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Differential parental investment in families with both adopted and genetic children☆

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Abstract

Stepchildren are abused, neglected and murdered at higher rates than those who live with two genetically related parents. Daly and Wilson used kin selection theory to explain this finding and labeled the phenomenon "discriminative parental solicitude." I examined discriminative parental solicitude in American households composed of both genetic and unrelated adopted children. In these families, kin selection predicts parents should favor their genetic children over adoptees. Rather than looking at cases of abuse, neglect, homicide and other antisocial behavior, I focused on the positive investments parents made in their children as well as the outcomes of each child. The results show that parents invested more in adopted children than in genetically related ones, especially in educational and personal areas. At the same time, adoptees experienced more negative outcomes. They were more likely to have been arrested, to have been on public assistance and to require treatment for drug, alcohol or mental health issues. They also completed fewer years of schooling and were more likely to divorce. In adoptive families, it appears that "the squeaky wheel gets the grease." Parents invest more in adoptees not because they favor them, but because they are more likely than genetic children to need the help. I conclude that discriminative parental solicitude differs in adoptive and step households because adoptive families generally result from prolonged parenting effort, not mating effort like stepfamilies.

Keywords: Adoption; Kin selection; Parental investment; Discriminative parental solicitude

1. Introduction

Kin selection theory dictates that altruism between individuals should vary according to the probability they share common genes (Hamilton, 1963, 1964). Daly and Wilson (1980) used this theory to explain why stepchildren are more likely to be abused, neglected or murdered by a live-in parent than those who reside with two genetically related parents. Briefly, stepchildren threaten the resources available to the genetic children of the stepparent (Daly & Wilson, 1980). In addition, stepparents are motivated to parent unrelated children by mating effort, while they are motivated to parent their genetic children by parenting effort (Marlowe, 2000).

While it is possible for parents to develop loving relationships with stepchildren, natural selection has designed psychological mechanisms to protect parents from investing in unrelated offspring (Daly & Wilson, 1980). Through a variety of proximate mechanisms like smell, mammalian parents can recognize their own offspring and favor them over unrelated ones. They can even distinguish between the more "fit" of their genetically related offspring and bias investment toward them. In humans, such "discriminative parental solicitude" (DPS or "The Cinderella Effect") has been formally demonstrated in Canada (Daly & Wilson, 1985), the United States (Wilson, Daly & Weghorst, 1980) and the United Kingdom (Gordon & Creighton, 1988). Canadian police records, for example, show that children living with stepparents are 40 times more likely to be abused and 120 times more likely to be killed by a live-in parent than those living with two genetic parents (Daly & Wilson, 1985, 2001). The cross-cultural presence of "Cinderella Stories" and notions of "wicked stepmothers" is anecdotal support that DPS exists even where it has not been studied formally (Daly & Wilson, 1999).

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Daly and Wilson (1980) address adoption, noting that, cross-culturally, it usually occurs between kin. Where this is the case, selection may favor adoption as the fitness benefits outweigh the costs (Hamilton, 1963; Silk, 1980, 1987a,b). But what of nonkin adoption? Silk (1980) suggests that, in subsistence economies where physical labor is central to family production, adoption is a means to acquire labor. In these economies, family size must fall within an optimal range; too small and fields lie fallow, too large and mouths go unfed. Adoption lets people actively control family size, and in this way, it is adaptive (Silk, 1980, 1987a,b).

In the contemporary West, adoption may bring adaptive social benefits as well. Whether childless by choice or by chance, childless couples are stigmatized by American society. They are often associated with words like "materialistic" and "selfish," while those with children are seen as "loving," "likeable" and "hard working" (Callan, 1985). Adoption is a way for the childless to live more in step with social norms.

Because they share no genes with household members, a strict interpretation of kin selection theory predicts that unrelated adopted children should be abused, neglected or murdered at higher rates than stepchildren. This paper is rooted in this logic, but focuses on positive parental investment, not criminal maltreatment. I hypothesize that parents of at least one adopted and one genetic child bias investment toward genetic offspring.

However, a recent article shows that children in adoptive households receive *more* parental investment than those in two genetic parent homes. Hamilton, Cheng and Powell (2007) show that, relative to children in two genetic parent homes, those in two adoptive parent households are more likely to have computers, attend religious services and eat meals with their parents. Adoptive parents are also more likely to participate in "cultural" activities like sports, game playing and science fair projects with their children.

The research I describe here differs from Hamilton et al. (2007) because it examines differential parental investment *within* families that have at least one adopted and one genetic child, whereas Hamilton et al. used national survey data to compare investments *between* two-adoptive parent households and two-genetic parent households. The current study here has an advantage because it was designed specifically to examine differential parental investment within genetically diverse adoptive families.

2. Methods

2.1. Participant selection

The study was conducted in conjunction with an adoption agency located in the Midwestern United States. Agency personnel randomly selected cases from their records and chose families having at least one genetic and one adopted child over the age of 22 as of January 2004. This age selection was used to enable comparisons of total education, alcohol and drug treatment, marriage history, and investments in cars. Many families had other children younger than 22, both adopted and genetic, and sample sizes vary throughout the paper due to this.

2.2. Survey instrument

The self-administered, 26-item survey referred to children by birth or adoption order (hereafter just "birthorder"). Firstborns were called "#1", secondborns "#2" and so on. I did this to move the adopted or genetic distinction farther from the questions. Respondents were given a grid with eight columns, one for each child, and 19 rows, each representing an investment. Parents were asked to mark an "X" in each box corresponding to the investment and the child for which it was provided. They were also asked to report how much time they invested in each child in six areas using a five-point Likert scale.

Parents were also asked about the educational, social and marital outcomes of each child. Table 2 lists these in their entirety. Excluding education, age at which the child left home and the child's income, responses to these questions were binary in order to make them less subjective.

2.3. Statistical methods

Statistics were computed using univariate general linear modeling in SPSS 16 for Windows (SPSS Inc., 2007). Controls for each investment included combinations of age, birthorder, gender, education, marital status and parent's income. Specific control combinations are footnoted in Table 2. Sample sizes vary throughout because many investments did not apply to all children. For example, only children over 15 were included in the question about investment in a car, and only those over 17 were included in a question about college tuition.

3. Results

3.1. Characteristics of adoptive parents

A total of 126 (42%) of 300 of surveys were returned. Some were incomplete, but all contained usable information. There did not appear to be any systematic ascertainment bias; however, as with all survey research, it is impossible to rule out completely. Most (75.6%) respondents were female. They averaged 57.6 years old (S.E.=1.056, n=123) and their spouses averaged 57.33 years (S.E.=1.027, n=111). The median yearly household income for respondents younger than retirement age was $50,000 to $74,999 ($n$=87). Just 5.9% ($n$=119) of respondents were divorced. A total of 57.6% (n=118) reported adopting because they were told they were biologically unable to conceive children.

3.2. Characteristics of adopted and biological children

Table 1 gives descriptive statistics for adopted and genetic children. Children are listed by birthorder from firstborn (1)

Table 1
Descriptive statistics on sample children

Birthorder	*n*	Percent adopted	S.E. Relatedness	Percent male	S.E. Gender	Mean age	S.E. Age
1	121	49.6	0.046	56.9	0.046	30.910	1.135
2	123	41.2	0.045	49.6	0.045	27.110	1.114
3	75	28	0.052	49.3	0.059	25.410	1.319
4	32	50	0.090	62.5	0.087	19.770	1.880
5	8	37.5	0.183	50.0	0.189	14.125	3.492
6	2	50	0.500	0.0	0.000	9.000	5.000
7	1	100	No data	0.0	No data	No data	No data
8	1	100	No data	0.0	No data	13.000	No data
Total	363	45.2	0.026	50.3	0.027	26.895	0.663

Age is in years. Relatedness and gender are binary. Total *n* varies because of missing data.

to lastborn (8). Overall, the 363 child sample was 26.9 years old, 50.3% male and 45.2% adopted. As a group, adopted and genetic children did not differ in birthorder (t_{361}=−0.968, n=363, p=.334, two-tailed), age (t_{325}=−1.167, n=327, p=.716, two-tailed) or gender (Fischer's exact test, n=352, p=.748, two-tailed). When age, marital status, gender and divorce history were controlled, their incomes did not differ ($F_{1,13}$=0.337, p=.563).

3.3. Differences in parental investment

Table 2 gives the results of general linear models on parental investment. Investments are categorized into four

Table 2
Comparisons of parental investments in adopted and genetic children

Dependent variable	*p*	*n*	S.E.	*F*	Controls†	Selection criteria	Other significant independent variables (*p*)
Health							
Braces	.946	137	0.088	0.005	a		Parent's income (047*); gender (.001**)
Cosmetic surgery	.147	138	0.012	2.117	a		Birthorder (.053)
Contact lenses	.742	137	0.087	0.463	a		Age (<.001***)
Education							
Preschool	.037*	121	0.084	4.400	a		Age (<.001***); parent's income (.003**)
Private tutoring	.014*	121	0.057	6.083	a		Age (.025*); gender (.041*)
Summer school	.001**	137	0.047	12.56	f		
Music lessons	.697	138	0.088	0.152	a	Age >12	Gender (.008**); parent's income (.023*)
Personal							
Car	.002**	138	0.073	9.586	a	Age >15	Age (.018*); parent's income (.001**)
Vacation	.988	138	0.080	0.000	a	Age >6	
Camp	.198	138	0.090	1.669	a	Age >11	
Scouts	.656	138	0.086	0.199	a	Age >6	Age (.049*)
Prom dress or tuxedo	.303	138	0.012	1.066	a	Age >15	
Wedding	.860	137	0.077	0.031	a	Married	Age (<.001***); gender (.002**); Parent's income (.019**)
Honeymoon	.555	137	0.045	0.350	a	Married	Gender (.011**); parent's income (.047*)
College	.309	138	0.085	1.039	a	Education >12 years	Parent's income (<.001***)
Rent	.007**	138	0.090	7.412	a	Age >17	Parent's income (<.001***)
Personal loan	.005**	138	0.089	7.961	a	Age >17	Age (044*); gender (.005**); Parent's income (.018*)
Cosign bank loan	.343	138	0.081	0.902	a	Age >17	Birthorder (.021*)
Time							
Homework	.124	96	0.223	2.409	a	Age >11	Age (.009**)
Sports	.043*	88	0.229	4.209	a	Age >5	Gender* relatedness (.027*)
Scholarships	.521	47	0.384	0.420	a	Age >16	Age (<.001***)
Family issues	.203	95	0.218	0.203	a	Age >2	Age (.037*)
Professional issues	.772	75	0.268	0.085	a	Age >17	
Dating issues	.724	89	0.240	0.126	a	Age >15	

* $p \leq .05$.
** $p \leq .01$.
*** $p \leq .001$.
† Controls: a=age, gender, birthorder, parent's income; b=age, birthorder, education; c=age, gender, birthorder, education, parent's income, marital status; d=age, gender, birthorder, parent's income, education; e=age, gender, birthorder; f=age, birthorder, parent's income.

Table 3
Comparisons of outcomes of adopted and genetic children

Dependent variable	*p*	*N*	S.E.	*F*	Controls†	Selection criteria	Other significant independent variables (*p*)
Divorce	<.001***	85	0.065	14.74	b	Ever married	Age (.001**); education (<.001***)
Income	.938	92	10266.1	0.006	c		Education (<.001***); gender (<.001***)
Education	.023*	131	0.546	5.263	a		Age (.01**); parent's income (.008**)
Age left home	.695	120	0.396	0.154	d		
Attended daycare	.807	142	0.063	0.060	e		
Mental health treatment	.002**	127	0.060	10.18	f		
Alcohol treatment	.041*	138	0.044	4.211	a	Age >17	Age (.039*); gender (.016**)
Drug treatment	.001**	137	0.040	10.94	a	Age >17	Birthorder (.057)
Arrested	.038*	128	0.041	4.355	f		Gender (.013**); birthorder (.053)

* $p \leq .05$.
** $p \leq .01$.
*** $p \leq .001$.
† Controls: a=age, gender, birthorder, parent's income; b=age, birthorder, education; c=age, gender, birthorder, education, parent's income, marital status; d=age, gender, birthorder, parent's income, education; e=age, gender, birthorder; f=age, birthorder, parent's income.

groups: health; educational; personal; social and time. There were no significant differences in health investments. Parents were equally likely to provide orthodontic braces, contact lenses and cosmetic surgery for adopted and genetic children. There were several significant differences in educational investments. Adopted children were more likely than genetic children to attend preschool ($F_{1,6}$=4.4, p=.037), receive private tutoring ($F_{1,6}$=6.083, p=.014) and attend summer school ($F_{1,6}$=12.559, p=.001). There were also significant differences in personal investments. Compared to genetic children, adoptees were more likely to receive cars ($F_{1,6}$=9.586, p=.002), rent ($F_{1,6}$=7.412, p=.007) and personal loans ($F_{1,6}$=7.961, p=.005). Adopted children also received more of their parents' time with sports ($F_{1,6}$=4.209, p=.043).

3.4. Outcomes of adopted and genetic children

The outcomes of adopted and genetic children differ in several ways (Table 3). Adopted children complete fewer years of school than genetic ones ($F_{1,6}$=5.263, p=.023) and are more likely to require professional treatment for alcohol addiction ($F_{1,5}$=4.211, p=.041), drug addiction ($F_{1,5}$=10.937, p=.001) and mental health issues ($F_{1,5}$=10.182, p=.002). They are more likely to have been arrested ($F_{1,5}$=4.355, p=.038), have been on public assistance ($F_{1,5}$=8.607, p=.004) and have divorced ($F_{1,4}$=14.735, p<.001).

4. Discussion

This study categorically fails to support the hypothesis that parents bias investment toward genetically related children. Every case of significant differential investment was biased toward adoptees. Parents were more likely to provide preschool, private tutoring, summer school, cars, rent, personal loans and time with sports to adopted children. Surprisingly, these positive investments were associated with negative outcomes for adoptees. Adoptees were more likely than genetic offspring to have ever received public assistance, been divorced or been arrested. They also completed fewer years of schooling and were more likely to have ever required professional treatment for mental health, alcohol and drug issues.

Note that the majority of adoptees in this sample never required treatment for addiction or mental health issues. Nor did most require extra investment from their adoptive parents. Overall though, adopted children in this sample appear more "troubled" than genetic children. This supports other research showing that, compared to genetic children, American adoptees have a higher overall risk of contact with mental health professionals, specifically for eating disorders, learning disabilities, personality disorders and attention deficit hyperactivity disorder (Brand & Brinich, 1999; Dickson, Heffron & Parker, 1990; Holden, 1991; Rogeness, Hoppe, Marcedo, Fischer & Harris, 1988; Silver, 1989). They also have lower achievement and more problems in school, abuse drugs and alcohol more, and fight with or lie to parents more than genetic children (Case, Lin & McLanahan, 2000; Miller, Fan, Christensen, Grotevant & van Dulmen, 2000).

The current study may demonstrate cases where "the squeaky wheel gets the grease." Summer school and private tutors are often remedial, and the fact that adopted children were more likely to receive them suggests they required them more often than genetic ones. The same can be said for rent, treatment and public assistance. Adoptees may have more difficulty establishing themselves relative to genetic children, and the fact that they divorce more often suggests they also have more difficulty staying established. Addiction and divorce may put adoptees in situations that require more parental investment. Parents provide more for adoptees not because they favor them, but because they need the help more often.

Adoptees may be genetically predisposed to negative outcomes at higher rates than the general population. Genetic factors clearly contribute to alcohol and drug addiction, as well as to some mental disorders like attention deficit hyperactivity disorder and schizophrenia (Faraonea et al., 2005; Sullivan, Kendler & Neale, 2003). An association between nonviolent criminality has been found between

European adoptees and their genetic parents (Mednick, Gabrielli & Hutchings, 1985). Furthermore, research with Swedish adoptees suggests 55–60% of their educational performance is explained by genetic factors, and that the number of years of school adoptees complete is significantly related to how many years their genetic mothers completed (Bjorklund, Lindahl & Plug, 2006; Plug & Vijverberg, 2003).

Birthmothers who place may have higher rates of addiction, criminality and mental health issues which they pass on to their children. Research on birthmothers is exceedingly rare because of confidentiality issues. But in a review of 2122 personal interviews of American birthmothers, Smith (2007) found that, at the time they placed their children, most were in their early to mid-20s and did so to avoid educational opportunity costs. Many others placed because of "extreme personal difficulties" including addiction, mental health and domestic problems, or because they expected their children to have developmental disabilities. Unfortunately, Smith did not say exactly how many women place for each reason, only that each appears to be a common motivation. More quantitative evidence comes from a sample of 168 English adoptions showing that 61.9% of children were "adopted from public care" because birthparents were unable or unwilling to parent due to substance abuse, physical abuse or mental illness (Neil, 2000). The agency that participated in the present research did at times facilitate state-sanctioned adoptions. In light of this, it seems reasonable to assume that a higher percentage of children placed for adoption suffer adverse outcomes due, at least in part, to their genes.

Why though do Western parents adopt in the first place? In our postindustrial society, optimal family size is no longer a key to survival. Assuming our psychology is the product of strategies that "paid off" in the past, adopting unrelated children seems maladaptive. It may be that adopting fulfills a common instinct to reproduce and parents do it because it produces positive emotions. When people cannot have children biologically, adoption gives them a way to fulfill the "drive" to parent, maladaptive or not. Once they do adopt, parents treat their children as they would "their own." They are motivated, like genetic parents, by parenting effort. Furthermore, while step and genetic parents can have children "the old fashioned way," adoptive parents must be much more deliberate. Adoption agencies are highly selective and years can pass between the time parents contact an agency and the time they adopt a child. Agency-mediated adoptions do not happen by accident—they are the consequence of prolonged parental effort.

In closing, must we consider the adoption of unrelated children maladaptive at all? The persistent American ideal remains to have two or three children (Hegewen & Morgan, 2005), and negative stereotypes often follow the childless. Callan (1985) showed that people perceived others with children as "devoted," "loving," likeable," "emotionally mature" and "hardworking." They associated people childless by choice with terms like "materialistic," "selfish" and "lonely in old age." Those especially apt to make such negative associations are "older, male, nonwhite, less educated, [people with] conservative religious beliefs" (Koropeckyj-Cox & Pendell, 2007). Children are socially important, and adoption puts those who cannot have children in the same social stead of those who can. In this way, adopting unrelated children may be adaptive.

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