin	14	100	14	100
Control	332	100	353	100
At 5 years				
IVF singleton	79	85	86	91
IVF twin	13	93	13	93
Control	144	43	157	44

^a Percentage of the total number of respondents in each group participating in the study.

Siblings

Of the spontaneously conceived children, 79.8% had one sibling and 8.2% had two siblings during the observation time. In the IVF group, there were ten (9%) couples who had a child during the study period (four spontaneous and six through a new IVF treatment). None of the twin parents had any more children.

Measures

The Swedish version of the Enrich marital inventory, originally created by Fournier et al. (11) was used to describe marital dynamics. The instrument provides scores of the women's and men's evaluation of their relationship in ten categories comprising ten items each. The scales are briefly described as follows:

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

Communication: Concerned with an individual's feelings and attitudes toward communication in the marriage. Items focus on the level of comfort felt by the respondent in 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 versus personal activities, shared versus individual preferences, and expectations about spending leisure time as a couple.

Sexual Relationship: Examines the partner's feelings about the affectional and sexual relationship. Items reflect attitudes about sexual issues, sexual behavior, 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, gender, 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. Summed, the category scale scores provide a global assessment of marital satisfaction varying between 100 and 500 points.

The Enrich scales have shown good internal consistency (alpha range 0.69–0.97) and test-retest reliability (r_{tt} range 0.65–0.94) as well as content and construct validity (11). The discriminant and concurrent validity of these scales have been established (12). The Swedish version of the inventory has been evaluated (13), whereby the reliability and the validity of the instrument have been established to be satisfactory.

Ethics

The study was approved by the Human Research Ethics Committee, Faculty of Health Sciences, Linköping University.

Statistics

The t test and the χ^2 test were used to analyze differences on background variables (group, age, length of relationship, and educational level) and the total score on the Enrich during pregnancy between the respondents who did, and who did not, participate in the 5-year follow-up. Group differences (i.e., between the IVF singletons, IVF twins, and control subjects) on the background variables were analyzed by means of the χ^2 test as well as one-way analysis of variance. Analysis of covariance with the differences in scores (i.e., score at the 5-year follow-up–score during pregnancy) on the Enrich subscales and total score, respectively, as dependent variables and group and educational level as factors, and age and length of relationship as covariates was performed. Interactions between the independent variables were tested against the total score, but because none of the interactions were significant (lowest P value was .163 for group $\times$ length of relationship) we did not include interactions in the models presented. Owing to the relatively large drop-out on educational level in the two IVF groups (Table 2), analyses were performed both with and without this variable. Including the educational level in the model did not substantially change the influence of the other included variables (data not shown), but the total n decreased from 236 to 199 among the studied men and 256 to 217 among the women. We also dichotomized the differences in scores between the two study occasions to 0 = no decrease and

1 = decrease and performed multiple logistic regression analyses with the dichotomies as dependent variables and group, age, and length of relationship as independent variables. In all analyses, the women (mothers) and the men (fathers) were analyzed separately.

Table 2: Background data of the study population.

	IVF singleton	IVF twin	Control
Men (fathers)			
<i>Education, n (%)^a</i>			
9–10 yrs	9 (17)	1 (17)	11 (8)
11–13 yrs	11 (21)	1 (17)	78 (54)
≥14 yrs	32 (62)	4 (67)	55 (38)
Missing, n (%) ^b	27 (34)	7 (54)	0
Age, yrs, mean (SD)	32.2 (3.1)	32.6 (4.0)	29.4 (4.0)
Missing, n (%) ^b	0	0	2 (1)
Length of relationship, yrs, mean (SD)	77.0 (27.0)	77.2 (21.3)	38.8 (27.4)
Missing, n (%) ^b	0	0	1 (1)
Women (mothers)			
<i>Education, n (%)^a</i>			
9–10 yrs	0	0	5 (3)
11–13 yrs	28 (51)	2 (29)	81 (52)
≥14 yrs	27 (49)	5 (71)	71 (45)
Missing, n (%) ^b	31 (33)	7 (54)	0
Age, yrs, mean (SD)	32.2 (3.1)	32.5 (3.8)	27.3 (3.5)
Missing, n (%) ^b	0	0	0
Length of relationship, yrs, mean (SD)	76.2 (26.6)	77.2 (21.3)	38.2 (27.1)
Missing, n (%) ^b	0	0	2 (1)

^a Note that the percentages are based on the respondents who participated both during pregnancy and when the children were aged 5 years.

^b Percentage of missing values among the respondents who participated on both occasions.

RESULTS

The twin frequency in the IVF group was 12% at the first assessment ($n = 14$ couples).

The total number of men who participated on both occasions (i.e., during pregnancy and when the children were aged 5 years) was 236, and the corresponding number of women was 256 (Table 1). A higher proportion of the control subjects did not participate at follow-up compared with the two IVF groups (i.e., IVF singletons and IVF twins; $P < .001$). There were differences in the studied background characteristics when comparing the respondents and the nonrespondents (i.e., the respondents who did and did not participate at the 5-year follow-up). The respondents were somewhat older, their relationship with their partner was longer, and they had higher educational levels compared with the nonrespondents ($P < .01$ on all comparisons; data not shown). In addition, the respondents' total scores on the Enrich inventory during pregnancy were higher ($P < .001$).

The age of the parents who participated on both occasions in the two IVF groups were higher than the controls, and they had longer relationships ($P < .001$ for both men and women on both variables; Table 2). Among the studied men, there were differences in educational levels among the three groups ($P = .001$). Of note is that the educational level was missing on a relatively large percentage in the two IVF groups (33%–54%; Table 2), for which reason the results concerning this variable should be interpreted with caution.

Table 3 shows the differences in scores (i.e., score at the 5-year follow-up – score during pregnancy) on the Enrich subscales and the totals in relation to gender and study group. The largest decrease on the total score was seen among the parents in the control group (–21.7 and –19.3, among the men and women, respectively), whereas parents to IVF singletons had the smallest decrease. Among the mothers to IVF twins, the decrease in the total score was close to that of the control group (–17.9 compared with –19.3), and the fathers to IVF twins had a decrease relatively similar to that of the IVF singletons. However, parents to IVF twins had the highest percentage with decreased total score between the two occasions (92% and 85%, respectively). Among the men, significant differences between the groups were found on the subscales “Sexual relationship” and “Children and parenting” when adjusting for the background

variables studied (Table 4). Among the women, group differences were found in “Sexual relationship,” “Children and parenting,” “Conflict resolution,” “Egalitarian roles,” and “Conception of life.” In all differences found, except for “Conflict resolution,” the mothers in the control group had a larger decrease than the parents to IVF singletons. In these analyses the IVF twin group was not significant, which might be owing to the fact that this group of parents had an average decrease in between the mean decreases of the IVF singleton group and the control group (Table 3) and/or to the small number of observations (13 men and 13 women). However, when the differences in scores between the two occasions were dichotomized into “no decrease” and “decrease,” there were some differences between of IVF twins group and the control group, even after adjustments for background variables (all data not shown). Fathers to IVF twins had a lower risk of decrease than control subjects on the subscale “Financial management” (odd ratio [OR] 0.24, 95% confidence interval [CI] 0.07–0.86; $P=.024$). In addition, mothers to IVF twins had a lower risk of decrease in “Children and parenting” (OR 0.18, 95% CI 0.05–0.69; $P=.013$).

The Children's Health

All children were, according to the parent's statements, considered to be normally healthy and without serious handicap at the time of the assessment. The newborn data on the group are presented elsewhere (8)

DISCUSSION

In this longitudinal study we failed to demonstrate a decline or a negative impact in IVF couples' relationships. The IVF couples were very satisfied with their relationships directly after the successful IVF treatment and continued to be so when the child/children reached 5 year of age. In the spontaneous pregnancy group the couples were satisfied in the first months of pregnancy, but their opinion about their relationship changed during the child's first year (8) and continued to change as the child reached 5 years of age. Parents with IVF twins seemed to have a more satisfied relationship compared with the spontaneously conceived couples and somewhat less satisfactory relationship compared with the singleton IVF couples. However, we were not able to detect any significant differences between the IVF twin group and the other two groups when comparing the scores on the Enrich scale measure at pregnancy and when the child was 5 years

old. A possible reason might be that the twin group is rather small (13 couples). Other studies have raised concerns that twins have a negative effect and cause disharmony in a relationship owing to the great burden of having two children to care for (14-16). The results presented here were stable when the duration of the relationship, age, and occupation were adjusted for. The duration of the relationship seems to be the most important background factor when evaluating the results.

Table 3: Differences in scores (i.e., score at the 5-year follow-up – score during pregnancy^a) on the Enrich subscales and of the total in relation to gender and study group.

	IVF singleton			IVF Twin			Control		
	Mean	SD	% decreased ^b	Mean	SD	% decreased ^b	Mean	SD	% decreased ^b
Men (fathers)									
Personality issues	-0.53	2.82	46	-0.22	4.40	54	-0.22	4.40	43
Communication	-0.81	3.69	54	-2.16	5.32	62	-2.16	5.32	64
Conflict resolution	-1.43	4.66	47	-0.99	5.63	31	-0.99	5.63	50
Financial management	-0.22	3.54	35	-0.72	4.62	69	-0.72	4.62	49
Leisure activities	-1.52	4.89	57	-2.69	3.15	77	-1.66	5.54	65
Sexual relationship	-1.18	4.70	53	-2.38	4.29	46	-4.65	5.91	74
Children and parenting	0.13	4.22	41	-0.54	5.22	39	-5.26	5.23	85
Family and friends	-2.16	3.95	63	-0.23	3.27	46	-1.26	3.97	57
Egalitarian roles	-0.47	4.84	46	-0.38	3.80	46	-1.70	4.52	58
Conception of life	-0.08	3.75	69	-0.31	1.97	46	-2.64	5.05	61
Total score	-8.95	21.97	73	-13.46	10.16	92	-21.71	35.15	72

	IVF singleton			IVF Twin			Control		
	Mean	SD	% decreased ^b	Mean	SD	% decreased ^b	Mean	SD	% decreased ^b
Women (mothers)									
Personality issues	0.35	3.86	48	-1.15	2.76	46	-1.91	5.80	57
Communication	0.03	3.92	48	-1.31	2.21	62	-2.19	6.54	56
Conflict resolution	-3.34	5.51	61	-2.15	5.34	46	-0.70	5.10	47
Financial management	-0.53	3.52	49	-1.62	3.73	54	-0.07	4.62	43
Leisure activities	-1.65	5.63	67	-4.15	6.01	77	-1.54	5.67	53
Sexual relationship	-1.17	3.82	50	-1.38	2.18	62	-3.91	5.65	71
Children and parenting	-0.19	4.25	37	-2.46	5.22	77	-4.51	6.72	79
Family and friends	-1.99	4.57	65	-2.46	3.02	69	-0.62	4.54	50
Egalitarian roles	1.21	3.94	28	-1.23	3.96	46	-1.39	4.71	54
Conception of life	-0.05	2.77	36	-0.62	2.87	46	-2.61	4.69	63
Total score	-9.34	25.07	66	-17.92	16.79	85	-19.29	37.79	72

^a Negative values on the differences designate a decrease in scores between pregnancy and when the children were aged 5 years.

^b Percentage of respondents with decreased scores between the two occasions.

Although the largest decrease on the total score was seen among the parents in the control group, the parents to IVF twins had the highest proportion of individuals who had a decrease on the total score on the Enrich between the assessment at the beginning of the pregnancy and when the children had reached 5 years of age, but the difference were not statistically significant. Thus, when studying the proportion with a decrease in score instead of the actual change in score between pregnancy and the 5-year-follow-up, we found that parents to IVF twins had a lower risk of a reduction in marital satisfaction on the subscales "Financial management" (men), and "Children and parenting" (women) compared with controls. One explanation of this finding might be that none of the IVF twin parents had any more children during the observation period. A high number (88%) of the couples in the control group had more children. Divorce studies have shown that the relationship is most challenged after the birth of the second child and when

the children are small (17). Another explanation of the present results might be that a higher proportion of the control subjects did not participate at follow-up. The respondents participating during both occasions were older, had longer relationships, and had higher educational levels. In addition, the respondents' total scores on the Enrich inventory during pregnancy were higher. We were not able to find out the separation rate in the control group, because there are no available statistics on the couples that are cohabiting. The reason for refraining to participate in the follow-up may just be that the couples have separated.

When studies are based on self-reported parental qualities and quality of relationship, a possibility exists of a bias to positive self-report. In the present study both men and women were advised to answer their questionnaires separately, but of course we were not able to control this. Nevertheless, the couples have assessed their relationship on different occasions over a considerable time span—nearly 6 years—and the results showed a similar pattern.

The number of twins in this study is very low (12%). This is explained by the fact that the clinic, as a routine, only transferred two embryos during the study period and we only included the parents that were first-time parents in this study. We have seen in different studies that between 20% and 40% of infertile couples desire a multiple birth (18-19). According to the present findings this is not to be considered as a risk for the couples' relationships or their parenthood, at least not for couples that have a stable relationship from the beginning and became parents for the first time and have children that are healthy. There are still many hazards with multiple births, and the health of the children might also have been crucial to our results. Other studies on multiple births have shown less favorable results and mostly a negative impact on the mother's well-being and health (16-20). A recent Danish study presents results concluding that physical health of IVF/ICSI twins is comparable to non-IVF/ICSI twins but poorer than IVF singletons (5) and (21).

A strength in the present study is a very low drop-out rate in both IVF groups and the fact that both men and women in the couples participated in the different stages in the investigations. On the other hand, the drop-out rate in the control group is relatively high and we can only speculate to what extent this may have influenced the reported results in that group. However, the main focus in the present study was to study the relationship in IVF couples. It is also important to

point out that the groups of IVF singletons and, especially, IVF twins consisted of fewer couples than the control group. Therefore, the power to detect significant differences (i.e., the statistical power) in the IVF group was lower, which in turn may give conservative results.

Table 4: F values and corresponding P values for the study groups as well as for the background characteristics studied on the differences in scores^a on the Enrich subscales and in total score (analysis of covariance).

	Group (factor)		Length of relationship (covariate)		Age (covariate)		Educational level ^b (factor)	
	F	P	F	P	F	P	F	P
Men (fathers)								
Personality issues	0.474	.623	0.104	.747	3.025	.083	1.844	.161
Communication	0.700	.498	3.923	.049	1.595	.208	0.970	.381
Conflict resolution	0.221	.802	0.945	.332	1.536	.217	0.221	.802
Financial management	0.517	.597	0.091	.763	1.366	.244	3.504	.032
Leisure activities	0.306	.767	0.028	.868	0.560	.455	0.602	.549
Sexual relationship	3.167	.044 ^c	8.998	.003	1.742	.188	1.412	.246
Children and parenting	12.101	<.001 ^c	10.186	.002	0.284	.595	0.227	.797
Family and friends	2.746	.066	1.295	.256	0.087	.769	0.092	.912
Egalitarian roles	1.640	.196	0.516	.473	3.798	.053	1.662	.192
Conception of life	2.567	.079	3.772	.053	0.001	.979	0.191	.827
Total score	1.159	.315	5.622	.019	1.371	.243	0.444	.642

	Group (factor)		Length of relationship (covariate)		Age (covariate)		Educational level ^b (factor)	
	F	P	F	P	F	P	F	P
Women (mothers)								
Personality issues	1.549	.215	7.272	.007	1.001	.318	0.138	.871
Communication	1.862	.157	4.754	.030	2.424	.121	0.173	.841
Conflict resolution	4.982	.008 ^d	0.003	.960	0.775	.379	0.753	.472
Financial management	0.351	.705	0.528	.468	3.811	.052	2.366	.096
Leisure activities	1.592	.206	8.306	.004	3.034	.083	0.603	.548
Sexual relationship	4.671	.010 ^c	2.896	.090	2.743	.099	0.047	.955
Children and parenting	9.027	<.001 ^c	1.236	.267	2.426	.121	1.696	.186
Family and friends	1.202	.302	0.119	.730	0.681	.410	2.458	.088
Egalitarian roles	8.562	<.001 ^c	0.007	.932	2.293	.131	0.038	.963
Conception of life	3.772	.024 ^c	6.565	.011	1.082	.299	1.033	.358
Total score	1.200	.303	4.405	.037	2.646	.105	0.588	.556

^a Score at the 5-year follow-up – score during pregnancy.

^b Owing to the relatively large drop-out on this variable in the two IVF groups (Table 2), analyses were performed both with and without the educational level. Including the educational level in the model did not substantially change the influence of the other included variables (data not shown), but the total n decreased from 236 to 199 among the studied men and from 256 to 217 among the women.

^c Parents in the control group had a larger decrease than parents to IVF singletons.

^d Parents to IVF singletons had a larger decrease than control parents.

CONCLUSION

In the present study, there is no evidence that parents to IVF twins had a higher decline in marital satisfaction at 5-year follow-up compared with during pregnancy than parents to spontaneously conceived children. However, because the IVF twin group was rather small, these findings may need to be explored in larger groups.

REFERENCES

- 1 N.M. Fisk and G. Trew, Commentary: Two's a company; three's a crowd for embryo transfer, *Lancet* **354** (1999), pp. 1572–1573.
- 2 T. Bergh, A. Ericson, T. Hillensjö, K.G. Nygren and U.B. Wennerholm, Deliveries and children born after in-vitro fertilisation in Sweden 1982–1995: a retrospective cohort study, *Lancet* **354** (1999), pp. 1579–1585.
- 3 L.A. Schieve, H.B. Peterson, S.F. Meikle, G. Jeng, I. Danel and N.M. Burnett *et al.*, Live-birth rates and multiple-birth risk using in vitro fertilization, *JAMA* **282** (1999), pp. 832–838.
- 4 A. Thurin, J. Hausken, T. Hillensjö, B. Jablonowska, A. Pinborg and A. Strandell *et al.*, Elective single-embryo transfer versus double-embryo transfer in in vitro fertilization, *N Engl J Med* **351** (2004), pp. 2392–2402.
- 5 A. Pinborg, A. Loft, L. Schmidt and A.N. Andersen, Morbidity in a Danish national cohort of 472 IVF/ICSI twins, 1132 non IVF/ICSI twins and 634 IVF/ICSI singletons: health-related and social implications for the children and their families, *Hum Reprod* **18** (2003), pp. 1234–1243.
- 6 R. Cook, S. Bradley and S. Golombok, A preliminary study of parental stress and child behaviour in families with twins conceived by in-vitro fertilization, *Hum Reprod* **13** (1998), pp. 3244–3246.
- 7 H. Colpin, A. De Munter, K. Nys and L. Vandemeulebroecke, Parenting stress and psychological wellbeing among parents with twins conceived naturally or by reproductive technology, *Hum Reprod* **14** (1999), pp. 3133–3137.
- 8 G. Sydsjö, M. Wadsby, S. Kjellberg and A. Sydsjö, Relationship and parenthood in couples after assisted reproduction and in spontaneous primiparous couples. A prospective long-term follow-up study, *Hum Reprod* **17** (2002), pp. 3241–3250.
- 9 G. Sydsjö, Prevalence and significance of social and psychological risk factors during pregnancy, *Int J Technol Assesss Health Care* (8 Suppl 1) (1992), pp. 123–128.
- 10 M. Wadsby and G. Sydsjö, From pregnancy to parenthood: a study of couples relationship, *Nordisk Psykologi* **53** (2001), pp. 275–288.
- 11 D.G. Fournier, D.H. Olson and J.M. Druckman, Assessing marital and premarital relationships: the Prepare/Enrich inventories. In: E.E. Filsing, Editor, *Marriage and family assessment*, Sage Publications, Newsbury, CA (1983), pp. 229–250.
- 12 B.J. Fowers and D.H. Olson, Enrich marital inventory: a discriminant validity and cross-validation assessment, *J Marital Fam Ther* **15** (1989), pp. 65–79.
- 13 M. Wadsby, Evaluation of the Swedish version of Enrich marital inventory, *Nord J Psychiat* **52** (1998), pp. 379–387.
- 14 M.A. Ellison and J.E. Hall, Social stigma and compounded losses: quality-of-life issues for multiple-birth families, *Fertil Steril* **80** (2003), pp. 405–414.

- 15 C. Glazebrook, C. Sheard, S. Cox, M. Oats and G. Ndukwe, Parenting stress in first-time mothers of twins and triplets conceived after in vitro fertilization, *Fertil Steril* **81** (2004), pp. 505–511.
- 16 M.A. Ellison, S. Hotamisligil, H. Lee, J.W. Rich-Edwards, S.C. Pang and J.E. Hall, Psychosocial risks associated with multiple births resulting from assisted reproduction, *Fertil Steril* **83** (2005), pp. 1422–1428.
- 17 [Divorces and separations, demographic reports.] Örebro: Statistics Sweden, 1995. Swedish.
- 18 T.J. Child, A.M. Henderson and S.L. Tan, The desire for multiple pregnancy in male and female infertility patients, *Hum Reprod* **19** (2004), pp. 558–561.
- 19 G.L. Ryan, S.H. Zhang, A. Dokras, C.H. Syrop and B.J. Van Voorhis, The desire of infertile patients for multiple births, *Fertil Steril* **81** (2004), pp. 500–504.
- 20 Y. Yokoyama, Comparisons of child-rearing problems between mothers with multiple children who conceived after infertility treatment and mother with multiple children who conceived spontaneously, *Twin Res* **6** (2003), pp. 89–96.
- 21 A. Pinborg, A. Loft, L. Schmidt, J. Langhoff-Roos and A. Nyboe Andersen, Maternal risks and perinatal outcome in a Danish national cohort of 1005 twin pregnancies: the role of in vitro fertilization, *Acta Obstet Gynecol* **83** (2004), pp. 75–84.