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Psychology of Personality: Real and Virtual Context

FAMILY RELATIONSHIPS AND SIBLING INTELLIGENCE

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Abstract

The aim of this study was to reveal links between family relationships (parent-child and sibling relationships) and sibling intelligence. 83 two-parent families with two children aged 7–22 participated in the study. The mean age of elder siblings was 17.59 years ($SD = 2.36$), the mean age of younger siblings – 14.35 years ($SD = 2.66$), the mean age of fathers – 45.64 years ($SD = 5.64$), the mean age of mothers – 43.26 years ($SD = 4.27$). The age gap between siblings was less than 6 years. To measure siblings' IQ, the Russian versions of Wechsler Intelligence Scales (WAIS and WISC) were used. Parenting styles were evaluated by the Parent-Child Interaction Questionnaire (five scales), sibling relationships were estimated using the Sibling Inventory of Differential Experience (SIDE) (only the sibling interaction part was used). Student's *t*-test, Cohen's *d*, Spearman correlation analysis and hierarchical regression analysis were used to analyze the results. It was found that parents exert greater control over younger siblings than their elder brothers or sisters. Elder siblings exhibited more cooperative and dominant behaviors toward the younger ones. On the other hand, younger siblings tended to show more closeness to the elder children. Parental control was negatively associated with intelligence scores of elder and younger siblings. The significant predictors of children's IQ depended on birth order.

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1. Introduction

Family relationships (both parent-child and siblings relationships) have a tangible impact on children's cognitive development. Parent-child relationship studies most often consider such characteristics as control and acceptance, just as jealousy and closeness are the most studied in sibling relationship studies.

1.1. Parent-child relationships and children's cognitive development

Most of the studies are focused on the influence effects of parent-child relationships on child academic achievement. It was shown that autonomy-supporting parenting has a positive effect on academic performance of primary school children, in particular on their reading skills (Joussemet et al., 2005), the executive functions development (Meuwissen & Carlson, 2015) and self-regulation (Edwards et al., 2010). Parental control therefore negatively affects children's academic performance (Bean et al., 2003; Su et al., 2015) and self-esteem (Bean et al., 2003).

Researchers often assume that parenting styles are the same for all children living in a family, regardless of their gender, age, birth order or psychological characteristics. Nevertheless, siblings raised in the same family often turn out to be very different from each other. One of the factors influencing differences between siblings is parental differential treatment. The more favored children have a higher self-esteem, higher well-being (Jensen & McHale, 2017), lower risk of antisocial behavior (Scholte et al., 2017) and drug use (Jensen & Whiteman, 2014).

There are very few studies that examine the relationship between the cognitive development of children and differential parental treatment. Singer and Weinstein demonstrated associations between differential parenting and children's academic achievement. It was found that the paternal (but not maternal) differential treatment (lower level of control), was related with academic success: siblings with less controlling fathers show better results (Singer & Weinstein, 2000).

1.2. Sibling relationships and children's development

Sibling relationships begin with the birth and continue throughout life, being one of the longest-lasting relationships that a person is forced to build. Siblings from the same family can play different, sometimes opposite roles: they can be playmates, antagonists, role models, protectors, etc (Noller, 2005). Relationships between children in a family are emotionally intense and can range from love to hostility. According to Dunn (1988), closeness and friendliness are as common for sibling relationships as aggression and conflict. Sibling relationships formed in childhood and adolescence often remain the same in adulthood.

In sibling relationships, positivity, conflict and sibling jealousy (generated by differential parental treatment) are usually distinguished (Buist et al., 2013). Sibling warmth or positivity in relationships includes acceptance, support, and intimacy. Sibling negativity includes aggression, hostility, dominance, arguments and fights.

A link between sibling relationships and children's cognitive development is mainly demonstrated through learning games when brothers and sisters play together. Based on their birth order, siblings can play different roles in such games. An older child often acts as a role model; he or she often teaches, explains, gives advice, taking on the role of teacher, tutor or manager in games. A younger child is usually in a subordinate position – being a pupil, a student, the one who needs help (Azmitia & Hesser, 1993).

Acting as teachers positively affects elder siblings' cognitive development. Elder children who've reported that they taught their younger siblings received higher grades in language subjects than those who did not engage in teaching their younger siblings (Smith, 1990, 1993).

However, for younger siblings, the help of elder children in schooling is not that effective. Bouchey et al. (2010) showed that elder children with high academic achievements were role models for younger ones (if an elder sibling had high academic achievements, the academic achievement of a younger sibling was also high. However, in regard to school learning assistance, the opposite results were found: more help from the elder sibling is associated with the lower achievements of the younger one. The researchers explain this by the fact that the decline of school performance of the younger sibling is the primary reason, as a result of which, the elder sibling begins to help him in his studies.

2. Problem Statement

The presented review of studies on family relationships demonstrates their influence on the children's development. However, most researchers consider academic achievements only, putting aside intelligence or other cognitive abilities. In the studies on sibling interaction, the influence of joint activities on school learning is more often considered, but not characteristics of sibling relationships. Children's birth order, gender and age are often not taken into account in such studies either.

3. Research Questions

The following questions were raised in this study:

- How does parental treatment differ depending on children's birth order?
- Is there an association between children's intelligence and parental styles, as well as sibling relationship?
- What parameters of family relationships make the greatest contribution to explain children's intelligence variance?

4. Purpose of the Study

The purpose of this study is to assess parenting styles and sibling relationships and their associations with intellectual development of siblings.

5. Research Methods

5.1. Participants

The sample included 83 two-parent families with two children aged 8–22. The age difference between children was less than 6 years. The mean age of older siblings – 17.59, SD – 2.36, age range 11–22 ; the mean age of younger siblings – 14.35, SD – 2.66, age range 7–18; father's mean age – 45.64, SD – 5.64, age range 35–62; mother's mean age – 43.26, SD – 4.27, age range 34–56.

5.2. Methods

IQ assessment. Level of intellectual development was assessed using the Wechsler Intelligence Scale. For siblings aged 8–16, the Wechsler Intelligence Scale for Children (WISC, Russian version) was used (Filimonenko & Timofeev, 2001). For siblings aged 17–22, the Wechsler Adult Intelligence Scale (WAIS, Russian version) was used (Egorova, n.d.).

Parent-Child Interaction Questionnaire. The Parent-Child Interaction Questionnaire (Markovskaya, 2006) contains 60 items. We used factor analysis (techniques of principal component factoring and varimax rotation) to redefine scales and found out 5 scales for parent version of Questionnaire. The scales were named Positive Relations with Child, Parental Control, Parental Gentleness, Parental Inconsistency and Parent-Child Confidence (Alekseeva & Kozlova, 2010).

Sibling Inventory of Differential Experience (SIDE). Sibling relationships were evaluated using the Sibling Inventory of Differential Experience (SIDE) (Daniels & Plomin, 1985). For our study, only the sibling interaction part of the inventory was used, which contains 24 items. The original version of this part of the inventory includes 4 scales: Antagonism, Caretaking, Jealousy and Closeness. A factor analysis of SIDE items was done on Russian sample (using techniques of principal component factoring and varimax rotation) (Alekseeva & Rzhanova, 2015). The scales obtained after factorization differed from the scales of the SIDE. Factorization results are presented in the table 1.

Table 01. Factor analysis of SIDE items on Russian sample

Items	Differential Sibling Dominance	Differential Sibling Antagonism	Differential Sibling Closeness	Differential Sibling Cooperation
1. Start fights	.34	.33		
2. Trust	-.33		.31	
12. Feel superior	.70			
19. Bossy	.74			
22. Try to outdo	.49			
24. Feel inferior	-.61			
7. Stubborn		.63		
9. Bitter		.55		
10. Compare to		.43	.42	
11. Anger		.60		
15. Kind		-.61		
3. Show concern			.52	
5. Like to be with			.62	
8. Confidence in			.45	
17. Show affection			.69	
20. Get along		-.34	.42	.37
23. Admire			.69	
4. Help to succeed		-.44		.48
6. Take responsibility	.43			.49
13. Understanding		-.34		.43
14. Jealousy			.46	-.47
16. Let down				-.62
18. Deceive				-.48
21. Supportive				.74

An analysis of the results was conducted on the use of Student's t-test, Cohen's d, Spearman correlation analysis and Hierarchical regression analysis.

6. Findings

6.1. Comparison of parenting styles depending on birth order of children

Comparison of groups was performed using Student's t-test and Cohen's d. It has been found that fathers and mothers exert greater control over the youngest child than the elder. In addition, fathers tend to show more confidence in the youngest child, and mothers – leniency. However, effect size is medium for parental Control scales and low for Paternal Confidence scale and Maternal Leniency scale (see table 2). Differences in parental control are most likely to be a result of age differences between siblings – younger children are more controlled because they are much younger than their elder siblings and mostly adolescent.

Table 02. Score Comparison of Parent-Child Interaction Questionnaire Scales to elder and younger children

Parent-Child Interaction Questionnaire Scales	M elder sibling	M younger sibling	t	p	d Cohen
Paternal Positive Relations with Child	3.48	3.51	-.33	.75	-.05
Paternal Control	2.68	2.93	-4.05	.00	-.40
Parental Leniency	3.31	3.33	-.30	.76	-.04
Paternal Inconsistency	2.45	2.43	.29	.77	.03
Paternal Confidence	3.58	3.67	-2.02	.05	-.20
Maternal Positive Relations with Child	3.51	3.50	.15	.88	.02
Maternal Control	2.68	3.06	-4.76	.00	-.66
Maternal Leniency	3.34	3.46	-2.18	.03	-.21
Maternal Inconsistency	2.35	2.27	1.30	.20	.16
Maternal Confidence	3.95	3.92	.60	.55	.08

6.2. Comparison of sibling relationships depending on birth order of children

As a result, it was revealed that elder siblings exhibit more cooperative and dominant behaviors toward the younger ones. Younger siblings show more closeness to their elder siblings. Effect size is large for Sibling Dominance, Sibling Closeness and Sibling Cooperation scales (see table 3).

Table 03. Score Comparison of SIDE Scales of elder and younger siblings

SIDE scales	M elder sibling	M younger sibling	t	p	d Cohen
Differential Sibling Dominance	3.27	2.76	4.78	.00	1.02
Differential Sibling Antagonism	2.97	2.78	1.59	.12	.33
Differential Sibling Closeness	2.95	3.36	-4.11	.00	-.88
Differential Sibling Cooperation	3.30	2.86	4.76	.00	1.04

6.3. Relations between parenting styles, sibling relationship and children's IQ

The IQ score of elder siblings is associated only with Parental Control. The high intelligence of elder children is related with low levels of both fathers' and mothers' control. The IQ score of younger siblings is associated with Maternal Control and Maternal Positive Relations with Child (see table 4). No relationships were found with paternal parenting styles.

Table 04. Correlations between Parent-Child Interaction Questionnaire Scales and siblings' IQ scores

Parent-Child Interaction Questionnaire Scales	IQ (elder sibling)	IQ (younger sibling)
Paternal Positive Relations with Child	-.01	.16
Paternal Control	-.33**	-.16
Paternal Leniency	.04	.25
Paternal Inconsistency	.05	.06
Paternal Confidence	.05	.20
Maternal Positive Relations with Child	.07	.28*
Maternal Control	-.34**	-.32*
Maternal Leniency	.12	.08
Maternal Inconsistency	-.22	-.10
Maternal Confidence	.11	.16

Note: * Significant at the .05 level; ** significant at the .01 level.

Significant correlations between SIDE scales and siblings intelligence were found only for the elder sibling's IQ score and the Dominance scale (see table 5). Elder children with low intelligence are more likely to dominate their younger siblings.

Table 05. Correlations between SIDE scales and siblings' IQ scores

SIDE scales	IQ (elder sibling)	IQ (younger sibling)
Dominance	-.28*	-.17
Antagonism	-.10	-.15
Attachment	.11	.11
Cooperation	.21	.14

Note: * Significant at the .05 level.

6.4. Family relationships as predictors of children's intelligence scores

To analyze interactions between children's intelligence score and the characteristics of parent-child relations, hierarchical linear regression analysis was conducted, where siblings' age gap and siblings' sex were added as variables that had to be controlled, as well as parameters of parental treatment and siblings relationships as new variables which effect has to be tested. The resulting model for the elder child's IQ (Model 1: $F(3, 64) = 0.754, p = .524$; Model 2: $F(1, 61) = 3.839, p = .003$) explains almost 27% of variance in child's IQ scores, whereas sibling's age gap and sex don't explain anything in elder child's IQ at all. Elder child's IQ was negatively related with Parental Control and Sibling Dominance (see table 6.).

Table 06. Hierarchical regression model for the first child's IQ

Predictors	IQ (elder sibling)				
	R	ΔR^2	F	β	p
Model 1	.19	.03	.75		.52
Control variables ^a					
Model 2	.52	.24	3.84		.00
Sibling age gap				-.02	.83
First child sex				-.02	.87
Second child sex				.06	.62
Paternal Control				-.23	.05
Maternal Control				-.30	.01
Dominance				-.31	.01
Total R^2		.27			

Note: ^aControl variables included siblings' age gap and siblings' sex.

The results of hierarchical regression analysis for the younger child's IQ (Model 1: $F(3, 51) = 3.931$, $p = .013$; Model 2: $F(1, 50) = 4.682$, $p = .003$) have shown that, as in the case of the elder child's IQ, analyzing parameters explains almost 27% of the variance in the younger child's IQ scores, whereas siblings' sex and age gap explain 19% of the variance. It was found out that Maternal Control, child sex and sibling sex significantly associated with the younger child's IQ (see table 7). Second-born girls with sisters and experiencing low maternal control tend to have higher IQ scores.

Table 07. Hierarchical regression model for the younger child's IQ

Predictors	IQ (younger sibling)				
	R	ΔR^2	F	β	p
Model 1	.43	.19	3.93		.01
Control variables ^a					
Model 2	.52	.08	4.68		.00
Sibling age gap				.19	.14
First child sex				.27	.03
Second child sex				.24	.05
Maternal Control				-.30	.02
<i>Total R²</i>		.27			

Note: ^aControl variables included siblings' age gap and siblings' sex.

7. Conclusion

The results revealed that parental control is the most significant pattern when examining the linkages between family relationships and children's cognitive development.

Differences in parental treatment based on birth order are associated with control. Both father and mother exert greater control over the younger sibling than the elder one. This result may have several explanations: 1) increased control over the second child is related to birth order – parents, based on the experience of raising the first child, have changed their tactics in interactions with the second child; 2) the strict parental control over the second child is associated with age of the child – most of the youngest children in our sample are adolescents, parents exert greater control over them because they are younger. To confirm one of the assumptions, an additional study to compare children of different birth orders, but of the same age, are needed.

In other parameters of parenting styles, such as positive relations with child, inconsistency and more, differences were not found.

Correlation and regression analysis revealed that paternal and maternal control is negatively related to the intelligence of the eldest child, maternal control – to the intelligence of the youngest child. There is a number of studies confirming these results (Bean et al., 2003; Singer & Weinstein, 2000; Su et al., 2015 etc). However, the question remains open whether high parental control is the cause of low intelligence in children, or there is a need for greater control over children with low intelligence scores by their parents (see Bouchey et al., 2010).

It should be noted that predictors of children's intelligence differ depending on birth order. The most significant predictors of an elder child's intelligence were paternal and maternal control, as well as

dominance in sibling relationships. The most important predictors of the younger sibling's intelligence were the gender of both the child and his or her sibling, and maternal (but not paternal) control.

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