AMERICAN PSYCHOLOGICAL ASSOCIATION

Developmental Psychology

ISSN: 0012-1649

2021, Vol. 57, No. 4, 535–547
https://doi.org/10.1037/dev0001155

Factors Associated With Behavioral Adjustment Among School-Age Children of Gay and Heterosexual Single Fathers Through Surrogacy

Nicola Carone[1], Lavinia Barone[1], Vittorio Lingiardi[2], Roberto Baiocco[3], and David Brodzinsky[4]

[1] Department of Brain and Behavioral Sciences, Lab on Attachment and Parenting – LAG, University of Pavia
[2] Department of Dynamic and Clinical Psychology, Sapienza University of Rome
[3] Department of Developmental and Social Psychology, Sapienza University of Rome
[4] Department of Psychology, Rutgers University

Thirty-one children of gay single fathers and 28 children of heterosexual single fathers, all born through surrogacy, were compared with 31 children of gay partnered fathers through surrogacy and 30 children of heterosexual partnered fathers through in-vitro fertilization on their perceptions of self-worth and their father- and caregiver-reported internalizing and externalizing behaviors. For children of single fathers, the study also examined associations between aspects related to their surrogacy conception, feelings about their family arrangement, and behavioral adjustment. All children (47.5% girls) were aged 6–12 years (M_{months} = 97.84, SD = 20.50) and living in Italy; all fathers (M_{years} = 43.79; SD = 6.42) identified as cisgender, reported a medium-to-high socioeconomic status, and were White (with the exception of one gay partnered father). No differences were found across the four family groups in any behavioral outcome, with children demonstrating, on average, high levels of self-worth and low levels of internalizing and externalizing problems. In single-father families, regardless of the father's sexual orientation, children with a weaker understanding of surrogacy, lower satisfaction with their contact with the gestational carrier, and lower comfort with their family arrangement were associated with more externalizing problems. Furthermore, children's female gender and lower satisfaction with their contact with the gestational carrier were associated with more internalizing problems, whereas children's male gender and greater understanding of surrogacy were associated with higher self-worth. Taken together, these findings do not support the commonly held assumption that the combination of surrogacy conception and single fatherhood is detrimental for children's behavioral adjustment.

Keywords: single-father family, gay fathers, behavioral problems, surrogacy, children's understanding of origins

Supplemental materials: https://doi.org/10.1037/dev0001155.supp

Among children who are conceived via surrogacy—the practice by which a woman bears the pregnancy for the intended parent(s) with the intention of handing over the resulting child—a small but growing number are being raised in gay or heterosexual single-father families (Carone et al., 2017b; Coles, 2015). In Italy, where the present study was conducted, domestic surrogacy is banned by law (i.e., Law 40/2004; applicable to all Italians); thus, intended single fathers who wish to conceive via this route must turn to international surrogacy services. As this path involves significant expenses (e.g., health insurance to cover all procedures and the pregnancy, legal services for agreements among all parties, etc.), it is mainly reserved for wealthy men, who generally pursue surrogacy arrangements in one of U.S. states (e.g., California, Nevada) or Canada provinces (e.g., British Columbia, Ontario), where reproductive services are extended to nonresidents, regardless of their sexual orientation and marital status (Berkowitz, 2020; Carone et al., 2017b).

Similar to many other countries, Italy has fostered considerable public debate over whether children born through surrogacy are more susceptible to poor psychological adjustment relative to children conceived through other paths—particularly spontaneous conception (Lingiardi & Carone, 2016). It is commonly thought that a child born through surrogacy might view the gestational carrier and/or egg donor as a mother and suffer when there is no relationship—or one that is limited by physical distance—and that this may increase the likelihood that the child will develop psychological problems (Lingiardi & Carone, 2016). More broadly, such

This article was published Online First March 4, 2021.
Nicola Carone https://orcid.org/0000-0003-3696-9641
Lavinia Barone https://orcid.org/0000-0002-4072-8317
Vittorio Lingiardi https://orcid.org/0000-0002-1298-3935
Roberto Baiocco https://orcid.org/0000-0002-6372-3762
David Brodzinsky https://orcid.org/0000-0002-8431-8942
We are grateful to all single-father families who have made this research possible.
Correspondence concerning this article should be addressed to Nicola Carone, Department of Brain and Behavioral Sciences, Lab on Attachment and Parenting – LAG, University of Pavia, Piazza Botta 11, 27100 Pavia, Italy. Email: nicola.carone@unipv.it

views echo the contention over whether dimensions of family structure (i.e., number of parents, parents' gender and sexual orientation, or method of conception) are more predictive of child adjustment than family processes (for a discussion, see Golombok, 2015).

Despite these widespread views, child behavioral adjustment in gay and heterosexual single-father families through surrogacy has received scarce research attention, both in Italy and globally. From a theoretical perspective, this represents a lost opportunity to gain insight into the role of fathers in children's outcomes. Recently, Volling et al. (2019) proposed theoretical and methodological advancements for studying the impact of the father–child relationship on child development; nonetheless, to date, fathering research has mainly involved heterosexual partnered fathers, though more recent research has also focused on gay partnered fathers (e.g., Carone, Baiocco, Lingiardi, & Kerns, 2020; Carone, Lingiardi, et al., 2018; Farr, 2017; Golombok, 2015). By the same token, it is largely unknown which particular aspects of fathering in a single-father family are associated with child development outcomes (Coles, 2015). From a policy level, the call for open access to fertility services (on ethical grounds), regardless of marital status or sexual orientation (De Wert et al., 2014); requires that the above-mentioned concerns about the impact of single fatherhood through surrogacy on child behavioral adjustment are informed and grounded in empirical research.

To this end, the present study investigated whether children of gay and heterosexual single fathers differed from children of gay and heterosexual partnered fathers in terms of behavioral adjustment in middle childhood. Furthermore, to contribute a deeper picture of which family variables might explain individual differences in children's behavioral adjustment in gay and heterosexual single-father families, for these children only, the study also identified whether—and to what extent—feelings about their family arrangement and specific factors pertaining to their surrogacy conception (i.e., understanding of surrogacy, frequency of contact with the gestational carrier, satisfaction with their contact with the gestational carrier, or curiosity about the gestational carrier) were uniquely related to their self-worth and internalizing and externalizing problems. With respect to this second aim, the study also examined the influence of fathers' sexual orientation on these associations.

Behavioral Adjustment of Children Born Through Surrogacy in Single-Father Families

There is very limited knowledge of the behavioral adjustment of children born to single fathers through surrogacy. The only study to have examined this compared children of gay and heterosexual single fathers with children of gay and heterosexual partnered fathers at mean age 5.5 years, in Italy (Carone, Baiocco, Lingiardi, & Barone, 2020). The findings showed that, irrespective of family type, children's internalizing and externalizing problems were in the normal range and very low in relation to the clinical cut-off points. Additionally, the only differences across family types pertained to greater parenting stress in the gay and heterosexual single fathers; furthermore, lower sensitivity and supportive parenting were associated with greater father-reported child internalizing problems, whereas lower rough-and-tumble play quality and sensitivity, greater negative parenting and parenting stress, and the child male gender were associated with greater father-reported child externalizing problems (Carone, Baiocco, Lingiardi, & Barone, 2020).

While these findings are unsurprising when connected to the broader literature on diverse new family forms, showing that family structure is less associated with child behavioral adjustment than family processes (for reviews, see Golombok, 2015; Patterson, 2017), research has yet to address the role of more specific family factors that uniquely characterize single-father families. To this end, the present study examined children's understanding of their surrogacy conception, contact with the gestational carrier and/or egg donor (if any), satisfaction with their contact, and feelings about their family arrangement, on the basis of research with adoptive families (Farr & Grotevant, 2019; Pinderhughes & Brodzinsky, 2019; Wrobel & Grotevant, 2019) and two-parent families formed through assisted reproduction (Carone, Barone, et al., 2020; Vanfraussen et al., 2002).

Developmental Context for Understanding Surrogacy Origins and Feelings About the Family Arrangement

In the preschool years, most children define their family in geographical and emotional terms, as the people who live with them and love them (and who are loved, in return; Brodzinsky, 2011). However, by the age of 6–8 years, children begin to grasp the significance of the biological concept of family and the implications of the absence of a biological connection among family members (Williams & Smith, 2010); as shown by research involving children raised in diverse family forms (e.g., Carone, Barone, et al., 2020; Farr et al., 2016; Messina & Brodzinsky, 2020; Tasker & Granville, 2011). Once single fathers disclose their surrogacy conception to their children, the children begin to elaborate on their conception throughout the course of their development (Carone, Baiocco, et al., 2018, Carone, Barone, et al., 2020) and gain an understanding of the nature of their family relationships (e.g., "Who is part of my family?") and the roles played by the gestational carrier and egg donor in their family arrangement (e.g., "Who am I related to genetically?"; "Whose body did I grow in?"). Similar to what Brodzinsky (2011) noted for children's understanding of adoption, children's comprehension of their surrogacy and their family arrangement (and the potential impact of these factors on children's behavioral adjustment) represents a developmental process that is closely tied to their understanding of birth and reproduction, family roles and relationships, values, interpersonal motives, and societal institutions.

Also, in line with Erikson's (1963) psychosocial developmental model, it would be reasonable to expect that surrogacy conception in gay and heterosexual single-father families might expose children to a unique set of psychosocial tasks that could interact with and complicate more universal developmental tasks. In middle childhood, children are typically industrious in their attempts to master and understand fundamental aspects of their life. For children of gay and heterosexual single fathers, this may translate into a need to gain clarity on their surrogacy origins (e.g., their father's need for a gestational carrier and egg donor to conceive) and family arrangement (e.g., no mother from the outset and, in the case of gay single-father families, a father with a nonheterosexual orientation), especially as they become more cognizant of the differences between their own family circumstances and those of their peers.

Although prior research with children raised in other diverse family forms has suggested that, during the school years, children actively attempt to understand their origins and develop positive feelings about their family arrangement (e.g., Farr et al., 2016; Messina & Brodzinsky, 2020; Tasker & Granville, 2011; Vanfraussen et al., 2002), there is limited knowledge on the relationship between children's understanding of their origins and their behavioral adjustment.

Most prior knowledge on this issue comes from adoption research, indicating that, in middle childhood, while adoptees' understanding and appreciation of the implications of their adoption grow at a profound rate (Brodzinsky, 2011), a rise in behavioral problems is also common. This finding has been partly explained by the fact that, during this period, the emergence of logical thought sensitizes children to the reality that gaining a new family through adoption also means separating from an original one (Brodzinsky, 2011; Farr & Grotevant, 2019). Similarly, research has found that higher levels of negative affect about the loss of a birthparent are associated with higher levels of depression and lower global self-worth (Smith & Brodzinsky, 2002).

Although school-age children born to single fathers through surrogacy and adopted children must both face the challenge of understanding their origins and family arrangement, their family circumstances differ greatly, and this may determine different behavioral outcomes. Contrary to research on adoptive families, studies of assisted conception families have not indicated that children in these families feel abandoned by their gestational carrier and/or gamete donors (Golombok, 2015). Rather, between the ages of 6–10 years, they tend not to view their conception as salient to their everyday experiences, and most report either positive or neutral feelings about their origins (Blake et al., 2014; Carone, Baiocco, et al., 2018). On the other hand, children's negative thoughts and feelings about their origins have been linked to late disclosure (i.e., in adolescence or adulthood) in two-parent heterosexual families (Golombok, 2015); this circumstance is unlikely to be replicated in single-father families through surrogacy, given the visible absence of a second parent from the onset. To summarize, research with assisted conception families and the emerging, normative desire of children to understand their origins support the hypothesis that, in single-father families through surrogacy, children with a more detailed understanding of their origins and more positive feelings about their family arrangement will be likely to demonstrate better behavioral adjustment than those with less knowledge or more negative feelings about their origins.

Contact With the Gestational Carrier/Egg Donor and Child Behavioral Adjustment

In the current context, contact refers to any type of communication the child has with their gestational carrier and egg donor, including the exchange of cards, letters, pictures, gifts, and emails, as well as phone calls and face-to-face visits. Two theoretical models from adoption research (i.e., the adoption curiosity pathway [Wrobel & Dillon, 2009; Wrobel & Grotevant, 2019] and emotional distance regulation [Grotevant, 2009]) provide initial frameworks for understanding the associations between children's contact with their gestational carrier and/or egg donor and their behavioral adjustment in single-father families through surrogacy. Similar to adoptees, who seek to learn more about their adoptive background on the basis of the intensity of their adoption-related curiosity (Wrobel & Dillon, 2009), children of single fathers through surrogacy can be expected to examine what their surrogacy conception and family arrangement mean to them (and to others) as they develop a more realistic understanding of their origins. However, fathers may vary in the level of support they offer in response to their children's curiosity about their origins, with some encouraging open exploration of surrogacy-related issues and others discouraging such exploration (Carone, Barone, et al., 2020).

Other factors also play a role in determining the level of information a child receives about their origins: whether the surrogacy was genetic or gestational; whether the egg donor was anonymous or open-identity; whether the gestational carrier and/or egg donor were previously known by the father; and whether agencies or clinics were involved in the conception. Consistent with Grotevant's (2009) emotional distance regulation model, children of single fathers through surrogacy may negotiate, fine-tune, and navigate closeness and distance with their gestational carrier and/or egg donor, as well as interpret this contact, in differing ways. Contact may occur directly or be mediated by the father, but given the relatively young age of these children and the vast geographical distance between parties, direct contact between the child and gestational carrier and/or egg donor is rare; more frequently, contact is mediated by the father and facilitated by technology and social media (Blake et al., 2016; Carone et al., 2017a; Carone, Baiocco, et al., 2018).

The relation between contact and children's adjustment has been much more widely investigated in adoptive families than in assisted conception families (for reviews, see Farr & Grotevant, 2019; Pinderhughes & Brodzinsky, 2019). Within adoption research, no differences have been found in externalizing behavior between adolescents who have never had contact with their birth parents and those who have had ongoing contact since early childhood (Brodzinsky, 2006; Grotevant et al., 2013; Von Korff et al., 2006). However, children's satisfaction with birth parent contact has been shown to be significantly associated with behavioral adjustment (Grotevant et al., 2013). Some studies have also linked greater structural openness to greater satisfaction on the part of adoptees (Farr & Grotevant, 2019; Pinderhughes & Brodzinsky, 2019); others have shown that adoptees who desire more information about—and contact with—their birth family report greater dissatisfaction with their current contact arrangement (Farr & Grotevant, 2019; Grotevant et al., 2013; Wrobel & Grotevant, 2019).

To date, research with assisted conception families has shown no differences in behavioral adjustment between children conceived using a known or an open-identity versus an anonymous (i.e., noncontactable) sperm donor (Bos & Gartrell, 2011; Carone et al., 2021). Whether—and to what extent—children of gay and heterosexual single fathers establish and maintain contact with their gestational carrier and/or egg donor, and the impact of such (lack of) contact on their behavioral adjustment, are currently unknown. However, from the research reviewed above, it is reasonable to expect that, regardless of the extent and type of contact between parties, children who are more satisfied with the contact arrangement will present better behavioral adjustment.

Study Hypotheses

On the basis of the literature discussed above, the present study used a multimethod and multi-informant design to test the following two hypotheses:

1. Children born to gay or heterosexual single fathers through surrogacy would not differ from children born to gay partnered fathers through surrogacy and children born to heterosexual partnered fathers through in-vitro fertilization (IVF) in levels of self-worth or internalizing and externalizing problems.

2. In gay and heterosexual single-father families only, children with a greater understanding of their surrogacy conception, greater satisfaction with their contact with the gestational carrier and/or egg donor, and greater ease with their family arrangement would perceive themselves as having greater value and be reported to display fewer internalizing and externalizing problems.

Method

Participants

The sample included 31 gay single-father families through surrogacy, 28 heterosexual single-father families through surrogacy, 31 gay two-father families through surrogacy, and 30 heterosexual two-parent families through IVF, comprising a total of 120 families. For each family, data gathered from the child and the genetic father were used. When gay partnered fathers failed to disclose their genetic status, their families were not included. All children were aged 6–12 years (M_{months} = 97.84, SD = 20.50) and living in Italy with their parent(s); all fathers (M_{years} = 43.79, SD = 6.42) identified as cisgender and were White, with the exception of one Latino/Hispanic gay partnered father. In families with more than one child in the relevant age range, the oldest child was studied. Although single-father families were not recruited on the basis of the type of surrogacy practiced (i.e., genetic vs. gestational), all used gestational surrogacy (involving the father's sperm, an egg donor, and a gestational carrier). In all families, the gestational carrier was unknown to the father before the surrogacy arrangement (i.e., the single father and the gestational carrier were connected by a fertility clinic, agency, or consultancy, or via an online advertisement); 36 single-father families (n = 17 headed by gay single fathers, n = 19 headed by heterosexual single fathers) chose an open-identity egg donor (contactable once the child turns 18), whereas the remaining 23 single-father families (n = 14 headed by gay single fathers, n = 9 headed by heterosexual single fathers) used an anonymous egg donor. The inclusion of gay partnered fathers and heterosexual partnered fathers as comparison groups enabled the analysis to control for the parent's male gender, his genetic relationship with the child, and the use of IVF to conceive (as all surrogacy arrangements were gestational, all embryos were created through IVF).

All families were required to have a caregiver who frequently (i.e., at least three times per week) spent time with the child; in this category, 62 babysitters, 48 grandparents, and 10 uncles/aunts participated in the study. The inclusion criteria for single fathers were as follows: (a) self-identified as gay or heterosexual, (b) decided to undertake parenting alone, (c) had not cohabited since the target child's birth, (d) had not been involved in a noncohabiting relationship that lasted longer than 6 months, (e) had a target child aged 6–12 years and conceived through surrogacy. Gay partnered fathers were required to still be living with their partner and to have conceived the target child through surrogacy; heterosexual partnered fathers were required to still be living with the mother of the target child and to have conceived the child through IVF (without donated gametes).

Single-father families are an extremely hard-to-reach population; thus, multiple recruitment strategies were used: (a) the researchers posted online advertisements on the websites of single-parent groups (n = 18, 30.5%); (b) participants passed information about the study to friends, colleagues, and acquaintances who fit the study criteria and/or disseminated information about the study through social media (n = 36, 61.0%); and (c) an association of same-sex parents distributed information about the study via their mailing list (n = 5, 8.5%). Additionally, multiple sources were used to recruit heterosexual partnered fathers: (a) three of the largest fertility clinics providing treatment to heterosexual couples in the area local to the research team (i.e., Rome and Milan) contacted (by phone) potential participants who met the study criteria and gave them the research team's e-mail contact information (n = 10, 33.3%); (b) the researchers posted online advertisements to reach parents who had conceived through assisted reproduction (n = 6, 20.0%); and (c) participants passed information about the study to friends, colleagues, and acquaintances who fit the study criteria and/or disseminated information about the study through social media (n = 14, 46.7%). Finally, gay partnered fathers were recruited in the context of another study run by the same research group (Carone, Lingiardi, et al., 2018). Fathers' demographic characteristics are presented in Table 1.

Procedure

Study approval was obtained from the Ethics Committee of the Department of Developmental and Social Psychology of Sapienza University of Rome (protocol 245/2016; Title: "Parent–Child Relationship and Child Adjustment in Single-Father Families Formed Through Surrogacy") and written informed consent was obtained from all adult participants (i.e., fathers and caregivers). Parents also consented for their child to participate and the caregiver to be contacted. Verbal assent was gained from children. Each participant was reminded that their responses would be confidential and that participation in all or part of the study could be terminated at any time; such information was conveyed to the children in an age-appropriate manner, both before and during their participation. Families were assessed at home by a researcher trained in the study techniques and no compensation was offered to participants. During home visits, before the questionnaire and interview related to surrogacy conception were administered to children, single fathers were asked whether and what they had disclosed to their child about their conception. Fathers' responses were written down by the researcher, who adapted the terminology and the questions to be used with each specific child. In single-father families, 39 fathers (i.e., 21 gay single fathers and 18 heterosexual single fathers) had only disclosed the involvement of the gestational carrier, whereas the remaining 20 (i.e., 10 gay single fathers and 10 heterosexual single fathers) had also referenced the egg donor. The older the child, the higher the stage of disclosure fathers had reached (r = .58, $p < .01$). Caregivers were

Table 1

Descriptive Statistics of Demographic Data, Predictors, and Outcome Measures by Family Type (N = 120)

Variables	Gay single fathers (*n* = 31)	Heterosexual single fathers (*n* = 28)	Gay partnered fathers (*n* = 31)	Heterosexual partnered fathers (*n* = 30)	$\chi^2(df)$		
Child gender					0.60 (3)		
Boy	15 (48.4%)	16 (57.1%)	17 (54.8%)	15 (50.0%)			
Girl	16 (51.6%)	12 (42.9%)	14 (45.2%)	15 (50.0%)			
Number of siblings					29.78*** (6)		
0	24 (77.4%)	20 (71.4%)	10 (32.3%)	7 (23.3%)			
1	7 (22.6%)	8 (28.6%)	17 (54.8%)	18 (60.0%)			
2 or more	0	0	4 (12.9%)	5 (16.7%)			
Family residence					3.91 (6)		
Northern Italy	13 (41.9%)	12 (42.9%)	10 (32.3%)	12 (40.0%)			
Central Italy	16 (51.6%)	14 (50.0%)	15 (48.4%)	13 (43.3%)			
Southern Italy	2 (6.5%)	2 (7.1%)	6 (19.3%)	5 (11.7%)			
Father race/ethnicity (White)	31 (100%)	28 (100%)	30 (96.8%)	30 (100%)	2.90 (3)		
Father educational attainment					3.94 (6)		
Undergraduate degree	6 (19.4%)	5 (17.9%)	2 (6.4%)	4 (13.3%)			
Master's degree	16 (51.6%)	18 (64.2%)	22 (71.0%)	19 (63.4%)			
Postdoctoral degree	9 (29.0%)	5 (17.9%)	7 (22.6%)	7 (23.3%)			
Father work status					5.55 (3)		
Full-time	26 (82.9%)	25 (83.3%)	29 (93.3%)	30 (97.8%)			
Part-time	5 (17.1%)	3 (16.7%)	2 (6.7%)	0 (2.2%)			
Father relationship status					69.38*** (3)		
Single	25 (80.7%)	17 (60.7%)	031 (100%)	030 (100%)			
In a relationship	6 (19.3%)	11 (39.3%)					
Variables	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*F*(*df*)	η_p^2	Bayes factor (BF01)
Child age (in months)	95.68 (19.20)	100.00 (21.93)	98.61 (22.08)	97.27 (19.49)	.24 (3,116)	.01	17.07
Father age (in years)	45.26 (6.71)	44.96 (7.01)	43.55 (5.29)	41.43 (6.18)	2.29† (3,116)	.06	1.68
Annual household income	70,032.26 (28,568.32)	65,357.14 (26,226.53)	118,080.65 (55,772.02)	77,316.67 (19,712.80)	13.89***[a] (3,116)	.26	<0.01
Child psychological adjustment-p					.04 (6,230)	<.01	
Internalizing problems	2.19 (1.85)	2.18 (2.07)	2.00 (1.90)	2.13 (1.83)			20.68
Externalizing problems	4.13 (2.43)	4.18 (2.86)	3.97 (2.29)	4.00 (3.32)			21.28
Child psychological adjustment-c					.24 (6,230)	.01	
Internalizing problems	2.00 (1.44)	2.07 (1.44)	1.81 (1.42)	2.03 (2.04)			18.48
Externalizing problems	3.87 (1.39)	3.89 (2.79)	3.32 (2.01)	3.47 (2.73)			14.30
Child self-worth	3.06 (0.55)	3.05 (.50)	3.12 (0.52)	2.90 (0.48)	1.02 (3,116)	.03	7.05
Child understanding of surrogacy	3.81 (.83)	3.75 (1.08)	/	/	.05 (1,57)	<.01	3.70
Frequency of contact with GC	2.65 (1.23)	2.68 (1.22)	/	/	.01 (1,57)	<.01	3.76
Child satisfaction with contact with GC	2.58 (1.03)	2.18 (1.116)	/	/	2.00 (1,57)	.03	1.64
Child curiosity about GC	1.87 (1.06)	1.89 (1.13)	/	/	.01 (1,57)	<.01	3.77
Child feelings about family arrangement	3.03 (1.02)	2.96 (1.11)	/	/	.06 (1,57)	<.01	3.69

Note. -p = parent report; -c = caregiver report; GC = gestational carrier; / = variable(s) which did not reach significance in the previous model.

[a] post hoc test for annual household income: gay partnered fathers versus gay single fathers, heterosexual single fathers, and heterosexual partnered fathers, $p < .001$. Bayes factors shown as the likelihood of obtaining the null model over the alternate. Variables related to surrogacy conception and family arrangement coded as: understanding of surrogacy: 0 (*no understanding*) to 5 (*complex understanding*); frequency of contact with the gestational carrier/egg donor: 0 (*never/contact has stopped*) to 4 (*frequently/once a month or more often*); satisfaction with contact with the gestational carrier/egg donor: 0 (*very dissatisfied*) to 4 (*very satisfied*); curiosity about the gestational carrier/egg donor: 0 (*not at all curious; child does not desire any information*) to 4 (*strongly curious; child states an intense desire for the identified information, which is of high importance*); feelings about family arrangement: 0 (*uncomfortable*) to 4 (*comfortable*).

† $p < .09$. *** $p < .001$.

informed that their responses would not be reported back to the child's father.

Measures

Children's Internalizing and Externalizing Problems

In each family, the father and a caregiver completed the Strength and Difficulties Questionnaire (SDQ; Goodman, 1997) to assess the child's emotional problems, hyperactivity/inattention, conduct problems, peer problems, and prosocial behavior. This scale comprises 25 items rated on a 3-point Likert scale, ranging from 0 (*not true*) to 2 (*certainly true*). Scores in the four problem areas can be combined to generate a total difficulties score, with higher scores indicating more problems. In the present study, total scores of internalizing (emotional plus peer items) and externalizing (conduct plus hyperactivity items) problems were calculated, following the recommendations of Goodman et al. (2010) for studying low-risk samples. The SDQ has been shown to have good internal consistency, test–retest and interrater reliability, and concurrent and discriminative validity (Goodman, 1997). In this study, Cronbach's αs for externalizing problems, as rated by fathers and caregivers, were .84 and .80, respectively; Cronbach's αs for internalizing problems, as rated by fathers and caregivers, were .81 and .77, respectively.

Children's Self-Worth

All children were administered the Self-Worth subscale of the Self-Perception Profile for Children (SPPC; Harter, 1985/2012), which consists of six items measuring perceived self-worth. Respondents are presented with a structured alternative format "Some kids . . . Other kids . . ." that involves an initial decision to identify a target person they consider most like them, followed by a rating of the degree of similarity ("Really true of me" or "Sort of true about me"). Items are scored from 1 to 4, with higher scores indicating higher self-worth. In the present study, questionnaire items were read aloud to the children to ensure comprehension by the youngest (aged 6–7 years). Cronbach's α was .80.

Children's Experiences of Their Surrogacy Conception and Family Arrangement

Children of gay and heterosexual single fathers only (n = 59) were interviewed about their experiences of their surrogacy conception and family arrangement using the Apple Tree Family procedure (AFT; Tasker & Granville, 2011). The AFT is a standardized child-friendly elicitation technique that supports respondents' familiarization with sensitive interview topics related to family. In the present study, children were initially asked to make an "apple tree" representation of their family, following Tasker and Granville (2011, p. 189) instructions: "We all come from different sorts and sizes of families. Family can mean different things for different children; it can include whoever you want or see as important. Could you put an apple on the tree for each person who you see as being in your family?" According to the child's preference and writing abilities, the interviewer or the child wrote the name of each family member the child wished to include on the family tree (for the detailed procedure, see Tasker & Granville, 2011). Following this initial familiarization exercise between the child and the interviewer, the interviewer asked the child what they knew about their birth and prompted them to describe their experiences of having been born with the help of a gestational carrier (and, if aware, also an egg donor) and living in a single-father family.

Questions related to children's experiences of their surrogacy conception and family arrangement were adapted from previous studies of birth family contact among adoptive families (e.g., Farr et al., 2018; Grotevant et al., 2011). Each interview lasted approximately 1 hr and was audio-recorded and transcribed verbatim, with the use of pseudonyms. The following variables were coded: frequency of contact with the gestational carrier or egg donor; satisfaction with contact with the gestational carrier or egg donor; curiosity about the gestational carrier or egg donor; and feelings about the family arrangement. Ratings for the interview variables were based on the entire interview transcript. All transcripts were coded by the first author. To calculate interrater reliability, the first author administered 20 hr of training to a graduate student on the interview codes and rating anchor points, using 20 transcripts collected by the research team for another project on diverse family forms. After interrater agreement ≥ .80 was attained, the graduate student independently coded half of the transcripts (n = 30) while unaware of the conditions of family type, child age, and child gender. Both coders were nonparents and had differing genders and sexual orientations; they met every 2 weeks to resolve disagreements through discussion. Interrater reliability was excellent, with intraclass correlation coefficients (ICCs) ≥ .81 for each variable.

Children's Understanding of Surrogacy

Children of gay and heterosexual single fathers (n = 59) completed the Understanding of Surrogacy Scale during the child interview focusing on: the distinction between natural conception and surrogacy; the nature of surrogacy family relationships; and the role of the gestational carrier and egg donor, respectively, in the conception process. This scale was derived from a scale designed by Brodzinsky et al. (1984) to assess children's understanding of their adoption. The interview was scored from 0 (*child exhibits no understanding of surrogacy*) to 5 (*child is aware of—and able to describe—the implications of a genetic relationship with the father; in the case of gestational surrogacy, child is also able to distinguish the different roles played by the gestational carrier and egg donor*), with higher scores indicating greater cognitive sophistication in understanding the surrogacy process. To ensure the independence of ratings, approximately half of the transcripts (n = 30) were analyzed by a second coder (i.e., a graduate student who did not code interview variables related to children's experiences of their surrogacy conception and family arrangement), following 20 hr of training on the interview codes administered by the first author. Interrater reliability was excellent, with ICC = .82. The detailed scale is available from the first author upon request.

Covariates

In all analyses, given the dramatic age range of the sample (6–12 years) and previous research suggesting gender differences in self-worth (Harter, 1985/2012) and internalizing and externalizing problems (Rescorla et al., 2007), child age and gender were entered as covariates. Furthermore, to test Hypothesis 1, number of siblings and annual household income were also entered as covariates, given the significant differences between groups.

Analytic Plan

All analyses were performed using the statistical software R (R Development Core Team, 2019). Given the small and extremely inaccessible study population, the aim was to generate sufficient power to detect at least medium effect sizes in the analyses of principal interest. Of note, power analyses for hierarchical linear modeling (HLM; Kenny et al., 2006) could not be performed before data collection, as the covariance structure was unknown. a priori power analyses (using pwr R package) with an alpha of .05 indicated that, for the bivariate correlations with 120 participants, power reached .99 for large effects, .92 for medium effects, and .19 for small effects; for the bivariate correlations with 59 participants, power reached .99 for large effects, .66 for medium effects, and .12 for small effects. For the analysis of covariance (ANCOVA), involving four groups, four covariates, and 120 participants, power reached .96 for large effects, .60 for medium effects, and .12 for small effects. For the multiple regression analyses, involving 59 participants and two predictors (child's self-worth as an outcome), power reached .98 for large effects, .73 for medium effects, and .14 for small effects. This suggests that the sample was sufficiently large to detect medium (e.g., d = .50) and large (e.g., d = .80) effects, but not small effects (e.g., d = .20; Cohen, 1988). Therefore, bootstrapping was used to understand the stability of the results within a larger simulated sample (n = 1,000 families).

To compare differences in children's self-worth across family types, an ANCOVA was run using child age, child gender, number of siblings, and annual household income as covariates. Comparisons were made using both traditional null hypothesis significance testing (NHST) and Bayesian analysis, as the latter facilitates a more robust examination of the null hypothesis (Dienes, 2011). In Bayesian analysis, a Bayes factor (BF01) of 1–3 indicates anecdotal evidence, whereas a BF01 of 3–10 indicates substantial evidence for the null hypothesis (i.e., data that are 3–10 times more likely to support the null vs. the alternative hypothesis; Dienes, 2011). Differences in children's internalizing and externalizing problems across family types were tested using HLM (lme4 R package), given that, in each family, fathers and caregivers reported on the same child. This procedure enabled the error variance to be adjusted for the interdependence of partner outcomes within the same dyad, resulting in more accurate standard errors and associated hypothesis tests.

To identify the likelihood that the data would detect the factors that best explained children's self-worth in gay and heterosexual single-father families, given a set of parameters (Van de Schoot et al., 2014); several Bayesian multiple linear regression models were computed and compared using the total coefficient of determination (TCD) and the Bayesian information criterion (BIC). The TCD method determines the combined effect of variables on the dependent variables; the BIC method measures the efficiency of the parameterized model in predicting data and, at the same time, penalizes model complexity (i.e., the number of unnecessary parameters). The higher the TCD (range 0–1), the more variance is explained; the lower the BIC, the better the model fit. Consequently, the model with the highest TCD and lowest BIC can be said to best fit the data. Factors associated with internalizing and externalizing problems in gay and heterosexual single-father families were examined using HLM (Kenny et al., 2006), to account for data dependency within each family. Again, to identify the model that best fit the data, Bayesian fit indices (i.e., TCD, BIC) were used. The investigated predictors of children's self-worth and internalizing and externalizing problems included fathers' sexual orientation (coded as −1 = gay, 1 = heterosexual) and children's gender (coded as −1 = boy, 1 = girl), age, understanding of surrogacy, frequency of contact with the gestational carrier, satisfaction with contact with the gestational carrier, curiosity about the gestational carrier, and feelings about the family arrangement. Variables related to the egg donor were not included, as only 20 children in gay and heterosexual single-father families had been told about the use of an egg donor to conceive.

Results

Descriptive statistics of the interview variables related to children's understanding of surrogacy, contact with the gestational carrier, satisfaction with contact with the gestational carrier, curiosity about the gestational carrier, and feelings about their family arrangement are shown in Table 1. Zero-order correlations between the study variables are displayed in Table 2. Finally, given evidence from the adoption literature indicating gender differences in several variables related to conception (e.g., desire for birth family contact, curiosity; Farr & Grotevant, 2019; Pinderhughes & Brodzinsky, 2019), preliminary analyses were performed to test whether variables related to surrogacy conception and family arrangement varied in the present sample according to child gender and family type (i.e., gay single-father vs. heterosexual single-father). These analyses are presented as online supplemental materials.

Differences in Children's Self-Worth and Internalizing and Externalizing Problems Across Family Types

The ANCOVA showed no differences in children's self-worth across family types, $F(3, 112) = 1.472$, $p = .226$, $\eta_p^2 = .038$, with children in all groups reporting, on average, relatively high levels of self-worth. Neither child age, $F(1, 112) = 1.985$, $p = .161$, $\eta_p^2 = .017$, nor child gender, $F(1, 112) = 2.839$, $p = .095$, $\eta_p^2 = .025$, nor number of siblings, $F(1, 112) = .737$, $p = .392$, $\eta_p^2 = .007$, nor annual household income, $F(1, 112) = 1.527$, $p = .219$, $\eta_p^2 = .013$, emerged as a significant covariate. The Bayes factor analysis was consistent with the ANCOVA results, indicating that the data were seven times more likely to substantially support the lack of a significant family type effect over the chance of detecting a significant effect (BF01 = 7.05). Similarly, the Bayes factors for number of siblings (BF01 = 5.11) and annual household income (BF01 = 4.95) indicated that the data were about five times more likely to support the lack of a significant effect over the chance of detecting a significant effect. Finally, for child age (BF01 = 2.03) and child gender (BF01 = 1.09), the data had anecdotal evidence of obtaining a null model over the alternative.

With regard to internalizing problems, the HLM analyses using the father and caregiver reports revealed no differences across family types, estimate = .064, SE = .303, p = .979, with children in all groups showing low levels of internalizing problems. However, irrespective of family type, girls were reported to display higher internalizing problems than boys, estimate = .629, SE = .263, p = .019; neither child age, estimate = −.010, SE = .007, p = .123, nor

Table 2
Associations Between Child and Father Demographic Information, Surrogacy-Related Variables, Feelings About the Family Arrangement, and Behavioral Adjustment Outcomes Across Family Types (N = 120)

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Child gender	1.00															
2. Child age	−.12	1.00														
3. Number of siblings	.02	.02	1.00													
4. Father age	.08	.20*	.15	1.00												
5. Father educational attainment	−.09	.07	−.09	−.04	1.00											
6. Annual household income	−.03	.15	.31**	.07	.16†	1.00										
7. Internalizing problems-p	.20*	−.17†	−.11	.07	−.11	−.13	1.00									
8. Internalizing problems-c	.19*	−.13	−.03	.15†	−.01	−.06	.40***	1.00								
9. Externalizing problems-p	−.22*	−.04	<.01	.12	−.17†	−.07	.48***	.28**	1.00							
10. Externalizing problems-c	−.05	−.01	−.03	.11	−.18†	−.12	.26**	.29**	.57***	1.00						
11. Child self-worth	−.17†	.13	.01	−.01	.11	−.03	−.46***	−.36***	−.34***	−.24**	1.00					
12. Child understanding of surrogacy	−.07	.45***	−.15	.12	.24†	.05	−.27*	−.29*	−.51	−.39**	.53***	1.00				
13. Contact with GC	−.24†	.39**	.04	.13	.15	−.06	−.14	−.13	−.20	−.11	.22†	.44***	1.00			
14. Child satisfaction with contact with GC	.03	.17	.18	.01	.14	.09	−.34**	−.31*	−.41**	−.33*	.20	.32*	.24†	1.00		
15. Child curiosity about GC	−.21	.34**	−.04	.13	−.04	.16	−.28*	−.19	−.18	−.08	.19	.41**	.15	.04	1.00	
16. Child feelings about family arrangement	.10	.22	.08	.06	.18	.06	−.31*	−.29*	−.45***	−.40**	.36**	.50***	.14	.24†	.24†	1.00

Note. Child gender coded as: −1 = boy; 1 = girl. -p = parent report; -c = caregiver report; GC = gestational carrier. For the associations between study variables and child understanding of surrogacy, contact with GC, child satisfaction with contact with GC, child curiosity about GC, and child feelings about family arrangement, the sample comprised 59 families (gay and heterosexual single-father families, only).
† $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

number of siblings, estimate = −.186, *SE* = .244, *p* = .449, nor annual household income, estimate < .001, *SE* < .001, *p* = .541, was a significant covariate. Finally, fathers and caregivers reported similarly low levels of externalizing problems across family types, estimate = .111, *SE* = .495, *p* = .954. Neither child age, estimate = −.004, *SE* = .011, *p* = .740, nor child gender, *b* = −.766, *SE* = .430, *p* = .078, nor number of siblings, estimate < .001, *SE* < .001, *p* = .321, nor annual household income, estimate = .187, *SE* = .399, *p* = .641, resulted as a significant covariate.

Factors Associated With Self-Worth and Internalizing and Externalizing Problems in Single-Father Families

To examine the factors associated with children's developmental outcomes in gay and heterosexual single-father families, fathers' sexual orientation and children's age, gender, understanding of surrogacy, frequency of—and satisfaction with—contact with the gestational carrier, curiosity about the gestational carrier, and feelings about their family arrangement were entered into a single multiple regression model of children's self-worth and two HLMs of children's externalizing and internalizing problems, respectively. Given the relatively limited sample size, to preserve statistical power, model fit indices were used to retain only variables demonstrating a significant predictive value in the final model. For the sake of concision, only the models that best fit the data for each outcome are discussed here. Fit indices and model details are reported in Table 3.

The multiple regression analysis indicated that boys, β = −.26, *p* = .019, and children with a greater understanding of surrogacy, β = .51, *p* < .001, reported greater self-worth (Model 3, TCD = .33, BIC = 80.22). Furthermore, the HLM analyses showed that girls, β = .28, *p* = .018, and children reporting greater satisfaction with their contact with the gestational carrier, β = −.41, *p* = .001, were reported (by their fathers and caregivers) to present fewer internalizing problems (Model 3, TCD = .21, BIC = 166.97); children with a greater understanding of surrogacy, β = −.30, *p* = .021, greater satisfaction with their contact with the gestational carrier, β = −.26, *p* = .021, and greater comfort with their family arrangement, β = −.27, *p* = .028, were reported (by their fathers and caregivers) to show fewer externalizing problems (Model 3, TCD = .36, BIC = 156.98). In all analyses, the effects were unlikely to have arisen because of multicollinearity, as all predictors showed tolerance and variance inflation factor (VIF) values within acceptable levels (>.50 and <2.00, respectively; Tabachnick et al., 2012).

Bootstrapping Simulation

Because the sample was not sufficiently large to detect small effects, ANCOVA, multiple regression and HLM analyses were rerun using bootstrapping to understand the stability of the results within a larger simulated sample (*n* = 1,000). If the bootstrap confidence intervals did not include 0 (and *p* < .05), a nonsignificant effect of the predictor(s) on each outcome (i.e., child self-worth, internalizing, and externalizing problems) was assumed. The bootstrapping results indicated that repeated samples taken under a sample size of *n* = 1,000 would be unlikely to detect different statistically (non-)significant effects from those detected by the present sample regarding both differences in children's behavioral

Table 3

Factors Associated With Children's Self-Worth, Internalizing and Externalizing Problems, and Model Fit Indices in Gay and Heterosexual Single-Father Families (N = 59)

	Child self-worth					Child internalizing problems					Child externalizing problems				
Variables	Estimate (*SE*)	B	CI [2.5%, 97.5%]	TCD	BIC	Estimate (*SE*)	β	CI [2.5%, 97.5%]	TCD	BIC	Estimate (*SE*)	β	CI [2.5%, 97.5%]	TCD	BIC
Model 0 (null model)					97.31					174.58					174.58
Model 1				.06	102.89				.05	180.56				.01	184.19
Father sexual orientation	−.05 (.13)	−.05	−.31, .21			.01 (.26)	.05	−.21, .31			.04 (.26)	.02	−.25, .28		
Child gender	−.30 (.13)	−.29*	−.55, −.03			.52 (.26)	.26*	<.01, .52			−.22 (.26)	−.11	−.38, .15		
Child age	<.01 (<.01)	.13	−.12, .39			−.01 (.01)	−.16	−.42, .10			−.01 (.01)	−.19	−.45, .08		
Model 2				.30***	94.32				.25**	175.58				.35***	164.42
Child gender	−.31 (.12)	−.30*	−.53, −.06			.48 (.24)	.24†	<.01, .49			/	/	/		
Child understanding of surrogacy	.29 (.08)	.53**	.22, .84			−.09 (.17)	−.09	−.41, .23			−.38 (.15)	−.36*	−.65, −.06		
Contact with GC	−.04 (.06)	−.10	−.36, .16			.06 (.11)	.07	−.20, −.34			.06 (.10)	.08	−.16, .32		
Child satisfaction with contact with GC	.02 (.06)	.05	−.19, .29			−.31 (.11)	−.34**	−.58, −.09			−.24 (.10)	−.27*	−.50, −.04		
Child curiosity about GC	.05 (.06)	.09	−.17, .35			−.18 (.13)	−.19	−.46, .08			−.25 (.12)	−.27*	−.52, .02		
Child feelings about family arrangement	.05 (.06)	−.10	−.35, .15			−.14 (.12)	−.15	−.41, .11			.05 (.11)	.06	−.18, .29		
Model 3				.33***	80.22				.21***	166.97				.36***	156.98
Child gender	−.27 (.11)	−.26*	−.48, −.05			.56 (.23)	.28*	.05, .52			/	/	/		
Child understanding of surrogacy	.28 (.06)	.51***	.30, .73			/	/	/			−.31 (.13)	−.30*	−.55, −.05		
Child satisfaction with contact with GC	/	/	/			−.37 (.11)	−.41**	−.64, −.17			−.24 (.10)	−.26*	−.49, −.04		
Child feelings about family arrangement	/	/	/			/	/	/			−.26 (.12)	−.27*	−.52, −.03		

Note. Father sexual orientation coded as −1 = gay; 1 = heterosexual. Child gender coded as −1 = boy; 1 = girl. CI = confidence interval; BIC = Bayesian information criterion; TCD = total coefficient determination; GC = gestational carrier; / = variable(s) which did not reach significance in the previous model. For each dependent variable, Model 3 was the one that best fit the data, with the highest TCD and the lowest BIC, and was interpreted in the Results section.

† $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

outcomes across family types and factors associated with behavioral adjustment in single-father families.

Discussion

The present study was the first to investigate the associations between child behavioral outcomes and family factors that uniquely characterize single-father families through surrogacy, as well as to examine whether children of gay and heterosexual single fathers might differ from children of gay and heterosexual partnered fathers in their self-worth and internalizing and externalizing problems. In line with our first hypothesis, reports from fathers and caregivers indicated no differences across the four family groups in any of the behavioral outcomes: children in all four groups demonstrated, on average, moderately high levels of self-worth and low levels of internalizing and externalizing problems. This finding is consistent with the results of prior studies on diverse family forms, indicating that family structure does not necessarily lead to child behavioral difficulties (Golombok, 2015; Patterson, 2017); as well as a previous study with gay and heterosexual single-father families through surrogacy, indicating no group differences in adjustment at mean age 5.5 years (Carone, Baiocco, Lingiardi, & Barone, 2020). However, it should be noted that the present research was not powered sufficiently to detect small differences between groups. In a similar vein, the lack of participant compensation and the required participation of a caregiver who frequently spent time with the child might have only attracted very high-functioning single-father families. Also, as all of the reported studies (including the present research) were cross-sectional, future longitudinal studies are required to identify temporal precedence in the developmental pathways of children born to single fathers through surrogacy.

Consistent with our second hypothesis, children's behavioral outcomes were unrelated to male single parenthood through surrogacy, but they were associated with particular aspects of the surrogacy conception and to children's feelings about their family arrangement. Specifically, children felt, on average, reasonably comfortable with their family arrangement. Furthermore, those who felt more comfortable displayed fewer externalizing behaviors. There are several noteworthy aspects of this result. First, in middle childhood, children become increasingly able to identify and articulate feelings about their family structure and to ask questions about it (Brodzinsky, 2011). This occurs not only because of children's greater cognitive sophistication, but also because they spend more time with peers, who may ask questions about their family diversity (Vanfraussen et al., 2002) and stimulate the children to inquire into the nature of their family structure, in conversation with parents. When fathers are responsive to their child's questions, the child may feel more comfortable raising aspects of their family arrangement they feel concerned or confused about; this, in turn, may be associated with better behavioral adjustment. This interpretation is consistent with findings from the adoption literature on the role and importance of open communication within the adoptive family system for children's adjustment. Parents who acknowledge the inherent differences associated with adoptive family life and create an environment that allows for children's curiosity and questions about these differences and the nature of their origins, generally facilitate healthier adjustment in children (for reviews, see Farr & Grotevant, 2019; Pinderhughes & Brodzinsky, 2019). Given that prior research with two-father surrogacy families (Carone, Barone, et al., 2020) has reported similar results, future studies of family dynamics within single-father families formed through surrogacy would benefit from examining the relationship between communication openness and children's psychological adjustment.

A second aspect of surrogacy conception that was found to relate to child behavioral outcomes was children's understanding of surrogacy. Specifically, children's greater cognitive sophistication in understanding the surrogacy process was associated with more positive self-worth and fewer externalizing problems, but it was unrelated to internalizing problems. It is likely that emerging cognitive development during this period leads to more effective coping strategies and a greater sense of internal control in relation to understanding of surrogacy, which may result in fewer acting-out behaviors and greater self-worth (Smith & Brodzinsky, 2002). Positive self-esteem may also be related to the way in which fathers discuss their child's origins. Previous research on donor conception families and surrogacy families has reported that parents typically adopt a script of disclosure that emphasizes the child's specialness and how much they were wanted (Blake et al., 2014; Carone et al., 2017a; Carone, Baiocco, et al., 2018).

It is also likely that coming to terms with one's surrogacy conception may be a less internal process in middle childhood than in adolescence and adulthood (as found in research with adopted adolescents and emerging adults, see Grotevant et al., 2011; Grotevant et al., 2017). From this perspective, greater externalizing symptoms may reflect children's unsuccessful efforts to cope with their thoughts and feelings about the uniqueness of their family arrangement, especially when they misunderstand information provided by their father about their origins, believe their father to be withholding relevant information from them, find themselves forced to reconcile discrepancies between the information they are given and what they are able to cognitively understand, and/or are unduly influenced by factors outside of the family, such as teasing and microagressions from others regarding their family structure or the nature of their origins.

Although children reported, on average, neutral feelings about their frequency of contact with the gestational carrier, those who were less satisfied were reported by fathers and caregivers to present more internalizing and externalizing problems. This finding is consistent with emotional distance regulation theory (Grotevant, 2009); insofar as it indicates that, regardless of the type or extent of contact children experience, their behavioral adjustment is more positive when their expectations of contact and their information needs (i.e., about their origins) are met. The finding also aligns with the adoption literature. For example, Grotevant et al. (2011) found that adolescents and young adults who were more satisfied with their level of postadoption contact with birth relatives demonstrated fewer externalizing behaviors. In addition, Farr and Grotevant (2019) reported that adolescents who were more satisfied with their contact with birth relatives reported more emotionally close relationships with their parents and better family communication. These findings suggest the importance of exploring in more detail the role of children's and adolescents' expectations regarding surrogacy information and contact as contributing factors in their behavioral adjustment, as well as their relationships with parents.

Additional considerations regarding children's satisfaction with their contact with the gestational carrier should be further contextualized in relation to the scarce opportunities Italian children have to communicate with her in middle childhood. Given the vast geographical distance between single-father families in Italy and their gestational carrier (typically in the United States or Canada) and the relatively young age of the children involved, it is realistic to assume that communication between children and their gestational carrier is completely dependent on their father's willingness to reveal the gestational carrier's identity, allow a relationship between them, and monitor their communication. Therefore, when fathers act as gatekeepers to the gestational carrier, children's satisfaction should be interpreted not just as pure satisfaction with their contact with the gestational carrier, but also as satisfaction with their father, who may deny or encourage this contact. This provides further indirect support for the idea that greater parent–child cohesiveness may be associated with fewer behavioral problems (Farr et al., 2019). Future research examining how patterns of contact between parties occur in single-father families could help to clarify this finding.

Future research with single-father families through surrogacy should also give due consideration to the potential salience of gender differences in variables related to surrogacy conception, given that the children in these families are likely to navigate unique identity issues and seek further knowledge of ancestry when they reach adolescence (Erikson, 1963; Grotevant et al., 2017). Adolescent girls may, in fact, become more interested in their gestational carrier than boys, in response to their developing reproductive identity and capacity for pregnancy, as adoption research indicates for adopted girls and their birth mother (Wrobel & Dillon, 2009). Whether adolescent daughters of single fathers through surrogacy will require more contact with their gestational carrier to clarify doubts or questions related to their conception—or whether they will dismiss such contact, as it could be perceived as detrimental to their relationship with their father—requires further investigation, because it might contribute to explaining the long-term effects of surrogacy conception on behavioral outcomes.

Strengths and Limitations

Several strengths of the study should be acknowledged. The data related to self-worth were obtained from the children, themselves, and the data related to internalizing and externalizing problems were obtained from caregivers, in addition to fathers, as the latter may have presented an overpositive view of their child's adjustment. Furthermore, the reliance on multiple informants was grounded in meta-analyses showing that correlations between informants are often modest and that information from different reporters can be important in conceptualizing child adjustment problems (Achenbach et al., 1987). Finally, criticism of research on new family forms often relates to statistical power (Golombok, 2015; Patterson, 2017), but such a critique is less relevant for the present study since power analyses revealed that our sample size was sufficiently large to detect medium and large effect sizes, and the bootstrapping simulation confirmed the stability of our findings even in a larger sample.

The present study is not, however, without limitations. First, considering that all single fathers were highly educated, cisgender, White, and relatively affluent, and they all conceived their long-awaited children through gestational surrogacy, it is difficult to precisely estimate the representativeness of this small volunteer sample. However, particularly regarding the very high income of participants in the study, because surrogacy involves significant costs (e.g., IVF physician services, health insurance to cover all procedures and the pregnancy, legal services for agreements among all parties, and agency services), it is only available to a small and relatively demographically homogeneous group. Evidence for this is provided by the demographic composition of participants in empirical studies with male-headed surrogacy families that have included information about income (e.g., Berkowitz, 2020; Carone, Barone, et al., 2020, Carone, Lingiardi, et al., 2020; Green et al., 2019). Second, contextual issues regarding the negative societal attitudes against—and prohibition of—surrogacy in Italy (Lingiardi & Carone, 2016) could limit the generalizability of the present findings to other countries.

Additionally, the findings may not generalize to genetic surrogacy arrangements (a less common type of surrogacy), in which the genetic relationship between the surrogate and the child may complicate children's understanding of and comfort with their conception and increase their interest in contact with the surrogate. Finally, given the children's relatively young age, there was a fundamental difficulty in interpreting their genuine understanding of surrogacy in the interviews. Prior research with diverse families suggests that children's understanding of conception is significantly influenced by their developmental stage (Brodzinsky et al., 1984); thus, it cannot be ascertained whether the children's responses truly reflected their understanding or simply replicated what their father had told them.

Conclusion

The present study of children born through surrogacy and raised by gay and heterosexual single fathers provides preliminary evidence of the positive functioning of these two rare—but growing (Coles, 2015)—family forms. It also informs single fathers and practitioners who interact with these families, showing that the developmental changes underlying children's acquisition of knowledge about their surrogacy origins have implications for their self-worth and externalizing behaviors. This is particularly important during middle childhood, when children transition to elementary school and are increasingly confronted with the views of peers. Also in this period, conduct problems and depressive and anxious symptoms are predictive of greater aggression, depression, and anxiety in adolescence and adulthood (Nivard et al., 2017; Roza et al., 2003); as well as self-worth, coping strategies, and behaviors that enable success for one's relationships, career, and well-being over time (Chung et al., 2017).

In conclusion, the findings contradict the commonly held assumption that the combination of surrogacy conception and single fatherhood has negative implications for children's behavioral adjustment. In line with the evidence that family processes are more important than parental sexual orientation and the number of parents for child behavioral outcomes (Golombok, 2015; Patterson, 2017), the findings encourage future studies to include an examination of children's understanding of their origins, satisfaction with their contact with the gestational carrier, and feelings about their family arrangement, to contribute a more nuanced picture of how children of single fathers develop within their family.

References

Achenbach, T. M., McConaughy, S. H., & Howell, C. T. (1987). Child/adolescent behavioral and emotional problems: Implications of cross-informant correlations for situational specificity. *Psychological Bulletin*, *101*(2), 213–232. https://doi.org/10.1037/0033-2909.101.2.213

Berkowitz, D. (2020). Gay men and surrogacy. In A. E. Goldberg & K. R. Allen (Eds.), *LGBTQ-parent families: Innovations in research and implications for practice* (2nd ed., pp. 143–160). Springer. https://doi.org/10.1007/978-3-030-35610-1_8

Blake, L., Carone, N., Slutsky, J., Raffanello, E., Ehrhardt, A. A., & Golombok, S. (2016). Gay father surrogacy families: Relationships with surrogates and egg donors and parental disclosure of children's origins. *Fertility and Sterility*, *106*(6), 1503–1509. https://doi.org/10.1016/j.fertnstert.2016.08.013

Blake, L., Zadeh, S., Statham, H., & Freeman, T. (2014). Families created by assisted reproduction: Children's perspectives. In T. Freeman, S. Graham, F. Ebtehaj, & M. Richards (Eds.), *Relatedness in assisted reproduction: Families, origins, identities* (pp. 251–269). Cambridge University Press. https://doi.org/10.1017/CBO9781139814737.017

Bos, H. M. W., & Gartrell, N. K. (2011). Adolescents of the U.S. National Longitudinal Lesbian Family Study: The impact of having a known or an unknown donor on the stability of psychological adjustment. *Human Reproduction*, *26*(3), 630–637. https://doi.org/10.1093/humrep/deq359

Brodzinsky, D. M. (2006). Family structural openness and communication openness as predictors in the adjustment of adopted children. *Adoption Quarterly*, *9*(4), 1–18. https://doi.org/10.1300/J145v09n04_01

Brodzinsky, D. M. (2011). Children's understanding of adoption: Developmental and clinical implications. *Professional Psychology, Research and Practice*, *42*(2), 200–207. https://doi.org/10.1037/a0022415

Brodzinsky, D. M., Singer, L. M., & Braff, A. M. (1984). Children's understanding of adoption. *Child Development*, *55*(3), 869–878. https://doi.org/10.2307/1130138

Carone, N., Baiocco, R., & Lingiardi, V. (2017a). Italian gay fathers' experiences of transnational surrogacy and their relationship with the surrogate pre-and post-birth. *Reproductive Biomedicine Online*, *34*(2), 181–190. https://doi.org/10.1016/j.rbmo.2016.10.010

Carone, N., Baiocco, R., & Lingiardi, V. (2017b). Single fathers by choice using surrogacy: Why men decide to have a child as a single parent. *Human Reproduction*, *32*(9), 1871–1879. https://doi.org/10.1093/humrep/dex245

Carone, N., Baiocco, R., Lingiardi, V., & Barone, L. (2020). Gay and heterosexual single father families created by surrogacy: Father–child relationships, parenting quality, and children's psychological adjustment. *Sexuality Research & Social Policy*, *17*, 711–728. https://doi.org/10.1007/s13178-019-00428-7

Carone, N., Baiocco, R., Lingiardi, V., & Kerns, K. (2020). Child attachment security in gay father surrogacy families: Parents as safe havens and secure bases during middle childhood. *Attachment & Human Development*, *22*(3), 269–289. https://doi.org/10.1080/14616734.2019.1588906

Carone, N., Baiocco, R., Manzi, D., Antoniucci, C., Caricato, V., Pagliarulo, E., & Lingiardi, V. (2018). Surrogacy families headed by gay men: Relationships with surrogates and egg donors, fathers' decisions over disclosure and children's views on their surrogacy origins. *Human Reproduction*, *33*(2), 248–257. https://doi.org/10.1093/humrep/dex362

Carone, N., Barone, L., Manzi, D., Baiocco, R., Lingiardi, V., & Kerns, K. (2020). Children's exploration of their surrogacy origins in gay two-father families: Longitudinal associations with child attachment security and parental scaffolding during discussions about conception. *Frontiers in Psychology*, *11*, 112. https://doi.org/10.3389/fpsyg.2020.00112

Carone, N., Gartrell, N. K., Rothblum, E. D., Koh, A. S., & Bos, H. M. W. (2021). The stability of psychological adjustment among donor-conceived offspring in the U.S. National Longitudinal Lesbian Family Study from childhood to adulthood: Differences by donor type. *Fertility and Sterility*. Advance online publication. https://doi.org/10.1016/j.fertnstert.2020.20.012

Carone, N., Lingiardi, V., Baiocco, R., & Barone, L. (2020). Sensitivity and rough-and-tumble play in gay and heterosexual single-father families through surrogacy: The role of microaggressions and fathers' rumination. *Psychology of Men & Masculinity*. Advance online publication. https://doi.org/10.1037/men0000267

Carone, N., Lingiardi, V., Chirumbolo, A., & Baiocco, R. (2018). Italian gay father families formed by surrogacy: Parenting, stigmatization and children's psychological adjustment. *Developmental Psychology*, *54*(10), 1904–1916. https://doi.org/10.1037/dev0000571

Chung, J. M., Hutteman, R., van Aken, M. A., & Denissen, J. J. (2017). High, low, and in between: Self-esteem development from middle childhood to young adulthood. *Journal of Research in Personality*, *70*, 122–133. https://doi.org/10.1016/j.jrp.2017.07.001

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences*. Erlbaum.

Coles, R. L. (2015). Single-father families: A review of the literature. *Journal of Family Theory & Review*, *7*, 144–166. https://doi.org/10.1111/jftr.12069

De Wert, G., Dondorp, W., Shenfield, F., Barri, P., Devroey, P., Diedrich, K., Tarlatzis, B., Provoost, V., & Pennings, G. (2014). ESHRE Task Force on Ethics and Law 23: Medically assisted reproduction in singles, lesbian and gay couples, and transsexual people. *Human Reproduction*, *29*(9), 1859–1865. https://doi.org/10.1093/humrep/deu183

Dienes, Z. (2011). Bayesian versus orthodox statistics: Which side are you on? *Perspectives on Psychological Science*, *6*(3), 274–290. https://doi.org/10.1177/1745691611406920

Erikson, E. H. (1963). *Youth: Change and challenge*. Basic Books.

Farr, R. H. (2017). Does parental sexual orientation matter? A longitudinal follow-up of adoptive families with school-age children. *Developmental Psychology*, *53*(2), 252–264. https://doi.org/10.1037/dev0000228

Farr, R. H., & Grotevant, H. D. (2019). Adoption. In B. H. Fiese (Ed.), *APA Handbook of Contemporary family psychology*: Vol. *1. Foundations, methods, and contemporary issues across the lifespan* (pp. 725–741). American Psychological Association. https://doi.org/10.1037/0000099-040

Farr, R. H., Bruun, S. T., & Simon, K. A. (2019). Family conflict observations and outcomes among adopted school-age children with lesbian, gay, and heterosexual adoptive parents. *Journal of Family Psychology*, *33*(8), 965–974. https://doi.org/10.1037/fam0000576

Farr, R. H., Crain, E. E., Oakley, M. K., Cashen, K. K., & Garber, K. J. (2016). Microaggressions, feelings of difference, and resilience among adopted children with sexual minority parents. *Journal of Youth and Adolescence*, *45*(1), 85–104. https://doi.org/10.1007/s10964-015-0353-6

Farr, R. H., Ravvina, Y., & Grotevant, H. D. (2018). Birth family contact experiences among lesbian, gay, and heterosexual adoptive parents with school-age children. *Family Relations*, *67*(1), 132–146. https://doi.org/10.1111/fare.12295

Golombok, S. (2015). *Modern families. Parents and children in new family forms*. Cambridge University Press. https://doi.org/10.1017/CBO9781107295377

Goodman, A., Lamping, D. L., & Ploubidis, G. B. (2010). When to use broader internalizing and externalizing subscales instead of the hypothesised five subscales on the Strengths and Difficulties Questionnaire (SDQ): Data from British parents, teachers and children. *Journal of Abnormal Child Psychology*, *38*(8), 1179–1191. https://doi.org/10.1007/s10802-010-9434-x

Goodman, R. (1997). The Strengths and Difficulties Questionnaire: A research note. *Journal of Child Psychology and Psychiatry*, *38*(5), 581–586. https://doi.org/10.1111/j.1469-7610.1997.tb01545.x

Green, R. J., Rubio, R. J., Rothblum, E. D., Bergman, K., & Katuzny, K. (2019). Gay fathers by surrogacy. Prejudice, parenting, and well-being

of female and male children. *Psychology of Sexual Orientation and Gender Diversity*, *6*(3), 269–283. https://doi.org/10.1037/sgd0000325

Grotevant, H. D. (2009). Emotional distance regulation over the life course in adoptive kinship networks. In G. Wrobel & E. Neil (Eds.), *International advances in adoption research for practice* (pp. 295–316). Wiley. https://doi.org/10.1002/9780470741276.ch13

Grotevant, H. D., Lo, A. Y., Fiorenzo, L., & Dunbar, N. D. (2017). Adoptive identity and adjustment from adolescence to emerging adulthood: A person-centered approach. *Developmental Psychology*, *53*(11), 2195–2204. https://doi.org/10.1037/dev0000352

Grotevant, H. D., McRoy, R. G., Wrobel, G. M., & Ayers-Lopez, S. (2013). Contact between adoptive and birth families: Perspectives from the Minnesota/Texas Adoption Research Project. *Child Development Perspectives*, *7*(3), 193–198. https://doi.org/10.1111/cdep.12039

Grotevant, H. D., Rueter, M., Von Korff, L., & Gonzalez, C. (2011). Post-adoption contact, adoption communicative openness, and satisfaction with contact as predictors of externalizing behavior in adolescence and emerging adulthood. *Journal of Child Psychology and Psychiatry*, *52*(5), 529–536. https://doi.org/10.1111/j.1469-7610.2010.02330.x

Harter, S. (2012). *Self-perception profile for children: Manual and questionnaires*. University of Denver. (Original work published 1985). https://doi.org/10.1037/t05338-000

Kenny, D. A., Kashy, D. A., & Cook, W. L. (2006). *Dyadic data analysis*. Guilford Press Press.

Lingiardi, V., & Carone, N. (2016). Lesbian mothers, gay fathers: An inconceivable conception? *Giornale Italiano di Psicologia*, *43*, 57–79. https://doi.org/10.1421/83618

Messina, R., & Brodzinsky, D. (2020). Children adopted by same-sex couples: Identity-related issues from preschool years to late adolescence. *Journal of Family Psychology*, *34*(5), 509–522. https://doi.org/10.1037/fam0000616

Nivard, M. G., Lubke, G. H., Dolan, C. V., Evans, D. M., Pourcain, B. S., Munafò, M. R., & Middeldorp, C. M. (2017). Joint developmental trajectories of internalizing and externalizing disorders between childhood and adolescence. *Development and Psychopathology*, *29*(3), 919–928. https://doi.org/10.1017/S0954579416000572

Patterson, C. J. (2017). Parents' sexual orientation and children's development. *Child Development Perspectives*, *11*(1), 45–49. https://doi.org/10.1111/cdep.12207

Pinderhughes, E. E., & Brodzinsky, D. M. (2019). Parenting in adoptive families. In M. H. Bornstein (Ed.), *Handbook of parenting*: Vol. *1*. *Children and parenting* (3rd ed., pp. 322–367). Routledge Publishers. https://doi.org/10.4324/9780429440847-10

R Development Core Team. (2019). *R: A language and environment for statistical computing*. R Foundation for Statistical Computing. http://www.R-project.org

Rescorla, L., Achenbach, T., Ivanova, M. Y., Levent, D., Almqvist, F., Bilenberg, N., Bird, H., Chen, W., Dobrean, A., Döpfner, M., Erol, N., Fombonne, E., Fonseca, A., Frigerio, A., Grietens, H., Hannesdottir, H., Kanbayashi, Y., Lambert, M., Larsson, B., & Verhulst, F. (2007). Behavioral and emotional problems reported by parents of children ages 6 to 16 in 31 societies. *Journal of Emotional and Behavioral Disorders*, *15*, 130–142. https://doi.org/10.1177/10634266070150030101

Roza, S. J., Hofstra, M. B., Van Der Ende, J., & Verhulst, F. C. (2003). Stable prediction of mood and anxiety disorders based on behavioral and emotional problems in childhood: A 14-year follow-up during childhood, adolescence, and young adulthood. *The American Journal of Psychiatry*, *160*(12), 2116–2121. https://doi.org/10.1176/appi.ajp.160.12.2116

Smith, D. W., & Brodzinsky, D. M. (2002). Coping with birthparent loss in adopted children. *Journal of Child Psychology and Psychiatry*, *43*(2), 213–223. https://doi.org/10.1111/1469-7610.00014

Tabachnick, B. G., Fidell, L. S., & Osterlind, S. J. (2012). *Using multivariate statistics*. Prentice Hall.

Tasker, F., & Granville, J. (2011). Children's views of family relationships in lesbian-led families. *Journal of GLBT Family Studies*, *7*(1-2), 182–199. https://doi.org/10.1080/1550428X.2011.540201

Van de Schoot, R., Kaplan, D., Denissen, J., Asendorpf, J. B., Neyer, F. J., & Van Aken, M. A. (2014). A gentle introduction to Bayesian analysis: Applications to developmental research. *Child Development*, *85*(3), 842–860. https://doi.org/10.1111/cdev.12169

Vanfraussen, K., Ponjaert-Kristoffersen, I., & Brewaeys, A. (2002). What does it mean for youngsters to grow up in a lesbian family created by means of donor insemination? *Journal of Reproductive and Infant Psychology*, *20*(4), 237–252. https://doi.org/10.1080/02646830210000331 65

Volling, B. L., Cabrera, N. J., Feinberg, M. E., Jones, D. E., McDaniel, B. T., Liu, S., Almeida, D., Lee, J.-K., Schoppe-Sullivan, S. J., Feng, X., Gerhardt, M. L., Dush, C. M. K., Stevenson, M. M., Safyer, P., Gonzalez, R., Lee, J. Y., Piskernik, B., Ahnert, L., Karberg, E., . . . Cookston, J. T. (2019). Advancing research and measurement on fathering and children's development. *Monographs of the Society for Research in Child Development*, *84*(1), 7–160. https://doi.org/10.1111/mono.12404

Von Korff, L., Grotevant, H. D., & McRoy, R. G. (2006). Openness arrangements and psychological adjustment in adolescent adoptees. *Journal of Family Psychology*, *20*(3), 531–534. https://doi.org/10.1037/0893-3200.20.3.531

Williams, J. M., & Smith, L. A. (2010). Concepts of kinship relations and inheritance in childhood and adolescence. *British Journal of Developmental Psychology*, *28*(Pt. 3), 523–546. https://doi.org/10.1348/026151009X449568

Wrobel, G. M., & Dillon, K. (2009). Adopted adolescents: Who and what are they curious about? In G. M. Wrobel & E. Neil (Eds.), *International advances in adoption research for practice* (pp. 217–244). Wiley. https://doi.org/10.1002/9780470741276

Wrobel, G. M., & Grotevant, H. D. (2019). Minding the (information) gap: What do emerging adult adoptees want to know about their birth parents? *Adoption Quarterly*, *22*(1), 29–52. https://doi.org/10.1080/10926755.2018.1488332

Received January 6, 2020
Revision received November 1, 2020
Accepted December 9, 2020 ■