

Sharing information with children conceived using *in vitro* fertilisation: the effect of parents' privacy orientation

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ABSTRACT

Objective: To examine the moderating effect of parents' approach to sharing information with children on the outcomes of information-sharing about *in vitro* fertilisation (IVF) conception. **Background:** Mental health professionals encourage parents to share information about IVF conception with their children, but limited research is available on associations among information-sharing, parent-child relationship quality and child adjustment. Predictions based on Communication Privacy Management Theory suggest that how parents share private information with children will moderate the association between sharing information about a child's IVF conception and parent-child relationship quality and indirectly affect child adjustment. **Method:** Study hypotheses were tested using a sample of 175 families with 246 6- to 12-year-old children conceived using IVF. Path models hypothesised associations among information-sharing, parent privacy orientation, parent-child relationship satisfaction and child behavioural and emotional adjustment. **Results:** The results supported the proposed process. Among parents with an 'open' privacy orientation, IVF information-sharing with children positively related to parent-child relationship quality ($r = .19, p = .03$). This association was negative when parents had a 'restricted' privacy orientation ($r = -.34, p = .01$). In turn, relationship quality affected child adjustment. **Conclusion:** Children conceived using IVF report wanting to know about their conception method and infertility counsellors often recommend information-sharing. These findings support the need to better understand IVF information-sharing processes, and parents who favour a 'restricted' privacy orientation may require additional support to promote open communication with children about their IVF conception.

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Since first used about 35 years ago (Stephoe & Edwards, 1978), *in vitro* fertilisation (IVF) has enabled increasing numbers of infertile couples to conceive children. Its use also brings

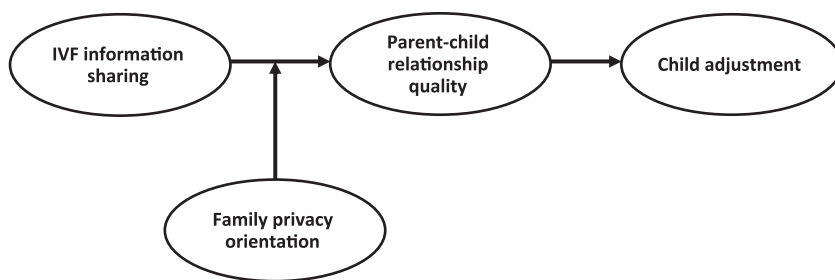


Figure 1. Conceptual model depicting the proposed associations among information-sharing, privacy orientation, relationship quality and child adjustment.

the challenge of deciding if and how parents will share with children the very personal information of their conception (Rosholm, Lund, Molbo, & Schmidt, 2010). This information-sharing challenge is significant, as evidenced by research showing that how a parent manages disclosing personal information to children can have substantial consequences for parent–child relationships (Finkenauer, Engels, Branje, & Meeus, 2004; Vangelisti, 1994). We propose a conceptual model explaining how sharing IVF information with children affects parent–child relationships and child adjustment (Figure 1).

Deciding to share information with children about their IVF conception

Most research on information-sharing in families created through IVF focuses on children conceived using donor gametes (Indekeu et al., 2013). Yet, private and potentially stigmatising topics are also of significance when parents used their own gametes, including the parents' infertility, sexual reproduction, the child's conception occurring in a laboratory and the possibility of the family being perceived as different. For example, learning that one is infertile can lead to feelings of failure, shame, grief and guilt that parents may not wish to discuss with their children (Hjelmstedt, Widström, Wramsby, & Collins, 2004). Many parents are reluctant to discuss sexual reproduction with their children because the topic is considered taboo (Irvine, 2002) or they feel unprepared to address children's questions (Byers, Sears, & Weaver, 2008; Guilamo-Ramos, Jaccard, Dittus, & Collins, 2008).

Answering IVF-conceived children's questions about their conception can be challenging. For example, answers to questions about reproduction become more complicated when the conception occurred in a laboratory. Thus, while some parents feel confident they will share information with their children about their IVF conception (Indekeu et al., 2012; Nekkebroeck, Bounduelle, & Ponjaert-Kristofferson, 2008), others may choose to not share information even though infertility counsellors increasingly recommend that parents share IVF information with their children (Mendell & Gordon, 2015). Indeed, fewer than half of parents share information about IVF conception with pre-teen children (Colpin & Soenen, 2002; Greenfeld, Ort, Greenfeld, Jones, & Olive, 1996; MacCallum, Golombok, & Brinsden, 2007; Nekkebroeck et al., 2008; Peters, Kantaris, Barnes, & Sutcliffe, 2005), although more recent studies show greater information-sharing rates (Hammarberg, Wilson, McBain, Fisher, & Halliday, 2015) and rates increase as children grow older (Colpin & Bossaert, 2008; Murray, MacCallum, & Golombok, 2006).

Available research suggests that IVF information-sharing has little effect on parent–child relationships or child psychosocial adjustment (Colpin & Bossaert, 2008; Hammarberg et al., 2015; Ludwig, Kataline, Jendrysik, Thyen, & Sutcliffe, 2008; Nekkebroeck et al., 2008), but this conclusion is weakened because existing studies assume families communicate sensitive information similarly. However, some parents share information as an ongoing process, with information provided gradually over time; others consider it sufficient to inform the child, expecting no further discussion of the topic (Dindia, Fitzpatrick, & Kenny, 1997; Shehab et al., 2008). We propose that variations in how parents handle IVF information-sharing moderate its outcomes (see Figure 1).

This proposal is derived from Communication Privacy Management Theory (CPMT; Petronio, 2002). CPMT states that families manage private or sensitive information, such as how a child was conceived, using rules determined by the parents. Some parents have an open privacy orientation and allow a free flow of information between parents and children (Bradford, Feeney, & Campbell, 2002; Leary & Allen, 2011). Others prefer a restricted privacy orientation, maintaining strict control of information-sharing with children (Leary & Allen, 2011). In these families, sensitive information is shared infrequently, and once shared, parents and children likely steer clear of the topic to avoid violating privacy rules (Dailey & Palomares, 2004).

Information-sharing as a process

IVF information-sharing likely activates a process involving increasingly sophisticated questions asked by children. Many parents report multiple parent–child conversations follow the initial information-sharing discussion (Peters et al., 2005). In families with an open privacy orientation, future conversations would be welcomed. Because openness to discussing important topics can strengthen relationships (Caughlin, 2003; Schrodt, Solis, & Braithwaite, 2008), we expect information-sharing to have a positive effect on parent–child relationships when parents have an open privacy orientation.

When a restrictive privacy orientation exists, additional discussion about the child's conception may not occur (Petronio, 2002). Instead, information-sharing may bring to light parental discomfort with discussing the topic. Because perceived avoidance of or secrecy about an important topic can lead to frustration and confusion that erodes relationship quality (Affi, Joseph, & Aldeis, 2012; Pasipanodya et al., 2012; Slepian et al., 2012), information-sharing is expected to relate negatively to relationship quality when parents have a restrictive privacy orientation.

Conceptualising IVF information-sharing as a process also allows us to view it as initiating a series of outcomes. For example, research shows that relationship quality is a proximal outcome of information disclosure (Collins & Miller, 1994) and parent–child relationship quality directly relates to child adjustment (Overbeek, Stattin, Vermulst, Ha, & Engels, 2007). This suggests that the association between IVF information-sharing and child psychosocial adjustment is mediated by parent–child relationship quality. Our conceptual model (Figure 1) proposes that information-sharing directly relates to parent–child relationship quality and indirectly relates to child psychosocial adjustment, through its association with parent–child relationship quality.

Methods

Participants

Study families were recruited from a university reproductive endocrinology clinic located in the Midwestern US. Eligible families had at least one parent with at least one child conceived through IVF using the intended parents' gametes and born between 1998 and 2004. Of the eligible families, 86% were located and $n = 175$ (82% response rate) agreed to participate in the study. Parents were heterosexual and mostly White (95.8%). The participating 175 families included $n = 264$ IVF-conceived children whose mean age was 8.48 years ($SD = 1.46$, $Min = 6.1$, $Max = 12.9$). Children were mostly singletons (55.4% singletons, 44.6% twins or triplets), mostly female (55% females, 44% males) and mostly conceived using intracytoplasmic sperm injection (ICSI; 53% ICSI with IVF, 47% IVF only).

Procedure

Using university Institutional Review Board-approved procedures, letters were sent to eligible clinic patients introducing the study and asking a parent to complete an online survey. The online survey included a consent form and demographic, family privacy, family relationships and child psychosocial adjustment questionnaires. As compensation for their time, participants received a \$25 gift certificate.

Measures

Initiation of information-sharing

For this study, we were interested in knowing if parents had initiated information-sharing with their child about his/her conception method. Thus, parents responded to the question, 'Does your child know that s/he was conceived by assisted reproductive technologies (ART)?' ($No = 0$, $Yes = 1$). Twenty percent of children ($n = 53$) knew of their conception method.

Family privacy orientation

Family privacy orientation was assessed as a latent variable with two indicators. Using a 7-point Likert scale (1 = *disagree completely* to 7 = *agree completely*), parents reported how much they agreed with two statements: (1) If I don't approve of it, I don't want to know about it ($\lambda = .73$) and (2) I often say things like 'There are some things that just shouldn't be talked about' ($\lambda = .37$) taken from the Revised Family Communication Patterns Questionnaire (Ritchie & Fitzpatrick, 1990).

Parent-child relationship quality

Parent-child relationship quality was measured using an adaptation of the Huston Marital Opinion Questionnaire (MOQ; Huston & Vangelisti, 1991). This measure has been adapted previously with demonstrated reliability and validity for assessing parent-child relationship quality (Caughlin & Afifi, 2004). The MOQ was chosen because it specifically assesses relationship quality and does not include items assessing behaviours related to communication. Thus, using the MOQ reduced the risk of finding artificially strong correlations between parent-child relationship quality and communication-related study measures (i.e. information-sharing and family privacy orientation).

The adaptation consists solely of changing the introductory instructions from asking the participants to describe their relationship with their spouse or romantic partner to asking the participant to describe their relationship with their child. Following the introductory instructions, participants were presented with 11 semantic differential items, each beginning with the statement 'I would describe my relationship as ...' and ending with two opposing options scaled from 1 to 7. The first 10 items reflect aspects of relationship quality (e.g. 1 = *hard* to 7 = *easy*; 1 = *hopeful* to 7 = *discouraging*; 1 = *empty* to 7 = *full*), while the final scale item reflects global relationship satisfaction (e.g. 1 = *completely satisfied* to 7 = *completely dissatisfied*). Items were reverse-coded as necessary; higher scores reflected higher quality relationship quality. The first 10 scale items were averaged. This average was added to the final global satisfaction score and averaged to create the parent–child relationship quality measure ($\alpha = .90$).

Child psychosocial adjustment

Parents reported children's adjustment, including children's behavioural and emotional problems, using the Child Behaviour Checklist (CBCL; Achenbach & Rescorla, 2001). The CBCL has strong test–retest reliability ($r = .91-.95$) and good content, criterion-related and construct validity (Achenbach & Rescorla, 2001). All items use a 3-point scale (0 = *not true* to 2 = *very true or often true*). The behaviour problems ($\alpha = .79$) and emotional problems scales ($\alpha = .87$) were summed; higher scores indicate more problems.

Covariates

For each child, parents reported the child's age and sex (1 = *female*, 2 = *male*). Parent emotional state was added as a covariate because extensive research shows that when a single reporter is used to assess study variables, as in this study, a person's emotional state at the time of assessment can bias their responses to questionnaire items and artificially inflate associations among the variables (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). For example, depressed respondents tend to report negatively across study measures (Chi & Hinshaw, 2002; Najman et al., 2001). To reduce the potential for biased findings, we entered the respondent's emotional state at the time of assessment as a control variable. Participants reported their emotional state using the Internalising subscale of the Adult Self Report (ASR; Achenbach & Rescorla, 2003). Overall, the ASR has strong test–retest reliability ($r = .88$), good content, criterion-related and construct validity (Achenbach & Rescorla, 2003). The ASR Internalising subscale uses a 3-point scale (0 = *not true* to 2 = *very true or often true*) and was created by summing three subscales (anxious depressed, withdrawn, somatic complaints; $\alpha = .83$).

Missing data

All study variables had less than 10% missing data. *t*-Test and chi-square comparisons between participants with complete data and those with missing data showed no significant differences on any study variable. Because recovery of missing data produces less biased study results than list-wise deletion of missing data (Enders, 2010), we used Full Information Maximum Likelihood (FIML) to estimate study parameters.

Table 1. Means, standard deviations and correlations among study variables.

Measure	1	2	3	4	5	6	7	Means	SD
1. IVF information-sharing	–							.17	.38
2. Family privacy orientation	–.10	–						.00	1.20
3. Parent–child quality	.01	–.25*	–					6.43	.64
4. Child behavioural adjustment	.03	–.06	–.50*	–				2.89	4.20
5. Child emotional adjustment	.07	–.10	–.40*	.55*	–			3.24	3.91
6. Child's age	.25*	–.12	.02	.03	.07	–		8.48	1.46
7. Child's sex	.08	.04	–.02	.04	–.12*	.11	–	1.46	.50
8. Parent's emotional state	.04	.01	–.34*	.36*	.40*	.01	–.08	6.26	5.37

* $p < .05$.

Statistical analyses

Our study hypotheses proposed indirect and interaction effects that we tested using two path models. The child behavioural adjustment model specified child behaviour problems as the dependent variable. The child emotional adjustment model specified child emotional problems as the dependent variable. In each model, initiation of IVF information-sharing, family privacy orientation and the interaction between information-sharing and family privacy orientation were independent variables (see Figure 1). The interaction term was created as a product of information-sharing and family privacy orientation, after centring both variables by subtracting their means. Parent–child relationship quality, the mediating variable, was regressed on information-sharing, family privacy orientation, the interaction term and control variables (child age, child sex and parent emotional state). The dependent variable (model 1: child behaviour problems; model 2: child emotional problems) was regressed on parent–child relationship quality, information sharing and child age, child sex and parent emotional state.

Statistical analyses were performed using a sample that included multiple children within the same family ($n = 264$ children from 175 families), suggesting the presence of shared family variance (Cook, 2012). To reduce the possibility of producing inflated t -values due to shared variance, all analyses were conducted using the COMPLEX specification in Mplus 7.1 (Múthen & Múthen, 2012). A good-fitting model was required to produce a statistically non-significant χ^2 (Bollen, 1989), a comparative fit index (CFI) and Tucker–Lewis index (TLI) above .90, a standardised root mean square residual (SRMR) less than .08, and root mean square error of approximation (RMSEA) less than .06 (Hu & Bentler, 1999).

Results

Child behavioural adjustment

Table 1 presents descriptive statistics for all study variables. The child behaviour problems model added three pieces of information beyond what was learned from these descriptive statistics. First, this model estimated the hypothesised associations among information-sharing, family privacy orientation, parent–child relationship quality and child behaviour problems after accounting for the control variables. After accounting for covariates, the relationship between information-sharing and relationship quality remained non-significant, but the association between privacy orientation and relationship quality was statistically significant ($\beta = -.30$, $t = -2.07$, $p = .04$). Thus, parents with more restricted privacy orientations

tended to report lower parent–child relationship quality. The negative association between parent–child relationship quality and child behaviour problems was also statistically significant ($\beta = -.43$, $t = -5.31$, $p < .001$), and the association between information-sharing and relationship quality was non-significant. Among controls, only parents' emotional state was associated with parent–child relationship quality ($\beta = -.38$, $t = -4.14$, $p < .001$) or child behaviour problems ($\beta = .22$, $t = 2.99$, $p = .003$), suggesting that depressed parents tended to report lower parent–child relationship quality and more child behaviour problems than less-depressed parents.

Second, this model included the interaction variable (family privacy orientation by information-sharing) used to estimate the moderating effect of family privacy orientation on the association between information sharing and parent–child relationship quality. The results supported the hypothesised moderator effect ($\beta = -.30$, $t = -2.93$, $p = .003$). As described below, this interaction indicates that in families with an open privacy orientation, information-sharing was associated with high parent–child relationship quality. In families with a restricted orientation, information-sharing was associated with lower parent–child relationship quality.

Finally, this model estimated three indirect effects on child behaviour problems through parent–child relationship quality. The indirect effect of information-sharing on child behaviour problems was non-significant. The indirect effect of family privacy orientation on child behaviour problems was statistically significant ($\beta = .13$, $t = 2.23$, $p = .03$), suggesting that parents with restricted privacy orientations tended to have children with higher levels of behaviour problems. Finally, as hypothesised, the indirect effect of the interaction variable was statistically significant ($\beta = .13$, $t = 2.57$, $p = .01$). Thus, in families with an open privacy orientation, information-sharing was related to lower child behaviour problems, through its positive association with parent–child relationship quality. In families with a restricted privacy orientation, information-sharing related to higher child behaviour problems, through its negative association with parent–child relationship quality.

Overall, the child behavioural adjustment model produced excellent fit measures ($\chi^2 = 8.94$, $df = 9$, $p = .44$; CFI = 1.00; TLI = 1.01; RMSEA = .00; SRMR = .03), suggesting an acceptable representation of the sample families' experiences. The behavioural adjustment model explained 30% of the variance in child behaviour problems ($t = 3.26$, $p = .001$) and 24% of the variance in parent–child relationship quality ($t = 3.45$, $p = .001$).

Hypothesis testing: child emotional adjustment

With child emotional problems as the dependent variable, the second statistical model produced results similar to those reported above. The relationship between information-sharing and parent–child relationship quality was non-significant. Over and above the effect of the control variables, the association between family privacy orientation and parent–child relationship quality was significant ($\beta = -.31$, $t = -2.14$, $p = .03$), as was the association between parent–child relationship quality and child emotional problems ($\beta = -.31$, $t = -4.94$, $p < .001$). Of the control variables, parent emotional state was related to parent–child relationship quality ($\beta = -.35$, $t = -3.92$, $p < .001$) and child emotional problems ($\beta = .27$, $t = 3.63$, $p < .001$). Child sex was also related to child emotional problems ($\beta = -.12$, $t = -2.46$, $p = .01$), suggesting that girls tended to score higher on emotional problems than boys.

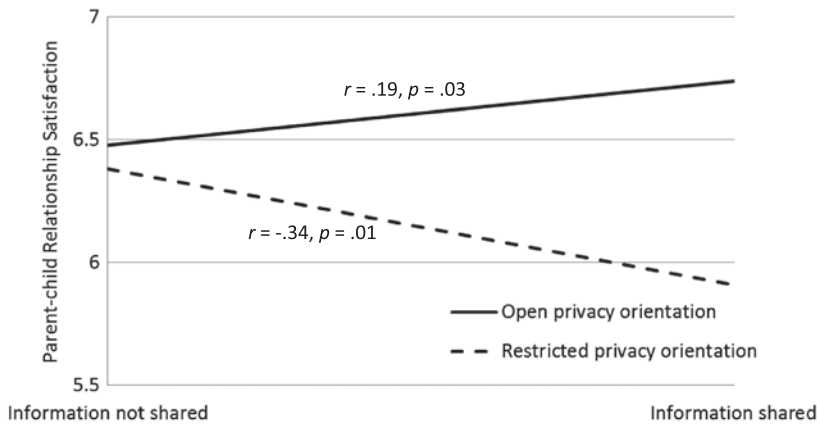


Figure 2. The association between information-sharing with children about their IVF conception and parent-child relationship quality in families with an open compared to a restricted privacy orientation.

As hypothesised for the emotional adjustment model, family privacy orientation moderated the association between information-sharing and parent-child relationship quality ($\beta = -.30$, $t = -2.87$, $p = .004$). This effect was nearly identical to the effect found in the behavioural adjustment model. Indirect effects produced by the emotional adjustment model were also similar to those found in the behavioural adjustment model. The indirect effects of family privacy orientation ($\beta = .10$, $t = 2.10$, $p = .04$) and the interaction variable ($\beta = .09$, $t = 2.64$, $p = .008$) on child emotional problems were also statistically significant.

The emotional adjustment model also produced excellent fit measures ($\chi^2 = 8.08$, $df = 9$, $p = .53$; CFI = 1.00; TLI = 1.05; RMSEA = .00; SRMR = .03). The emotional adjustment model explained 25% of the variance in child emotional adjustment ($t = 4.00$, $p < .001$) and 23% of the variance in parent-child relationship quality ($t = 3.28$, $p = .001$).

Depiction of moderating effect

As described above, family privacy orientation moderated the association between information sharing and parent-child relationship quality. Figure 2 depicts this moderating effect, which was similar across the behaviour and emotional adjustment models. To create this figure, we identified two subgroups within the sample that represented parents with the most open privacy orientations and those with more restricted privacy orientations. The first subgroup, the 'open privacy orientation' group, consisted of children whose parents reported a 1 (strongly disagree) on both privacy orientation statements ($n = 121$, 45.8%). Information-sharing had occurred in 24% of the open privacy orientation families. The second subgroup, the 'restricted privacy orientation' group, consisted of children whose parents reported 4 or higher (neutral to strongly agree) on either statement ($n = 51$, 19.3%; information-sharing rate: 19.6%). Frequency distributions for both groups were examined to rule out the presence of outliers. Correlations between information sharing and parent-child relationship quality were then calculated within each subgroup. As shown in Figure 2, in the open privacy orientation subgroup, information sharing and parent-child relationship quality were positively correlated ($r = .19$, $p = .03$). The association in the restricted privacy orientation subgroup was negative ($r = -.34$, $p = .01$).

Discussion

Earlier studies examining associations between information-sharing about IVF conception and parent–child relationships or child adjustment report few significant findings (Colpin & Bossaert, 2008; Colpin & Soenen, 2002; Hammarberg et al., 2015; Ludwig et al., 2008; Nekkebroeck et al., 2008). We extend this research by showing that parents' privacy orientation can influence the outcomes of IVF information-sharing.

The information sharing process we tested was informed by Communication Privacy Management Theory (CPMT; Petronio, 2002). This theory proposes that parents vary in their approach to dealing with private, sensitive topics. Some have an open orientation to managing private information. In these families, parents allow free flow of information and sensitive information is regularly shared and discussed with children (Bradford et al., 2002; Leary & Allen, 2011). Within an open privacy orientation, the sharing of private information is associated with positive outcomes (Caughlin, 2003; Schrodt et al., 2008).

This study's findings support the proposed theoretical process. Information-sharing about children's conception within an open privacy orientation was associated with stronger parent–child relationships. Children also tended to do well when information-sharing occurred within an open orientation, as evidenced by the indirect association between information-sharing and fewer child emotional and behavioural problems.

CPMT also proposes that some parents strictly control sharing of private information. Within this restricted privacy orientation, sensitive information may not be shared with children, and if it is, later discussion of the topic is likely avoided. Thus, information-sharing may result in family secrets or topic avoidance which can lead to deteriorating parent–child relationships (Afifi et al., 2012; Pasipanodya et al., 2012; Paul & Berger, 2007; Slepian et al., 2012).

Close to one in five study children had parents with a restricted privacy orientation. Based on the above description, parents with a restricted privacy orientation would seem unlikely to share IVF conception information with children. Yet, information-sharing occurred in a substantial proportion of restricted privacy orientation families. The circumstances of information-sharing are unknown. Nevertheless, existing literature provides insight into possible reasons why children in families with a restricted privacy orientation might know of their IVF conception. For example, information-sharing could be initiated by someone other than parents. Indeed, most parents have told others about their use of IVF (e.g. Peters et al., 2005), and a common reason for disclosing IVF conception to a child is to pre-empt information-sharing by others (MacCallum et al., 2007; Nekkebroeck et al., 2008). Also, parents who might otherwise be reluctant to do so may tell children about their IVF conception due to concerns their child could also experience infertility (Daniels, Grace, & Gillett, 2011) or when other medical concerns are present (Ludwig et al., 2008; Nekkebroeck et al., 2008).

When information-sharing occurred in restricted privacy orientation families, parent–child relationships and child adjustment tended to be poorer than if it had not occurred. These findings may raise concern among infertility counsellors, many of whom encourage information-sharing because openness can benefit both parents and children, and secrecy can cause physical and psychological burdens (Paul & Berger, 2007; Slepian et al., 2012; Vangelisti, Caughlin, & Timmerman, 2001). However, the poorer outcomes observed in this study may not indicate that information-sharing should not occur in some families. Rather, these findings may suggest that parents with a restricted privacy orientation may be unprepared for the communication challenges posed by IVF information-sharing, an interpretation consistent

with parental reports of feeling unprepared to talk with children about IVF conception (Peters et al., 2005) and related topics (Byers et al., 2008; Guilamo-Ramos et al., 2008).

Thus, while many families who conceive children using IVF are doing well when faced with communication challenges, these results show that a substantial proportion of families may need assistance beyond what is currently available. Families in this sample came from a medical clinic where protocols included meeting with a counsellor prior to undergoing infertility treatment. The counsellor assisted parents with the stress of the medical procedures and discussed information-sharing about IVF use with children. This is a common approach in reproductive medicine clinics that utilise mental health professionals (Gross et al., 2004). Nevertheless, more research is needed to test the possibility that parents with a restricted privacy orientation may benefit from post-partum assistance to achieve positive outcomes of information sharing. Also, we expect the proposed process unfolds overtime, but this study, the first to examine the moderating effect of parents' privacy orientation on the outcomes of IVF information-sharing, used cross-sectional data. Future research must test the proposed process using longitudinal data capable of capturing the long-term implications of open versus restricted privacy orientations for IVF information-sharing.

Study strengths and limitations

A primary strength of this study is conceptualising information-sharing as a process, instead of a one-time event. Doing so allowed us to specify contextual influences and multiple information-sharing outcomes. Other strengths included a sample large enough to allow identification of variations in family context and a high response rate, which builds confidence in the representativeness of the data. Generalisability of study findings are limited to families with 6- to 12-year-old IVF-conceived children. Outcomes of information-sharing may vary across child age groups (Siegel, Dittrich, & Vollman, 2008) and may be different in families whose children were conceived using donor gametes.

Conclusions

This study is the first to consider the moderating effect of parents' privacy orientation when examining outcomes of IVF information-sharing with children. Research suggests that children conceived using IVF would like to be told of their origins (Siegel et al., 2008). To facilitate positive outcomes of this information-sharing, particularly when parents have a restricted privacy orientation, effective ways to help families meet the communication challenges posed by IVF use must be identified. Furthermore, extensive research documents the communication challenges of information-sharing when parents used donor gametes to conceive their children (Indekeu et al., 2013). Future research is needed to determine if the theoretically based information-sharing process examined in this study is operating in families with donor-conceived children.

Disclosure statement

No potential conflict of interest was reported by the authors.

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