

Siblings Reared Apart: A Sibling Comparison Study on Rearing Environment Differences

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Abstract

A plethora of studies with parents and children who are biologically related has shown that the family environment plays an important role in child development. However, scientists have long known that a rigorous examination of environmental effects requires research designs that go beyond studies of genetically-linked family members. Harnessing the principles of sibling comparison and animal cross-fostering designs, we introduce a novel approach: the siblings-reared-apart design. Supplementing the traditional adoption design of adopted child and adoptive parents with a sample of the adopted children's birth parents who raised their biological child(ren) at home (i.e., biological siblings of adoptees), this design provides opportunities to evaluate the role of specific rearing environments. In this proof of concept approach, we tested whether rearing environments differed between adoptive and birth families. Using data from 118 sets of adoption-linked families, each consisting of an adoptive family and the adoptee's birth family, both of whom are raising at least a child in each home, we found that compared with families in the birth homes, (a) adoptive families had higher household incomes and maternal educational attainment; (b) adoptive mothers displayed more guiding parenting, less harsh parenting, and less maternal depression; and (c) socioeconomic differences between the two homes did not account for the behavioral differences in mothers. We discuss the potential of the sibling-reared-apart design to advance developmental science.

Keywords: siblings-reared-apart, sibling comparison, cross-fostering, adoption, environment, parenting

Thousands of studies with families whose children are raised by biologically related parents have evidenced that the family plays an important role in child development (Bornstein, Leventhal, & Lerner, 2015). However, behavioral genetic studies have also shown that family influences child development not only through environmental pathways, but also through genetic transmission and the creation of rearing environments that are correlated with, and evoked by, the genes that parents pass on to offspring (Horwitz & Neiderhiser, 2011; Klahr & Burt, 2014; Plomin, DeFries, & Loehlin, 1977; Scarr & McCartney, 1983). The broader field of developmental science is faced with a similar challenge when associations between developmental outcomes and contextual factors are influenced by unmeasured characteristics of the child or other contexts (Duncan, Magnuson, & Ludwig, 2004). A rigorous examination of environmental effects is crucial because it could identify modifiable factors in children's rearing environments and generate possibilities for new preventions and interventions (Leve et al., 2017; Rutter, Pickles, Murray, & Eaves, 2001). In this report, we introduce a siblings-reared-apart design that presents new insights into the study of the rearing environment. We use feasibility data to illustrate the potential of this design.

Siblings Reared Apart: A Naturalistic “Cross-Fostering” Design

In their quest to test causal models, scientists often apply randomized experimental designs. However, the application of randomized experiments is not always feasible, especially in studies involving humans. In the field of child development, sibling-comparison designs, a special type of quasi-experimental design that recruits multiple children from a family, has been advocated as a powerful alternative to randomized experiments when studying environmental influences on development (D'Onofrio et al.,

2016; D'Onofrio, Lahey, Turkheimer, & Lichtenstein, 2013; Duncan et al., 2004; Lahey & D'Onofrio, 2010). The major advantage is that the comparison within a sibling cluster eliminates unmeasured family-level confounds that may bias the associations between environment(s) and development. Within-home sibling-comparison designs require that the putative environments have to vary between siblings in the same family (Lahey & D'Onofrio, 2010). This criterion has become a topic of investigation in itself (Plomin & Daniels, 1987). However, it would be useful to have a sibling design that captures wider variations in the putative family-level environments, such as family socioeconomic status (SES) and rearing parents' mental health, that are typically shared by siblings.

We propose that studying siblings who are reared apart from birth allows an alternative approach to examine the role of the rearing environment. In essence, siblings-reared-apart designs are a hybrid of sibling-comparison and cross-fostering designs. In the siblings-reared-apart paradigm, a newborn is removed from the birth parent soon after birth and reared by adoptive parents who are genetically unrelated. Meanwhile, the birth mother is parenting another biological child who is a biological sibling to the adoptee. A unique feature of this design is that although genetic influences on a phenotype are shared among siblings (full siblings sharing 50% of genes and half-siblings 25%, on average), the rearing environment is provided by different parents. In non-human animal and plant studies, this approach, called a *cross-fostering design*, is the gold standard paradigm for studying the interplay of genes and the environment. Rodent and non-human primate studies have made significant scientific advances with this design, demonstrating that mothers' nurturing behaviors in early life can provide a significant impact on behavioral, neuroendocrine, epigenetic profiles in offspring later on (e.g., Francis & Meaney, 1999;

Maestripieri, 2005; Meaney, 2001; Suomi, 1997). For obvious ethical reasons, the direct application of a cross-fostering design to humans is not feasible, but studies of human infants adopted at birth offer comparable benefits (Rutter et al., 2001). Under naturalistically occurring life circumstances, genetically related siblings may be reared apart in two separate homes, creating a quasi-cross-fostering paradigm.

Of the very few siblings-reared-apart studies that exist, there are two variants: first are studies in which siblings are adopted into separate adoptive homes. The best-known paradigm in this category is the monozygotic (MZ) twins-reared-apart study (Bouchard, Lykken, McGue, Segal, & Tellegen, 1990; Pedersen et al., 1991), although this design has also been applied to nontwin siblings (Mednick, Gabrielli, & Hutchings, 1984). Second – the focus of this study – are studies that recruit two children from a family network that has expanded by adoption, in which one is an adoptee placed in an adoptive home, and the other is his/her biological sibling who is reared by the biological parent(s) of both children. Birth home-reared siblings are a quasi-reference group that provides some information about “what if” the adoptee had not been adopted. To our knowledge, other than case studies (Segal et al., 2015; Segal & Hur, 2008), there exist only three projects of this type (Kendler, Ohlsson, Sundquist, & Sundquist, 2016; Kendler, Turkheimer, Ohlsson, Sundquist, & Sundquist, 2015; Schiff, Duyme, Dumaret, & Tomkiewicz, 1982; Sorensen, Price, Stunkard, & Schulsinger, 1989).

Despite these initial efforts, room for improvement remains. Earlier sibling-reared-apart studies have assumed that siblings experience different rearing environments, but the foundational question of *whether and how* environments differ has yet to be tested. This is a crucial omission because the core premise of the siblings-reared-apart design relies on

the assumption that the rearing environment provided in the two households differs. In this study, we compared aspects of the proximal rearing environment of adopted children (i.e., parenting and parental mental health) and that of their birth home-reared siblings. If this assumption is validated, it paves the way for future research examining child developmental outcomes within these studies.

Adoptive Versus Birth Homes: Do Specific Aspects of the Rearing Environment Differ?

The first step in demonstrating the validity of the siblings-reared-apart design is to show whether and how adoptive and birth homes differ. Socioeconomic status (SES) is one aspect of the rearing environment that may distinguish adoptive and birth homes. To be eligible to adopt a child in the United States, regulations often require evidence of financial security to ensure that prospective parents have the means and ability to provide a safe and resourceful home environment. Therefore, it is no surprise that adoptive families are, on average, more affluent than nonadoptive families (McGue et al., 2007). These socioeconomic advantages are expected to allow parents to make more materialistic and psychological investments in the lives of their children (for reviews, see Bradley & Corwyn, 2002; Conger & Donnellan, 2007). In contrast, little is known about the SES of birth parents and its heterogeneity. Although birth mothers who pursue adoption are often perceived as “poor” and “inadequate” (Sweeney, 2012), this assumption is untested.

Also left unexamined is how family processes differ between adoptive and birth homes. To our knowledge, no study has compared parents' behaviors in adoptive and birth homes of adoptees. However, recent research that compares parents who adopted a child versus parents who raised their biological children shows that adoptive parents allocate

more economic, cultural, and social resources to their children (Hamilton, Cheng, & Powell, 2007). This phenomenon supports the compensation theory of parental investment -- facing the unique challenges of not being biologically-related to the child, adoptive parents increase their efforts to become “good parents” by showing intensified commitment to parenthood (Hamilton et al., 2007). Interestingly, however, compensation effects are mostly accounted for by sociodemographic advantages of adoptive parents. The intricate relations between family SES and parental investment is also echoed in the family stress model (Conger, Ge, Elder, Lorenz, & Simons, 1994), in which family economic pressure is theorized to undermine family processes such as parenting and parents’ mental health.

If the compensation effect exists and the social advantages of adoptive families are supported by our data, it logically follows that 1) adoptive parents’ engagement to become effective parents should be evident when compared to birth parents of adoptees; but 2) such differences should be explained by differences in SES. A study that tests these hypotheses must first be an adoption study with the recruitment of adoptive families and the adoptees’ birth families (i.e., adoption-linked families). Second, the participating parents of both families must be raising children in their respective homes. Third, the study must conduct a comprehensive assessment of the rearing environments in both homes. We introduce the first sibling-reared-apart study that meets all these criteria.

Present Study

The aims of this report are to introduce the siblings-reared-apart design and to evaluate its core assumption that the rearing environments of linked adoptive and birth families differ. Three hypotheses were formulated: (a) family SES would be higher in adoptive homes than in birth homes; (b) adoptive mothers would show lower depressive

and anxiety symptoms and more effective parenting than would birth mothers; and (c) the differences in SES would explain differences in parenting and parental psychopathology.

Method

Participants

This report is based on pilot data collected from a subsample of families ($N = 118$) who participated in Cohort I of the Early Growth & Development Study (EGDS; Leve et al., 2013). The EGDS follows adoption-linked families ($N = 561$), each of which includes an adopted child, the adoptive parents, and the birth mother. The EGDS also includes birth fathers whenever possible (birth fathers participated in approximately 37% of the families). All the EGDS children were adopted around the time of birth (median age of child at adoption placement = two days, $SD = 12.45$ days, range = 0 to 91 days). The EGDS families were recruited from 45 agencies in 15 states across the United States, reflecting the full range of U.S. adoption agencies, including public, private, religious, secular, open, and closed adoptions. The study eligibility criteria included the following: (a) the adoption placement was domestic within the United States; (b) voluntary adoption placement occurred within 3 months after the birth of the child; (c) the adopted infant was biologically unrelated to the adoptive family (d) no major medical conditions were present at birth; and (e) the birth and adoptive parents had English proficiency at the 8th-grade level. The protocols were approved by the institutional review board at the University of Oregon (Protocol#03042014.001, Project Title: EGDS-MSCH Family and peer processes and G-E interplay in middle school: An adoption study).

The current report used feasibility data from a subsample of Cohort I families whose birth parents were parenting *at least* one biological child under age 18 (and thus, a

biological sibling of an EGDS adoptee). Capitalizing on the parenting data from adoptive parents that the EGDS was also collecting, we administered the same parenting tasks in the eligible birth parents' interview protocol.

The sample consisted of 118 pairs of adoption-linked adoptive and birth mothers. In this analytical sample, 92% of the adoptive mothers were Caucasian, 75% had attained at least a 4-year college degree, and over half had a household income of more than \$100,000. The adoptive mothers were, on average, 42.31 years old ($SD = 5.85$) at the time of the parenting assessment. Seventy-one percent of birth mothers were Caucasian, with 3% having a 4-year college degree or above and 82% with a household income of less than \$40,000. The mean age of the birth mothers at the time of the parenting assessment was 27.43 years ($SD = 4.68$). Many birth mothers were parenting multiple children who were genetically related to the adoptee. Altogether, 229 children under age 18 were biological siblings of the adoptees (77% half-siblings, 23% full siblings of adoptees) raised by, and living with, 118 birth mothers at the time of data collection. No data were collected from the children living with the birth parent for this pilot study.

We report data collected from adoptive (M age = 42.76 [$SD = 6.11$]) and birth fathers (M age = 28.60 [$SD = 6.89$]) when possible. A birth father eligible for this study is a biological father of the EGDS adoptee who was parenting his biological child at his home, but he was not necessarily co-parenting the child with the birth mother. Birth fathers are a hard-to-reach population as exemplified by only having 19 birth fathers with usable parenting data (and 34 for SES data). This small sample size posed statistical challenges. Therefore, we limited the use of fathers' data to descriptive purposes only. Over 60% of adoptive fathers reported a household income over \$100,000, while no birth father did so.

Seventy percent of adoptive fathers obtained a 4-year college degree or more, while the same percentage of birth fathers attained high school degree or less. The majority of adoptive (90%) and birth (80%) fathers were Caucasian.

To detect possible systematic patterns of missingness, we compared the families who were vs. who were not included in the pilot study using the existing EGDS data. Results showed no significant group differences, except that birth mothers in the pilot study had lower educational attainment at the time of the pilot study assessment ($M = 3.11$ [$SD = 1.34$]) than did birth mothers who did not participate in the study ($M = 3.53$ [$SD = 1.54$]), $t_{(319)} = 2.45, p < .015$.

Procedure

Assessments were conducted via in-person home interviews, web-based and mail-in surveys, and phone interviews. Separate teams of interviewers conducted the assessments of the birth and adoptive families so that the interviewers were not aware of which birth family was linked to which adoptive family.

Because of the tag-along nature of this feasibility data onto the scheduled EGDS assessment, the assessment is aligned with the timing of the adoptees' age, not with age of the child(ren) in the birth parent home. For this report, data from both birth and adoptive parents, including their demographic information, were collected when the adoptees were approximately age 4.5 years.

Measures

Household income. Self-reported household income in adoptive and birth homes at adoptee's age 4.5 years was classified according to a 7-point Likert scale: 1 = less than \$15,000; 2 = \$15,001 to \$25,000; 3 = \$25,001 to \$40,000; 4 = \$40,001 to \$55,000; 5 = \$55,001 to

\$70,000; 6 = \$70,001 to \$100,000; and 7 = more than \$100,000.

Parental educational attainment. Adoptive and birth parents reported their highest educational level attained. Their responses were coded as follows: 1 = less than a high school degree; 2 = G.E.D. degree; 3 = high school degree; 4 = trade school degree; 5 = 2-year college degree (e.g., associate's degree); 6 = 4-year college or university degree; and 7 = completed a graduate program (e.g., law school, doctoral programs, MBA).

Parental depressive and anxiety symptoms. Adoptive and birth parents completed the Beck Anxiety Inventory (BAI; Beck & Steer, 1993a) and the Beck Depression Inventory (BDI; Beck & Steer, 1993b). The BAI ($\alpha = 0.81 \sim 0.90$ across birth and adoptive parents) and BDI ($\alpha = 0.82 \sim 0.91$) are widely used self-report measures of anxiety and depressive symptoms in which the respondents are asked to indicate the degree to which they have been bothered by specific symptoms in the past week using a 4-point scale ranging from *not at all* to *severely* (bothered).

Parenting practices. Parenting practices were ascertained using the KidVid Analog Parenting Task (DeGarmo, Reid, & Knutson, 2006), which is a video-based analog parenting task. KidVid uses "point of view" perspectives to assess how parents would respond, given a specific situation with their child. Parents individually watched a series of two short video clips about a variety of benign to aversive behaviors requiring parental discipline. For example, a parent visits her son's room, expecting that the son is getting ready to go to school. The son says, "I am too tired." Parents were then asked what they would do or say if they were the child's parent. After a pause that allowed parents to respond, the video shows the son saying, "I don't want to go to school." Again, the parents were probed about what they would say or do in response to the child's insistence. Parents' open-ended

responses were coded using 28 content codes developed by DeGarmo et al. (2006). The overall kappa was 0.64. We computed the frequencies of four categories of parenting practices: *harsh parenting* (e.g., yelling, spanking/slapping), *limit setting* (e.g., giving a time-out), *guidance* (e.g., giving commands, discussing), and *ineffective parenting* (e.g., doing nothing).

In analog parenting tasks, parents act and react by responding to familiar scenes of everyday interactions with the child character, which is thought to approximate the dynamic interpersonal processes of parenting (DeGarmo et al., 2006; Russa & Rodriguez, 2010). The validity of analog parenting task has been supported by high correlations with self-reported parenting (Russa & Rodriguez, 2010) and predictive effects on child adjustment (DeGarmo & Forgatch, 2004).

Analytic Plan

Missing data. Of the 118 participating pairs of mothers, missing data on parenting practices and maternal depression and anxiety ranged from 0% to 27%. For maternal educational attainment and household income, we supplemented the missing cases with the updated information collected at a later wave in the EGDS to reduce the number of missing cases. The results of Little's (1988) missing completely at random (MCAR) test yielded a nonsignificant $\chi^2 = 202.590$, $df = 231$, and $p = 0.911$. Given that MCAR is warranted, all 118 pairs of mothers were included in the analyses, and missingness was treated with multiple imputation (Graham, 2009). As noted earlier, father data are provided for descriptive purposes only, and thus no missingness treatment was applied.

Analysis overview. First, we provide descriptive statistics of the adoptive and birth homes. We tested the differences between birth and adoptive home environments by

conducting paired *t*-tests. To examine whether SES differences accounted for differences in maternal behaviors (i.e., maternal parenting and depressive and anxiety symptoms), we conducted a series of regression analyses. The descriptive statistics presented here are based on the available data with pairwise deletion, but as recommended (Graham, 2009; Schafer & Graham, 1999), the subsequent inferential statistics are based on multiply imputed data for the treatment of missing data. We used SAS PROC MI to create five imputed datasets using all the key study variables and then combined them with PROC MIANALYZE to generate estimates (Yuan, 2011).

Results

Adoptive Versus Birth Home Rearing Environments

The descriptive statistics of the home environment variables are presented in Tables 1 and 2. We performed a series of paired *t*-tests, which revealed several differences between the two homes. First, family income and maternal educational attainment were higher in adoptive homes than in birth homes. A cross-tabulation of adoptive versus birth home SES (not shown) revealed that 95% of adoptees had a household income higher than that of their birth home-reared siblings, and that the majority of adoptees (90%) were raised by adoptive mothers whose educational attainment was higher than that of their birth mothers. Similar differences in SES were observed in comparisons between adoptive and birth fathers.

Second, the adoptive mothers had lower levels of depressive symptoms than did the birth mothers, but this pattern was not observed for anxiety. In the parenting domain, adoptive mothers engaged in higher levels of guidance and lower levels of harsh parenting than did birth mothers, but no differences were evident in ineffective parenting or limit

setting. The descriptive statistics of paternal characteristics supported this pattern of differences.

Predicting Differences in Adoptive Versus Birth Homes From SES Differences

Next, we examined whether the household differences we observed for guidance, harsh parenting, and depressive symptoms were attributable to differences in SES. To test this possibility, we first calculated the differences between the adoptive versus birth home environments with the following equation: rearing environment in adoptive home – rearing environment in the birth home. We then regressed the difference scores for the rearing environment (i.e., guidance, harsh parenting, depressive symptoms) on the difference scores for socioeconomic characteristics (income and education, separately). The results (Table 3) revealed no significant associations, suggesting that income and education differences alone did not explain the variance in why maternal parenting practices and depressive symptoms differed between the two homes.

Discussion

The aim of this report was to test a core assumption underlying siblings-reared apart designs by studying a sample of linked adoptive–birth families and comparing aspects of the rearing environment. Findings indicated that adoptive homes were, on average, materialistically and psychologically better resourced than birth homes in specific domains of the rearing environment. Specifically, compared with birth mothers, adoptive mothers were more educated and financially secure and displayed higher levels of guidance and lower levels of harsh parenting and depressive symptoms. However, no significant differences were found for maternal anxiety symptoms and ineffective and limit setting parenting between the two mothers.

The findings on the socioeconomic advantages of adoptive homes are not surprising. After all, applicants who wish to adopt a child are thoroughly screened, including their financial resources. Although no specific minimum income is set for domestic adoption, many adoption agencies check the financial security of applicants to ensure the stability of the home environment and to validate prospective parents' ability to manage the financial costs incurred during the adoption process. Our data reflect the implementation of these guidelines. Unsurprisingly, adoptive mothers also showed higher educational attainment than birth mothers. The ubiquity of the differences between the two homes was quite striking. Compared with their birth home-reared siblings, the majority of adoptees were raised by parents whose educational attainment was higher than that of birth parents (90% and 84% for maternal and paternal education, respectively). The most frequently observed birth mother versus adoptive mother contrast was a high school degree versus a graduate or professional degree, representing 16% of the sample. These findings are consistent with earlier work demonstrating higher SES in adoptive families (McGue et al., 2007; Sacerdote, 2007; Stoolmiller, 1999).

Our findings on guidance, harsh parenting, and maternal depression suggest that adoption can operate as a booster of not only SES but also psychological enrichment at home. These findings support a previous report (Hamilton et al., 2007), revealing the high commitment of adoptive parents to fulfill their role as parents. However, the adoption-generated benefit was not detected in limit setting, ineffective parenting, or maternal anxiety symptoms. This is the first siblings-reared-apart study to examine proximal family processes relative to child rearing, and the findings illustrate more nuanced differences between the two homes than assumed.

Contrary to previous work (Hamilton et al., 2007), SES differences between the two homes did not explain the differences in parental behaviors (i.e., maternal guidance, harsh parenting, and depressive symptoms). Although null results do not readily advocate the nil effect, we speculate that other unmeasured constructs independent of SES may be operating to make adoptive and birth homes different. One possibility is adoptive versus birth mothers' reasons for, and means of, having a child (Nelson, Kushlev, & Lyubomirsky, 2014). Research has demonstrated that parents who gain parenthood by adoption show higher parenthood satisfaction than do parents who gain a child biologically (Ceballo, Lansford, Abbey, & Steward, 2004). Furthermore, some adoptive parents who have struggled with infertility often undergo a long wait for a child and may experience heightened positive emotions that come with parenthood (Nelson et al., 2014). If positivity about parenthood is instilled more strongly in adoptive mothers than in birth mothers, we could speculate that regardless of an SES difference between the two homes, adoptive mothers may engage in more guiding and less harsh parenting than would birth mothers. Future research would benefit from data on the meaning of parenthood held by adoptive and biological parents.

Limitations and Future Plans

Several limitations must be acknowledged. First, at the time of the parenting assessment, many birth parents were raising multiple children in their household, whose ages varied considerably. It is unknown which child the birth parents had in mind. Second, the KidVid is a simulation task; it may not capture the behaviors that other measures (e.g., self-reports, observation) would encapsulate. Third, parents in both homes reported relatively low levels of harsh parenting. Fourth, although the type of design used in this

investigation has been called “cross-fostering,” strictly speaking, it is an *incomplete cross-fostering* design (Capron & Duyme, 1989) because children are typically adopted from higher risk (e.g., lower SES, higher parental psychopathology) to lower risk (e.g., higher SES, lower parental psychopathology), excluding cases that transition from lower to higher risk environments. Although our data show some variation, most adoptees transitioned to more enriched rearing environments after adoption, and only a few children experienced the reverse pattern. This pattern is expected because adoption is designed to provide a possible solution that serves the best interests of the child, birth parents, and adoptive families, but from a methodological perspective, it makes the cross-fostering design incomplete. Fifth, we included fathers’ data whenever possible, but the small sample size of birth fathers posed analytical challenges. Sixth, it is important to consider why birth parents have decided to place one child for adoption and parent other child(ren). At 3-6 months post-adoption, we asked all birth mothers in EGDS why they placed the child in adoption. Table 4 summarizes their open-ended responses. Nearly 40% of responses from birth mothers identified specific reasons such as “financial reasons,” “child’s best interest,” and “didn’t/couldn’t have an abortion.” For teen mothers, “not ready to be a mom” was the top reason for choosing adoption. However, for ethical reasons, this pilot study did not assess their reason for choosing to parent other child(ren). If a parent’s decision to place one child for adoption and parent another at home is a function of differences in circumstances during each pregnancy (e.g., parental age, income, or occupational reasons for each child), the logic that siblings in birth homes serve as the virtual case of “what if the adopted child had been raised by the birth mother” would not be precise. Finally, some children in the birth parent home were half-siblings and others were full siblings to the

adoptive. Although this pilot study did not focus on sibling comparisons, the variation in sibling genetic relatedness should be accounted for in future inquiries that focus on phenotypes that are under genetic influence. Relatedly, the purpose of this report is to provide a “proof of concept” for the siblings-reared-apart design to demonstrate that rearing environments do differ between the two homes. A next step is to investigate how these environmental differences predict the development of the sibling pairs. The fulfillment of this step is underway in our project, the Early Parenting of Children (Leve et al., 2017) and will be extended in NIH’s recent Environmental Influences on Child Health Outcomes (ECHO) initiative.

Conclusion

Our study highlights the potential utility of the siblings-reared-apart design in testing questions about environmental effects on family functioning and child development. Our findings confirmed that this design captures important differences in rearing environments that siblings reared apart experience, but that differences are much more nuanced than those of tightly controlled non-human animal cross-fostering experiments. Against the backdrop of great discovery from animal cross-fostering studies, developmental scientists have lamented that such methodologies cannot be transferred to human research. However, by capitalizing on naturally occurring events, we can shift our scientific conduct from the impossible to a new possibility to better understand environmental influences on child development.

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Table 1. Mean Differences in SES, Maternal Psychopathology, and Parenting Between Birth Homes and Adoptive Homes

	Birth Homes		Adoptive Homes		Mean difference (95% CL)	<i>t</i>	Std. Error	<i>p</i> value
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>				
<u>Mothers</u>								
SES								
Household income	2.34	1.30	6.16	1.30	3.81 (3.48~4.14)	22.58	0.17	<.0001
Educational attainment	3.11	1.33	5.84	1.20	2.73 (2.38~3.07)	15.70	0.17	<.0001
Maternal psychopathology								
Depressive symptoms	6.98	6.91	4.53	4.76	-2.41 (-4.27~-0.55)	-2.57	0.94	0.009
Anxiety symptoms	6.12	6.24	4.92	5.61	-1.24 (-3.30~0.82)	-1.12	0.90	0.235
Maternal parenting								
Harsh parenting	1.27	1.35	0.80	1.13	0.49 (-0.83~-0.15)	-2.85	0.17	0.005
Guidance	6.06	2.49	7.79	2.92	1.82 (0.93~2.72)	4.18	0.44	<.0001
Limit setting	1.97	1.76	1.97	1.94	-0.18 (-0.76~0.40)	-0.62	0.28	0.539
Ineffective parenting	3.63	1.98	4.00	2.38	0.39 (-0.24~1.00)	1.23	0.31	0.224
<u>Fathers^a</u>								
SES								
Household income	2.67	1.51	6.28	1.30				
Educational attainment	2.88	1.39	5.56	1.55				
Paternal psychopathology								
Depressive symptoms	4.19	6.17	3.69	4.67				
Anxiety symptoms	5.26	6.27	3.55	4.67				
Paternal parenting								
Harsh parenting	1.47	1.57	0.67	0.99				
Guidance	6.16	2.59	7.43	2.89				
Limit setting	5.74	3.18	1.66	1.74				
Ineffective parenting	3.89	1.79	3.88	2.58				

Note. The means, standard deviations, and percentages presented here are based on the preimputed data. Inferential statistics are based on multiply imputed data to deal with missing cases. ^aFathers' data are for the descriptive purpose only; no inferential statistics was computed due to the small sample size of birth fathers (*n* = 19 for KIDVID).

Table 2. Correlations Among Study Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 AM harsh parenting	--															
2 BM harsh parenting	0.109	--														
3 AM guidance	-0.175	-0.312	--													
4 BM guidance	-0.017	-0.249	0.200	--												
5 AM limit setting	0.013	0.338	-0.506	-0.263	--											
6 BM limit setting	0.034	0.118	-0.455	-0.316	0.325	--										
7 AM ineffective parenting	-0.065	0.146	-0.525	-0.142	0.352	0.387	--									
8 BM ineffective parenting	0.183	-0.244	-0.147	-0.383	0.177	0.246	0.140	--								
9 AM anxiety	0.070	0.001	0.175	0.010	-0.029	-0.062	0.040	-0.088	--							
10 BM anxiety	-0.180	0.052	-0.054	-0.104	0.033	0.044	0.098	0.120	-0.227	--						
11 AM depression	0.152	-0.101	0.151	-0.014	0.044	0.007	0.164	0.090	0.789	-0.150	--					
12 BM depression	0.027	0.115	0.069	0.003	-0.042	-0.056	-0.077	-0.109	-0.149	0.648	-0.124	--				
13 AM education	-0.036	-0.023	0.091	0.223	0.158	-0.105	0.160	-0.035	-0.002	-0.152	-0.024	-0.160	--			
14 BM education	-0.193	-0.119	0.033	0.218	-0.078	-0.103	0.240	-0.123	0.009	-0.004	-0.078	-0.048	-0.118	--		
15 AM income	-0.037	-0.146	-0.048	0.118	-0.003	0.021	0.155	0.063	-0.047	-0.011	-0.134	-0.031	0.292	-0.116	--	
16 BM income	0.104	-0.278	0.095	0.108	0.076	-0.034	-0.115	-0.007	-0.025	-0.143	-0.087	-0.168	-0.091	0.212	0.040	--

Note. Coefficients are based on raw (pre-imputed) data. Bolded coefficients are at $p < .05$. AM = adoptive mothers. BM = birth mothers.

Table 3. Regression Results: Predicting Adoptive-Birth Home Differences in Parenting and Maternal Depressive Symptoms From Differences in SES

Independent Variables	Harsh parenting			Guidance			Maternal depressive symptoms		
	<i>b</i>	SE	<i>p</i> value	<i>b</i>	SE	<i>p</i> value	<i>b</i>	SE	<i>p</i> value
Model 1:									
Intercept	0.107	0.325	0.742	1.941	0.679	0.005	-3.495	1.604	0.032
Education difference	-0.219	0.118	0.078	-0.058	0.257	0.826	0.399	0.474	0.402
Model 2:									
Intercept	0.061	0.442	0.890	2.840	0.967	0.005	-0.048	1.958	0.091
Income difference	-0.145	0.119	0.233	-0.276	0.229	0.233	-0.616	0.469	0.189

Note. Estimates are based on multiply imputed data to deal with missingness. Bolded coefficient is at $p < .05$.

Table 4. Birth Mothers' Reasons for Placing a Child in Adoption

Age Reasons	Under 20		20 - 29		30 - 39		Over 40	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Too young, not ready to be a mom	34	16.1	17	3.7				
Heard about it or talked about it with other people, ads/shows on adoption, referred to agency	29	13.7	39	8.4	18	12.6		
Financial reasons	27	12.8	73	15.7	28	19.6	4	23.5
Child's best interest, for a better life, not able to care for or give the attention needed, give others a chance to parent	24	11.4	64	13.8	15	10.5		
Non-specific (just wanted to)	23	10.9	51	11	15	10.5	1	5.9
Didn't want an abortion, too far along for an abortion	18	8.5	57	12.3	17	11.9	4	23.5
To please parent(s)	15	7.1	7	1.5				
Marital status, birth father not around, wants the child to have two parents	6	2.8	17	3.7	7	4.9	2	11.8
Felt there was no other option	6	2.8	15	3.2	12	8.4		
Too many children already	5	2.4	47	10.1	9	6.3	1	5.9
Good experience with adoption already	5	2.4	18	3.9	4	2.8	2	11.8
Wanted to keep in contact	4	1.9						
Birth Father hostile, on drugs, the mother was raped by him	3	1.4	17	3.7	6	4.2		
Mental or emotional problems	3	1.4	7	1.5	2	1.4		
Religious reasons, through prayer	3	1.4	5	1.1	1	0.7		
Felt coerced by someone / not her decision	3	1.4	4	0.9	1	0.7		
Child would go to foster care	1	0.5	8	1.7				
No support	1	0.5	5	1.1			1	5.9
Extra-marital affair, problems in marriage	1	0.5	3	0.6	2	1.4		
Birth mother and/or birth father did not want child(ren)			5	1.1	4	2.8		
Unstable lifestyle / On drugs			5	1.1	2	1.4		
Too old to raise another baby							2	11.8
Total	211		464		143		17	