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ABSTRACT

The present study involved a meta-analysis of 157 studies in which only children were compared with individuals raised with siblings. Findings failed to confirm the persistent negative stereotype of only children as maladjusted and disadvantaged. In fact, results suggested that only children are advantaged with respect to intelligence, educational and occupational attainment, achievement motivation, self-esteem, leadership, and relations with their parents. Many of these advantages are sustained even when social class and ethnicity are controlled. Only children and children with siblings were also found to be comparable in terms of academic performance, peer popularity, extraversion, autonomy, maturity, anxiety, mental illness, and behavior problems. In none of the 14 areas examined was there evidence that only children are handicapped by the absence of siblings. (Author/RH)

SIBLINGS AND CHILD DEVELOPMENT:

EVIDENCE FROM A META-ANALYSIS OF THE LITERATURE ON ONLY CHILDREN

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Introduction

Most Americans believe that parents should provide their children with at least one sibling. According to a Gallup poll taken in the 1970s, a large majority of white Americans feel that an only child is disadvantaged and that the two-child family is ideal. There is a persistent popular view that children raised without siblings are deprived of an important life experience and that as a consequence they are generally poorly adjusted.

From a theoretical standpoint, only children represent a useful and challenging concept. Because they do not grow up with siblings, only borns provide a natural comparison group for those who seek to determine what impact siblings have on development. Only borns are also of interest to both birth order and family size theorists. Because of the convergence of these diverse perspectives, there is an abundance of published research in which only children have been compared with non-onlies.

The purpose of the present study was to systematically analyze the literature on only children using meta-analytic techniques to quantify the size of the difference between onlies and others. Meta analysis reduces the results of each study into standardized scores that can be combined with scores from

other studies and then analyzed statistically. In this way, a clearer understanding of the combined results of all empirical studies of only children can be achieved.

Method

This meta analysis was based on 157 studies published between 1925 and 1984. Table 1 summarizes the characteristics of the sample of studies. The majority of studies were from the discipline of psychology, and almost all were based on English-speaking samples, predominantly from the U.S. The studies ranged in sample size from 50 to nearly 700,000. The number of onlies in the studies ranged from 10 to 78,000. The mean sample sizes, as shown in Table 1, are skewed by a handful of studies with over 10,000 subjects.

Three-fourths of the studies had samples with both male and female subjects. Many studies, however, failed to describe the sample with respect to ethnicity and social class. Among those in which this information was reported, the most typical sample composition was all white, of mixed social class. The subjects ranged in age from pre-schoolers to adults. The mean age was approximately 17.8 years.

For purposes of monitoring the quality of the included studies, the overall quality of the study was assigned a rating by the two authors on a 6-point scale. Points were assigned to the study if it possessed the following attributes that were judged as desirable for a methodologically rigorous study: (1)large sample size ($N \geq 500$); (2)use of probability sampling; (3) controls for extraneous variables; (4) sophistication of its analytic approach; and (5)use of established instruments (e.g., a standardized IQ test).

The quality ratings ranged from zero to five, with zero being assigned to studies with none of the above attributes and five being assigned to studies

with all of the above characteristics. Studies with a quality rating of zero were omitted from the meta-analysis ($N = 6$). The average quality rating for the 157 included studies was 2.2.

The meta-analysis involved contrasts between only children and various comparison groups. First, onlies were compared to all non-onlies (i.e., anyone who had a sibling). Additional comparison groups were defined in terms of birth order and family size. Three family-size comparison groups were established: small (two-child), medium (three- or four-child), and large (five- or more child) families. In terms of birth order, onlies were compared with first-borns, middle-borns, and later-borns from multi-child families. Finally, for some outcomes it was possible to make comparisons of onlies and nononlies separately by gender, social class, and ethnicity.

For each of the comparisons, a standardized estimate of effect size was computed, according to the formula developed by Cohen. The basic calculation for computing an effect size involves subtracting the mean score on a dependent variable for the non-only comparison group from the mean score for onlies and dividing by the pooled within-group standard deviation. Thus, the effect size represents the mean difference between groups relative to within-group variation.

Results

The outcome or dependent variables in the studies were initially classified into 14 categories, as shown in Table 2. This table shows, for each category, the following information: the number of studies on which the analysis was based; the effect size for the contrast between onlies and all non-onlies; the

median number of subjects in the sample; the mean age of the subjects; and the mean quality rating of the studies.

The effect size was always computed so that a positive number indicates the presence of a desirable attribute or the absence of an undesirable attribute. That is, a positive effect size indicates that the only children had more desirable characteritics than the non-only children, and a negative effect size means the reverse. For example, a positive effect size in the IQ category indicates higher intelligence among onlies than their non-only comparisons. In the Behavior Problem category, a positive effect size reflects a lesser degree of behavior problems among the onlies than their non-only comparisons.

Table 2 indicates that, for six of the categories, only children were significantly different from non-onlies. Specifically, only children were found to surpass others with respect to intelligence, educational and occupational attainment, achievement motivation, self-esteem, leadership, and relations with their parents. None of the other comparisons were significant, suggesting that onlies and nononlies are similar in terms of academic performance, peer popularity, extraversion, autonomy, maturi , anxiety, mental illness, and behavior problems.

Because some of the fourteen categories shown in Table 2 contained too few studies to make more detailed comparisons, some were combined to form broader topic clusters. Table 3 presents the results of analyses in which onlies were compared with specific subgroups of nononlies for seven topic areas: Intelligence; Achievement (which combines educational/occupational attainment with school grades); Achievement Motivation; Sociability (which combines measures of Extraversion and Peer Popularity); Personal Adjustment (which combines the categories of Anxiety and Self Esteem); Autonomy; and Character (which combines the Leadership and Maturity categories).

Table 3 shows that only children are not disadvantaged relative to others, regardless of family size, birth order, gender, or social class in any of the seven areas examined, with only rare exceptions. With respect to intelligence, onlies are similar to those from two-child families and to first-borns from multi-child families; however, they surpass individuals with two or more siblings, as well as middle- and last-borns. The only-child advantage was observed for both middle- and lower-class samples, and for all white subgroups. There is some indication that the effect is stronger for males than females. In the area of achievement, which combines adult achievement with children's achievement as measured by school grades, the results are very similar.

In the remaining five topic areas, few significant subgroup differences emerged, reflecting in part the small numbers of studies available for specific comparisons. The overwhelming majority of effect sizes are positive, that is, in a direction suggestive of an only-born advantage, and confirming the absence of a disadvantage with regard to motivation, sociability, personal adjustment, autonomy, and character.

One further aspect of Table 3 merits comment and that is the gender differences. In several comparisons onlies appear to be more advantaged relative to nononlies if they are male. This pattern was observed with respect to Intelligence, Achievement and Personal Adjustment. In the area of Sociability, female onlies were found to be significantly less sociable than female nononlies, but there was no significant effect among the males in Sociability.

Table 4 presents the results of correlational analyses in which the aggregate effect size for the fourteen original categories is correlated with three characteristics of the studies: the year the research was published, the

mean age of the study sample, and the size of the study sample. Several of the correlations reached levels of statistical significance. The year the research was published was significantly and negatively correlated with the effect sizes for IQ, educational and occupational attainment, and school grades. This means that larger differences favoring onlies in these three categories were published earlier, while more recent studies tended to have smaller effect sizes.

The effect size was also significantly correlated with the subjects' age in three of the fourteen categories. In the area of educational and occupational attainment, the effect size favoring onlies tends to become larger as subjects get older. With respect to self-esteem, the correlation is negative, indicating that the only child advantage in self esteem is particularly strong in younger children. Finally, the correlation between age and the effect size for Extraversion is also negative, indicating a tendency for onlies to become decreasingly extroverted, relative to nononlies, as they become older. Overall, however, onlies and nononlies did not differ on the Introversion/ Extraversion dimension.

Finally, Table 4 indicates that none of the effect sizes were significantly correlated with sample size. A further analysis, not shown in these tables, revealed that the effect sizes were not significantly correlated with the study's quality rating.

Discussion

Overall, the results of this meta-analysis suggest that the perceived need of parents to provide their children with siblings is not justified in terms of measurable differences in the development of onlies and others. In fact, the results indicate that, in terms of many characteristics considered desirable in

our society, only children surpass others from multi-child families. Specifically, only children were found to have significantly better outcomes than non-onlies with respect to intelligence, adult achievement, achievement motivation, self esteem, leadership, and the quality of the relationship with their parents. In none of the areas examined were onlies at a significant disadvantage in comparison with others.

Some of the findings reported in this study are consistent with those reported in other literature reviews or large-scale research studies. However, this is not the case with respect to intelligence. The so-called "only child discontinuity" in the generally linear inverse relationship between family size and IQ scores has been observed in several large data sets used to buttress Zajonc's confluence theory. Zajonc has hypothesized that the IQ scores of only children do not conform to predictions based on the confluence model because, unlike others, they have no opportunity to tutor younger siblings and thereby to reinforce their cognitive learnings. There was no evidence of such a discontinuity (that is, an only child disadvantage) when data from 49 studies were statistically combined in the present research. Only borns had IQ scores similar to those from two-child families, and higher than those from families with three or more children. One possible explanation for the present finding indicative of an IQ advantage for only borns is that this analysis included IQ data from a wide range of ages; most studies indicating an only born disadvantage have as subjects people no younger than adolescents. The modest negative correlation between subjects' age and IQ effect size, though not significant, is consistent with this interpretation.

In terms of theoretical implications, there have been several approaches to studying only children and their development. One broad class of explanations (into which Zajonc's sibling tutoring hypothesis falls) may be called the

"Deprivation" approach. Pervading much thought on only children is the notion that if siblings provide critical developmental experiences for each other, then the absence of siblings means that development is impaired. The findings of this research are totally incongruent with a deprivation explanation.

Blake's "dilution model", on the other hand, is consistent with much of the findings in the present study. This model stipulates that, as family size increases, intrafamilial resources become diluted and result in less favorable outcomes to the children. "Resources" in this model are defined broadly to include money, parental time and attention, and opportunities for enriching activities. The data in Table 3 suggest that only borns are most similar to children from two-child families, and that the only born advantages sharpen as family size increases.

The "dilution" explanation is supported by considerable external evidence. For example, studies have shown that parents spend more one-on-one time with only children than with children with siblings, and that the quality of the time spent is better. It seems plausible that enhanced parental attention aids the child in acquiring more sophisticated intellectual skills, such as vocabulary, as well as more self confidence. It also seems plausible that this increased parental contact would positively influence the child's perceptions of parental warmth and acceptance, which figure heavily in most measures of parent-child relations.

In terms of economic resources, there is ample documentation that a family's living standard is inversely related to the number of children in the family. Only borns may benefit from the fact that the totality of the family's financial resources can be directed towards their care. This probably improves their chances of obtaining higher education, enriching educational experiences,

and better health care. Interestingly, the only child advantage in IQ and achievement was sustained even when social class was controlled, but the dichotomous classification of middle- and lower-class still leaves considerable variability for the distribution of economic resources within families of different sizes.

It is not clear why several of the only-child advantages were found to be stronger among males than females. This finding may reflect the fact that sons are generally preferred to daughters in our society, particularly for a first birth. Consequently, parents with only daughters may not have limited their families to one child by choice, and this may be reflected in parental behaviors. In any event, female onlies were not at a disadvantage, relative to other girls with siblings, except for a tendency to be less outgoing and sociable.

In summary, an integration of results from 157 empirical studies indicates that the presence of a sibling is not a prerequisite to healthy adjustment and development. Other factors, such as parental inputs and financial resources, are hypothesized as mechanisms that enhance the development of desirable attributes in only children.

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TABLE 1

CHARATERISTICS OF STUDIES INCLUDED IN THE META ANALYSIS

Characteristic	Mean or Percentage
Mean year of publication	1965.9
Percent of studies from a(n):	
Psychological source	51.0
Educational source	10.8
Sociological source	14.0
Interdisciplinary source	14.0
Health-related source	7.6
Other source	2.5
Percent of studies based on samples from:	
United States	77.1
Non-U.S., English speaking	15.9
Non-U.S., non-English speaking	7.0
Mean sample size	13,106.5
Median sample size	813.0
Mean number of onlies in sample	1,495.0
Median number of onlies in sample	115.0
Percent of studies with sample of:	
Mixed gender	74.5
All males	14.0
All females	8.9
Unspecified gender mix	2.5
Percent of studies with sample of:	
Mixed ethnicity	24.2
All whites	32.5
All non-whites	2.5
Unspecified ethnic mix	40.8
Percent of studies with sample of:	
Mixed social class	49.0
All middle class	14.0
All lower/working class	1.9
Unspecified social class	35.0
Subjects' mean ag	17.79
Mean Quality Rati	2.22
TOTAL NUMBER OF INCLUDED STUDIES	157

TABLE 2

AGGREGATE META ANALYSIS RESULTS COMPARING ONLIES AND NON-ONLIES, FOR FOURTEEN VARIABLE CATEGORIES

Variable Category	Number of Studies	Mean Effect Size	Median Sample Size	Mean Age	Mean Quality
IQ	49	.18***	2,523	12.0	2.78
Educational/Occupational Attainment	15	.25***	4,556	30.3	3.07
Grades in School	19	.09	522	15.6	1.74
Achievement Motivation	24	.14*	718	16.0	2.17
Self Esteem	15	.17*	332	18.7	2.20
Peer Popularity	15	.06	332	15.8	1.87
Extraversion/Need Affiliation	30	-.02	297	18.1	2.17
Leadership/Dominance	16	.15*	282	18.5	2.06
Autonomy/Personal Control	25	.11	300	18.5	2.04
Maturity/Cooperativeness/ Citizenship	16	.03	951	17.9	2.19
Anxiety/Neuroticism	42	-.05	339	17.2	1.81
Mental Illness	16	-.10	969	17.1	1.94
Behavior Problems/Acting Out	15	.03	442	9.3	1.47
Parent-Child Relations	14	.14*	1,440	15.1	2.07

NOTES: The effect size is calculated such that it is positive if it reflects an only child advantage.

*p < .05
***p < .001

TABLE 3

MEAN EFFECT SIZES[a] FOR ONLIES AND SPECIFIED COMPARISON GROUPS, FOR SEVEN TOPIC CLUSTERS

Comparison Group	Topic Cluster: IQ		Achievement[b]		Achievement Motivation		Sociability[c]	
All Nononlies	.18***	(49)	.16***	(34)	.14*	(24)	.00	(45)
Small Families	.04	(35)	-.05	(18)	.05	(6)	.01	(15)
Medium Families	.14***	(36)	.09	(19)	.09	(6)	-.06	(14)
Large Families	.44***	(31)	.47***	(18)	.13	(5)	.11	(13)
First Borns	.04	(20)	.11**	(16)	.05	(14)	.02	(26)
Middle Borns	.18*	(12)	.36**	(15)	.08	(13)	.03	(22)
Last Borns	.18***	(18)	.19***	(16)	.04	(13)	.02	(26)
Male Nononlies	.15**	(16)	.18**	(14)	.10*	(12)	-.03	(14)
Female Nononlies	.10	(12)	.13***	(18)	.14	(9)	-.08*	(15)
Middle Class Nononlies	.13*	(13)	.12	(9)	--		-.04	(8)
Lower Class Nononlies	.14**	(13)	.13**	(5)	--		--	
White Nononlies	.18***	(22)	.05	(11)	.16	(8)	.05	(19)

NOTES: [a]Effect sizes are not shown if the number of studies is fewer than five.

[b]Achievement Cluster = Educational/Occupational Attainment + School Grades.

[c]Sociability Cluster = Peer Popularity + Extraversion.

*p < .05
**p < .01
***p < .001

TABLE 3 (Cont.)

MEAN EFFECT SIZES[a] FOR ONLIES AND SPECIFIED COMPARISON GROUPS, FOR SEVEN TOPIC CLUSTERS

Comparison Group	Topic Cluster: Personal Adjustment[d]		Autonomy		Character[e]	
All Nononlies	.01	(57)	.11	(25)	.09	(32)
Small Families	.03	(21)	.06	(9)	.10	(11)
Medium Families	.04	(16)	.26*	(7)	.14	(7)
Large Families	.05	(15)	.39	(5)	.31	(6)
First Borns	.02	(30)	.02	(14)	.07	(18)
Middle Borns	.01	(26)	.14	(10)	.11	(19)
Last Borns	.11	(30)	.05	(14)	.15	(18)
Male Nononlies	.12*	(20)	-.02	(9)	.01	(12)
Female Nononlies	-.05	(25)	.09	(13)	.06	(13)
Middle Class Nononlies	.05	(14)	.14	(8)	.07	(8)
Lower Class Nononlies	--		--		--	
White Nononlies	.08	(22)	.20**	(9)	.09	(9)

NOTES: [a]Effect sizes are not shown if the number of studies is fewer than five.

[d]Personal Adjustment Cluster = Anxiety + Self Esteem.

[e]Character Cluster = Leadership + Maturity/ Cooperativeness.

*p < .05
**p < .01

TABLE 4

CORRELATIONS BETWEEN AGGREGATE (ONLY/NONONLY) EFFECT SIZES AND STUDY CHARACTERISTICS, FOR FOURTEEN VARIABLE CATEGORIES

Variable Category	Study Characteristic		
	Year of Publication	Subjects' Mean Age	Sample Size
IQ	-.31*	-.08	-.19
Educational/Occupational Attainment	-.57*	.52*	-.23
Grades in School	-.60*	-.06	-.17
Achievement Motivation	-.03	-.02	.01
Self Esteem	-.21	-.56*	-.09
Peer Popularity	-.09	-.17	.00
Extraversion	-.15	-.42*	-.02
Leadership	-.16	-.38	-.22
Autonomy	-.36	.07	-.11
Maturity	-.24	-.21	-.03
Anxiety	.23	.03	.06
Mental Illness	-.02	-.31	.16
Behavior Problems	.17	.05	-.25
Parent-Child Relations	.33	-.22	-.10

*p < .05