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THE NUMBER OF CHILDREN IN A FAMILY AS A FACTOR OF THEIR MUTUAL RELATIONSHIPS

Abstract: It is a very important step to consider the variables that affect sibling relationships together. This study aimed to determine the effects of the variables Birth Order (First, Middle, and Last), Gender (Female, Male), and Number of Siblings ("two or three" and "four or more"), which have been suggested to affect sibling relationships in the literature, in young adults. The family is one of the essential components of society. What makes the family is the interaction and communication between mother, father, and children. Sibling relations are an essential part of these. Sibling relations play an important role in individuals' cognitive, mental and social development. It is the research defined to examine relationships. "Lifelong Sibling Relations Scale" was directed to 735 university students in the study. Data were collected from students attending a university in Turkey. The interaction of three variables for the sub-dimensions of the scale and the total scores obtained from the scale were examined separately. Aligned rank transformation ANOVA (ART anova) was used since there were three different independent variables in the study and the values did not show normal distribution. In order to carry out the research, it used the R statistics program and ARTool package. As a result of the research, while the median values of the scores in both the total and sub-dimensions of sibling relationships did not differ according to the interaction of the three variables, a significant difference was found in sibling relationships according to birth order, which is one of the main effects. When the three variables are considered together, it is observed that the highest sibling relationship for both the total score and the sub-categories belongs to female students who were born in the first place and have two or three siblings. It has been observed that individuals with four or more siblings born in the middle have the lowest scores in sub-dimensions except adult cognition. In this study, gender, birth order, and the number of siblings, which is seen to affect sibling relations of young adults in the literature, and the interactions of these variables are discussed. A scale consisting of six sub-dimensions and an overall score for lifelong sibling relations was used in the study. The differentiation of the total score obtained from the scale and its sub-dimensions according to the variables was analyzed.

Keywords: Sibling, Nonparametric Factorial Analyse, Birth Order

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Introduction

The family is one of the essential components of society. What makes the family is the interaction and communication between mother, father, and children. Sibling relations are an essential part of these (Brody, 1998; Cicirelli, 1985; Doron, 2009). Sibling relations play an important role in individuals' cognitive (Brook, 1997), mental (Van Volkom, Guerguis, & Kramer, 2017), and social development (Brook, 1997; Doron, 2009). It is deep, lasts lifelong and affects all development areas of the individual. (Steinberg, 2007; Wagner, Schubert, & Schubert, 1985). In addition, the relationships with siblings have a significant effect on solving the problems that individuals will experience with their peers in the future (Doron, 2009; Van Volkom et al., 2017).

Sibling relationships play a crucial role in a child's development and have significant pedagogical importance. According to a study conducted by McHale and Crouter (1996), siblings serve as important socialization agents and provide opportunities for learning and growth. They engage in various activities together, such as playing, sharing, and resolving conflicts, which help children develop important social and emotional skills. Siblings also serve as role models for each other, providing guidance and support in navigating the world around them. Furthermore, research by Dunn and Kendrick (1982) suggests that sibling relationships can enhance cognitive development. Through interactions with their siblings, children engage in language development, problem-solving, and critical thinking. They engage in imaginative play, storytelling, and collaborative activities that stimulate their cognitive abilities. Siblings also provide a unique learning environment where children can practice and refine their communication and negotiation skills. In addition to social and cognitive development, sibling relationships also contribute to the development of empathy and emotional intelligence. According to a study by Volling (2012), siblings provide emotional support and help each other regulate their emotions. They learn to understand and empathize with each other's feelings, which fosters emotional intelligence and empathy towards others. In conclusion, sibling relationships have significant pedagogical importance as they contribute to social, cognitive, and emotional development. They provide a unique learning environment where children can develop important skills and qualities that will benefit them throughout their lives. Parents and educators should recognize and nurture these relationships to maximize their educational potential.

Sibling relationships play a crucial role in the development and education of young adults. According to a study conducted by McHale and Crouter (1996), siblings serve as important socializing agents, providing emotional support, and teaching valuable life skills. They act as a source of companionship, helping young adults navigate through various challenges and transitions. Siblings also play a significant role in shaping one's identity and self-concept. A study by Feinberg, Neiderhiser, Simmens, Reiss, & Hetherington (2000) found that positive sibling relationships were associated with higher levels of self-esteem and overall well-being in young adults. Furthermore, sibling relationships can enhance cognitive development and academic achievement. A study by Brody and Murry (2001) revealed that siblings who engage in cooperative activities, such as studying together or discussing academic topics, tend to have higher academic performance. These findings highlight the pedagogical importance of sibling relationships in young adults, emphasizing the need to foster positive and supportive sibling dynamics.

Alfred Adler conducted the first studies on the definition of sibling relations, which are very important and exist throughout the individual's life. Adler (2011) states that sibling relations have significant effects on an individual's life. According to Adler (2011), the individual's birth order, the number of siblings, and interactions with siblings are effective in many areas, especially social development. Adler's (2011) studies involve the dynamics that occur in childhood, and these dynamics are accepted to be effective throughout the individual's life. However, sibling relations change and differentiate over time. The first changes are seen during adolescence. Peers relationships become as important as sibling relations for adolescents whose relationships with their parents weaken, and peer relationships gain importance (Cicirelli, 1985). In the young adulthood period, new responsibilities and

changes in the expectations from life also differentiate the quality of sibling relations. During this period, relations become closer, and expectations from siblings are based on support (Gold, 1990).

Sibling relations, in which basic emotions such as love and anger are experienced, exist throughout the person's life (Noller, 2005). However, the literature review shows that the studies are limited to childhood and involve how sibling relations differ in individuals with disabled siblings (Angin, 2015; Brook, 1997; Erginoglu & Dincer, 2015; Yildirim, 2005). It is crucial to examine sibling relations, which affect all development areas throughout life, in young adulthood (Cox & Paley, 1997; Sandler, 1980). Variables affecting sibling relations may also vary according to the emotions dominating developmental stages. For example, jealousy is a variable that affects the relationship between siblings in early childhood (Brook, 1997); the differences may vary according to different variables as stated above. Although the factors affecting sibling relations in early childhood lose their influence over time, they may still be effective in young adulthood. Regarding many variables on sibling relations, the followings are influential: culture and socioeconomic level (Fulmer, 1987), the gender of the individual (Brook, 1997; Pulakos, 1990; Wagner et al., 1985), number of siblings (Bossard & Boll, 1956; Newman, 1996; Prime, Pauker, Plamondon, Perlman, & Jenkins, 2014), birth order (Bleske-Rechek & Kelley, 2013; Doron, 2009; Pollet & Nettle, 2009; Wagner et al., 1985; Rocca, Martin, & Dunleavy, 2010), sibling's gender and age difference (Brook, 1997). Among these variables, examining the combined interaction of gender, birth order, and the number of siblings on the sibling relations of young adults and expressing these effects with their reasons will be an essential step in interpreting sibling relations. In this regard, the research aims to explain the change in lifelong sibling relations through the interaction of independent variables.

Method

This study examines the combined effect of the variables that affect sibling relations in the literature, namely *Birth Order, Gender, and Number of Siblings*. This study is based on a causal comparison design as it aims to examine the sibling relations of university students with their reasons by using these independent variables.

Study Group

The research data were obtained from the students studying at university in the spring semester of the 2020-2021 academic year. The data of 18 students who did not have siblings or missing data were excluded from the data set of 753 individuals, and the analyzes were carried out on 735 people. The overall score was obtained after reverse scoring. The analyses were made using this final score, and the combined interaction of the variables was examined in 6 sub-dimensions. The information obtained from the students for the independent variables used in the study is given in Table 1.

Table 1: Frequencies

Rank	Gender	Number of siblings	f
Middle-born	Female	Four or more	23
		Two or three	50
	Male	Four or more	88
		Two or three	90
Last-born	Female	Four or more	31
		Two or three	38
	Male	Four or more	99
		Two or three	104

Rank	Gender	Number of siblings	f
First-born	Female	Four or more	24
		Two or three	25
	Male	Four or more	96
		Two or three	67

Data Collection Tool

The study data were collected through the "Lifelong Sibling Relations Scale" adapted to Turkish for young adults by Oz Soysal, Yurdabakan, Uz Bas, and Aysan (2016). The scale has a 5-point Likert (1-Totally Disagree; 5-Totally Agree) form and a six-factor structure consisting of 48 items, 8 in each sub-dimensions. The sub-dimensions of the scale are Adult Emotions, Adult Behaviors, Adult Cognition, Childhood Emotions, Childhood Behaviors, and Childhood Cognition. The overall score that can be obtained from the scale varies between 48 to 240. The reliability coefficients of the scale's sub-dimensions were 0.91 for Adult Emotions, 0.87 for Adult Behaviors, 0.91 for Adult Cognition, 0.89 for Childhood Emotions, 0.84 for Childhood Behavior, 0.88 for Child Cognition, and 0.96 for the overall scale. The reliability coefficients of the sub-dimensions were found to be 0.914, 0.908, 0.927, 0.894, 0.853, and 0.902, respectively, in this study. The reliability coefficient of the overall scale is 0.973.

The scale was sent to the students online, and the data of the students who did not have siblings or showed extreme values were removed from the data set. Students with more than one sibling were asked to fill the scale for a sibling they wanted to evaluate. The kurtosis and skewness values of each sub-dimension and overall scale scores are given in Table 2.

Table 2: Distribution of overall score and sub-dimension scores of sibling relations according to independent variables

	Birth Order	Gender	Number of siblings	Overall Score	AE	AB	AC	CE	CB	CC
Mean	First	Male	Four or more	194	34.3	33.2	35.6	30.9	29.6	30.5
			Two or three	196	34.4	33.6	34.5	31.6	30.2	31.3
		Female	Four or more	194	34.9	33.1	35.0	31.9	29.3	30.1
			Two or three	197	35.0	33.1	34.8	32.1	30.3	31.9
	Middle	Male	Four or more	164	28.4	27.2	29.1	26.3	27.0	26.3
			Two or three	158	27.3	25.4	26	28.4	26.1	25.4
		Female	Four or more	155	28.4	24.8	28.1	25.8	24.1	23.9
			Two or three	164	28.5	25.9	27.4	29.6	26.3	26.6
Last	Male	Four or more	164	29.2	26.4	29.0	27.1	25.7	26.9	
		Two or three	173	30.1	27.1	29.7	30.1	28.7	27.4	
	Female	Four or more	163	29.0	26.2	28.8	27.0	25.8	26.5	
		Two or three	164	28.6	25.7	28.4	28.6	26.3	26.6	
Skewness	First	Male	Four or more	-0.92	-0.05	-0.26	-0.52	-0.45	-0.92	-1.2
			Two or three	-1.73	-1.01	-1.13	-0.88	-1.75	-1.14	-1.67

	Female	Four or more	-0.80	-1.02	-1.57	-1.68	-0.50	-0.38	-0.64	
		Two or three	-1.64	-2.15	-1.32	-1.9	-1.54	-0.99	-1.2	
Middle	Male	Four or more	0.28	0.18	0.156	0.22	0.01	0.29	-0.45	
		Two or three	-0.61	-0.47	-0.38	-0.40	-0.43	-0.59	-1.07	
	Female	Four or more	-0.79	-0.67	-0.35	-0.72	-0.35	0.06	-0.33	
		Two or three	-0.02	-0.47	-0.34	-0.36	-0.16	-0.39	0.01	
Last	Male	Four or more	-0.15	-0.49	-0.54	-0.40	0.15	-0.12	-0.26	
		Two or three	-0.33	-0.98	-0.69	-1.09	-0.08	-0.52	-0.36	
	Female	Four or more	0.07	-0.07	-0.03	-0.18	-0.04	-0.13	-0.13	
		Two or three	-0.19	-0.45	0.16	-0.08	-0.29	-0.29	-0.14	
Kurtosis	First	Male	Four or more	0.65	-0.43	-0.75	-0.96	-0.31	1.43	1.94
		Two or three	5.37	2.43	2.18	0.64	5.50	1.97	5.44	
	Female	Four or more	0.52	1.80	2.32	3.64	-0.27	-0.09	0.10	
		Two or three	2.96	5.48	1.33	3.82	3.04	0.81	1.23	
	Middle	Male	Four or more	-0.51	-0.87	-0.69	-0.98	-0.37	-0.68	-1.34
		Two or three	-0.03	-0.52	-0.13	-0.66	0.68	0.09	0.95	
	Female	Four or more	0.22	-0.02	-0.26	-0.19	-0.44	-0.68	-0.72	
		Two or three	-0.38	-0.31	-0.79	-0.39	-0.03	-0.38	-0.74	
	Last	Male	Four or more	-0.36	-0.75	0.03	-0.56	-0.46	-0.14	0.01
		Two or three	0.31	1.92	0.44	1.34	-1.22	1.84	-0.22	
	Female	Four or more	-0.62	-0.61	-1.02	-0.95	-0.38	-0.11	-0.26	
		Two or three	0.02	0.37	-0.26	-0.74	-0.63	-0.16	-0.23	

AE : Adult Emotions

CE. : Childhood Emotions

AB : Adult Behaviors

CB. : Childhood Behaviors

AC :Adult Cognition

CC. : Childhood Cognition

The scores taken from 48 items on the scale ranged between 155-197. First-born individuals have higher scores than the others, whereas middle-born ones have lower scores than those in the other categories. Adult Emotions scores vary between 27.3-35.0; Adult Behaviors between 24.8-33.6; Adult Cognition between 26.0-35.6; Childhood Emotions between 25.8-32.1; Childhood Behaviors between 24.1-30.3; and Childhood Cognition between 23.9-31.9. Regarding the sub-dimensions, the largest range is observed in Adult Cognition and the narrowest in Childhood Behaviors. The skewness values are between -1.73-0.28 for the overall score; -2.15-0.18 for Adult Emotions; -1.57- 0.16 for Adult Behaviors; -1.68-0.22 for Adult Cognition; -1.75-0.15 for Childhood Emotions; -1.14-0.29 for Childhood Behaviors; and -1.67- 0.01 for Childhood Cognition. The kurtosis values are between -0.67- 5.37 for the overall score; -0.43-5.48 for Adult Emotions; -1.02-2.32 for Adult Behaviors; -0.98- 3.82 for Adult Cognition; -1.22-5.50 for Childhood Emotions; -0.68-1.97 for Childhood Behaviors; and -1.34-5.44 for Childhood Cognition

The kurtosis and skewness values for the overall and sub-dimensions are not between [-1;+1] in many categories. The subgroups showing normal distribution in overall and sub-dimensions are the following: last-born female students with two or three siblings, last-born male students with four or more siblings; middle-born male students with two or three siblings; and middle-born female students. Kurtosis and skewness values do not meet normal distribution assumptions in the remaining groups.

Data Analysis

As there were three independent variables in the study, and they did not show normal distribution, aligned ranks transformation ANOVA (ART ANOVA) was used. (ART) ANOVA is based on a nonparametric approach. The scores obtained from the sibling relation scale and its sub-dimensions were analyzed separately as the dependent variable. Birth Order, Student Gender, Number of Siblings were taken as independent variables. The variables included in the study were Birth Order (First, Middle, and Last), Gender (Female, Male), and Number of Siblings ("two or three" and "four or more"). The factorial model to be carried out with these categories was 3*2*2. Independent variables and their interactions were compared in subgroups. Comparisons were made with Tukey's test. The R statistics program and ARTool (Kay, 2019) and emmeans (Lenth, 2020) software packages were used to carry out the analysis.

Results

The scale developed to examine students' sibling relations consists of six factors. The differentiation of overall score and sub-dimensions scores according to the combinations of birth order, gender, and the number of siblings was analyzed. One of the nonparametric approaches, ART ANOVA, was used to carry out the analyses. The ANOVA table obtained from the analysis of the overall sibling relation scores is as follows.

Table 3: Three-Factor ART ANOVA output for overall Sibling relations score

Sibling relations	df	Df. Res	F	p	η^2_{partial}
BirthOrder	2	723	66.7927	< 2e-16 *	0.16325831
Gender	1	723	0.008735	0.35311	0.00119273
NOofsiblings	1	723	0.315761	0.54606	0.00050427
BirthOrder:Gender	2	723	0.927415	0.15072	0.00522104
BirthOrder:NOofsiblings	2	723	0.087949	0.77143	0.00071760
Gender:NOofsiblings	1	723	0.089122	0.45923	0.00075786
BirthOrder:Gender:NOofsiblings	2	723	0.645056	0.65650	0.00116344

Regarding the overall scores obtained from the sibling relations scale and the differences between the categories according to the combination of three independent variables, there is no significant difference between the sibling relations according to the triple effect ($F_{\text{BirthOrder:Gender:NOofsiblings}} = 0.645$, $p > .00$). Besides, the effect size of the interaction of the three independent variables is very small ($\eta^2_{\text{BirthOrder:Gender:NOofsiblings}} = 0.001$). Regarding the pairwise interactions for overall scores, "BirthOrder:Gender" ($F_{\text{BirthOrder:Gender}} = 0.927415$, $p > .00$), "BirthOrder:NOofsiblings" ($F_{\text{BirthOrder:NOofsiblings}} = 0.087949$, $p > .00$) and "Gender:NOofsiblings" ($F_{\text{Gender:NOofsiblings}} = 0.089122$, $p > .00$) interactions do not have a significant effect on lifelong sibling relations. At the same time, their effect sizes are very small.

Among the main effects, only students' birth order caused a significant difference in sibling relations ($F_{\text{BirthOrder}} = 66.7927$, $p < .00$). The other variables did not have a significant effect on sibling relations. The scores were compared to reveal the groups that differed according to birth order. The results of the comparisons are given in Table 4.

Table 4: Comparisons between groups according to birth order

contrast	estimate	SE	df	t	p
First-middle	223.7	20.4	723	10.956	<.0001
First-last	201	20.0	723	10.055	<.0001
Middle-last	-22.7	18.6	723	-1.218	0.4426

The overall sibling relation scores of first-born and middle-born students (all children between the first and last) differed significantly. Similarly, there is a significant difference between the sibling relations scores of first-born and last-born students. The results show that the sibling relation scores of the first-born children are higher than the scores of the students in other categories. This result indicates that first-born children attach more importance to sibling relations. The group that gives second most importance to sibling relations is the last-born children.

The figure showing lifelong sibling relations according to the combination of three independent variables is given below.

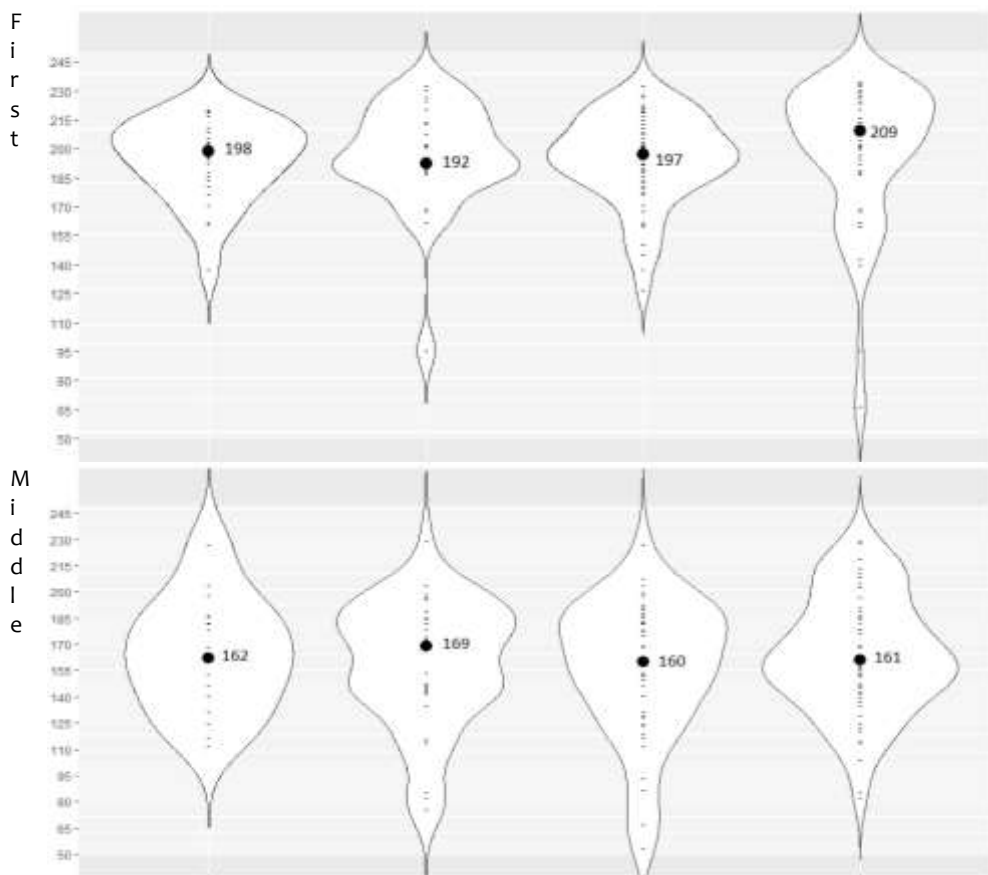




Figure 1. Analysis of overall sibling relation score according to Birth Order: Gender: NO of siblings variables

Figure 1 shows sibling relation scores according to the combination of three independent variables (Birth Order: Gender: NO of siblings), and their medians are marked with bold dots. Accordingly, the sibling relation scores of the first-born children are higher. The interaction of the three variables showed that "first-born female students, with two or three siblings" is the group that assigns the highest importance to sibling relations (209), although it contains low scores. Among the first-borns, the one with the lowest scores is "first-born male students with two and three siblings (192)." The widths of the shapes represent the number of scores at those points. Therefore, the answers given by first-born females with two and three siblings are more heterogeneous than the others.

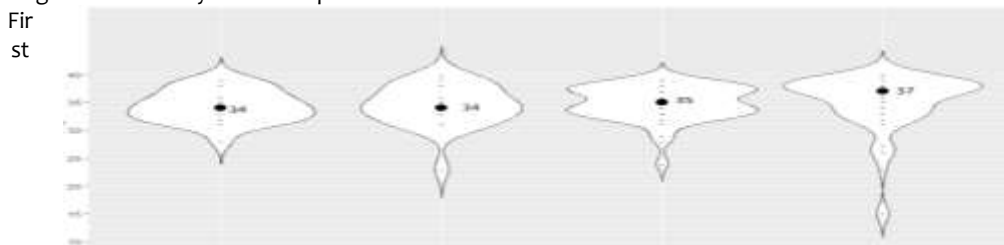
The median scores of middle-born and last-born students are close to each other. In both categories, male students with two and three siblings have higher sibling relation scores, while females with two and three siblings have lower scores.

So, regarding the median of the overall score, last-born female students with four or more siblings get the lowest score, and first-born female students with two or three siblings have the highest score.

The sub-dimensions of the sibling relation scale were also addressed separately and tested whether they differed according to the combination of three variables and their interactions.

Adult Emotions Sub-dimension;

Sibling relation scores of the *Adult Emotions* sub-dimension are given below for the categories formed by three independent variables.



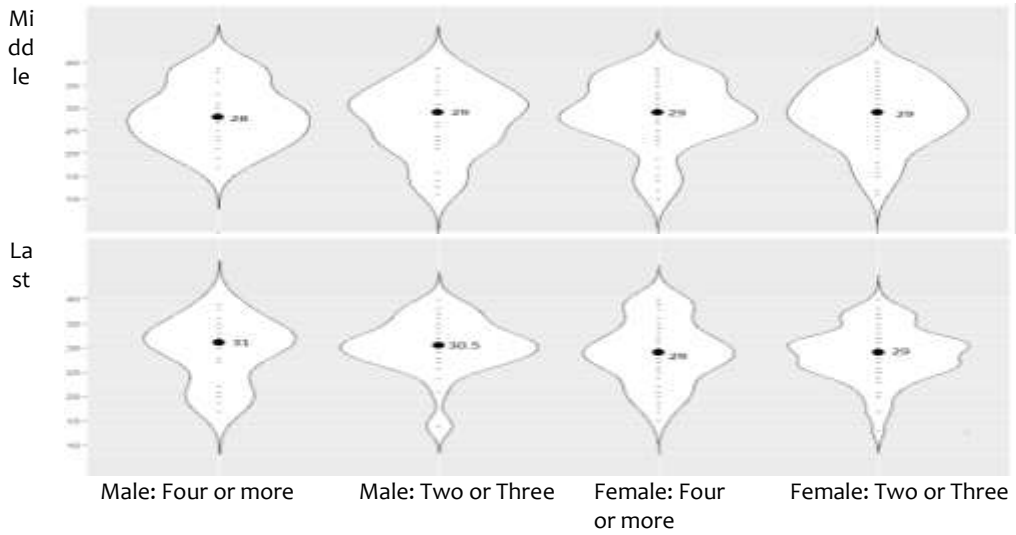


Figure 2. Analysis of **Adult Emotions sub-dimension** score according to **BirthOrder:Gender:NOofsiblings** variables

Regarding Figure 2, the median of Adult Emotions score is the highest for first-born female students, with two or three siblings, whereas the lowest score is in middle-born male students with four or more siblings. The significance of the difference between the scores was tested. The ANOVA table obtained for Adult Emotions scores of the Lifelong Sibling Relations Scale is as follows.

Table 5: Three-Factor ART ANOVA output for Adult Emotions scores

Sibling relations	df	Df. Res	F	p	η^2 partial
BirthOrder	2	723	69.77691	< 2e-16*	0.16179
Gender	1	723	1.057294	0.304177	0.00146
NOofsiblings	1	723	0.693572	0.405227	0.00096
BirthOrder:Gender	2	723	3.123738	0.044587*	0.00857
BirthOrder:NOofsiblings	2	723	0.354450	0.701681	0.00098
Gender:NOofsiblings	1	723	0.041172	0.839263	0.00006
BirthOrder:Gender:NOofsiblings	2	723	0.308242	0.734834	0.00085

Regarding Adult Emotions scores and the difference between categories, there is no significant difference between Adult Emotion scores of the participants according to the triple effect ($F_{\text{BirthOrder:Gender:NOofsiblings}} = 0.308$ $p > .00$). In addition, the effect size of the interaction of the three independent variables is quite small ($\eta^2_{\text{BirthOrder:Gender:NOofsiblings}} = 0.0008$).

Regarding the pairwise interactions in this sub-dimension, only "BirthOrder:Gender" ($F_{\text{BirthOrder:Gender}} = 3.123738$, $p > .00$) interaction has a significant effect on Adult Emotions. The differentiation of the scores according to birth order: gender interaction is given in Table 6.

Table 6: Comparisons of Adult Emotions Scores by Birth Order:Gender interaction

contrast	Estimate	SE	df	t.ratio	p.value
First Male - Medium Male	-11.53	40.5	723	-0.285	0.7761
First Male - Last Male	-69.04	39.8	723	-1.732	0.0836

First Male - First Female	-28.96	34.8	723	-0.832	0.4058
First Male - Medium Female	-36.76	34.3	723	-1.071	0.2847
First Male - Last Female	-1.58	33.9	723	-0.047	0.9629
Medium Male - Last Male	-57.50	37.2	723	-1.547	0.1224
Medium Male - First Female	-17.42	31.7	723	-0.549	0.5830
Medium Male - Medium Female	-25.23	31.2	723	-0.809	0.4190
Medium Male - Last Female	9.96	30.7	723	0.324	0.7457
Last Male - First Female	40.08	30.8	723	1.300	0.1939
Last Male - Medium Female	32.27	30.3	723	1.065	0.2871
Last Male - Last Female	67.46	29.8	723	2.266	0.0238*
First Female - Medium Female	-7.81	23.3	723	-0.336	0.7373
First Female - Last Female	27.38	22.6	723	1.212	0.2259
Medium Female - Last Female	35.19	21.9	723	1.610	0.1079

According to the Birth Order:Gender interaction, the only significant difference in Adult Emotions scores is between last-born males and females.

Regarding the main effects of the variables on Adult Emotions scores, the students differed significantly according to their birth order ($F_{\text{BirthOrder}}=69.77691, p<.00$). The other variables did not have a significant effect on sibling relations. The scores were compared for variable categories to see the groups differing according to birth order. The results of the comparisons are given in Table 7.

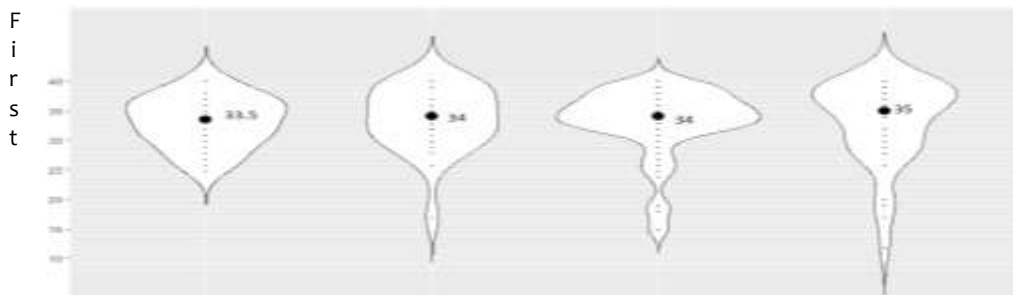
Table 7: Comparison of Adult Emotions scores by BirthOrder

contrast	estimate	SE	df	T	p
First-middle	222.6	20.8	723	10.696	<.0001
First-last	207.8	20.4	723	10.188	<.0001
Middle-last	-14.8	19.2	723	-0.772	0.4405

For this sub-dimension, Adult Emotion scores of first-born students differed significantly compared to the others. Adult Emotions scores show that first-born children attach more importance to sibling relations.

Adult Behaviors Sub-dimension;

Sibling relation scores of the Adult Behaviors sub-dimension are given below for the categories formed by three independent variables.



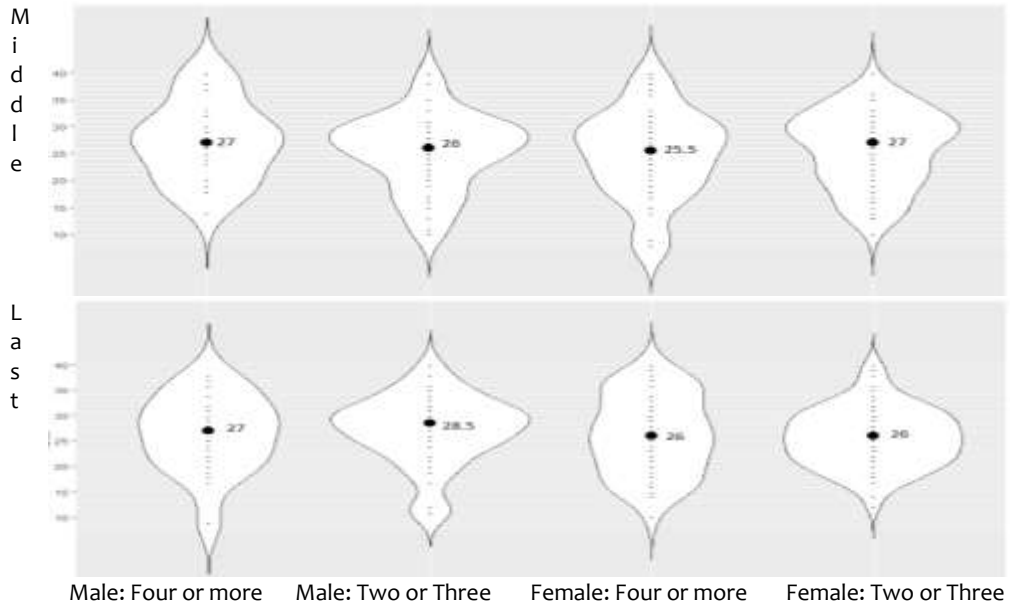


Figure 3. Analysis of Adult Behaviors sub-dimension score according to BirthOrder:Gender:NOofsiblings variables

Regarding Figure 3, the median of Adult Behaviors score is the highest for first-born female students with two or three siblings, whereas the lowest is for middle-born female students with four or more siblings. The significance of the difference between category scores was tested. The ANOVA table obtained for Adult Behaviors scores of the Lifelong Sibling Relations Scale is as follows.

Table 8: Three-Factor ART ANOVA output for Adult Behaviors scores

Sibling relations	df	Df. Res	F	p	η^2_{partial}
BirthOrder	2	723	70.755000	< 2e-16**	0.16369
Gender	1	723	0.000082	0.99277	0.00000
NOofsiblings	1	723	0.384080	0.53562	0.00053
BirthOrder:Gender	2	723	0.700930	0.49646	0.00194
BirthOrder:NOofsiblings	2	723	0.328560	0.72007	0.00091
Gender:NOofsiblings	1	723	0.189480	0.66348	0.00026
BirthOrder:Gender:NOofsiblings	2	723	1.103700	0.3322	0.00304

Regarding Adult Behaviors sub-dimension scores and the difference between categories, there is no significant difference between Adult Behaviors of the individuals according to the triple effect ($F_{\text{BirthOrder:Gender:NOofsiblings}} = 1,103700, p > .00$). In addition, the effect size of the interaction of the three independent variables is quite small ($\eta^2_{\text{BirthOrder:Gender:NOofsiblings}} = 0.003$).

Regarding the main effects, Adult Behaviors scores differed significantly according to birth order ($F_{\text{BirthOrder}} = 70.755000, p < .00$). The scores were compared for variable categories to see the groups differing according to birth order. The results of the comparisons are given in Table 9.

Table 9: Comparison of Adult Behaviors scores by BirthOrder

contrast	estimate	SE	df	T	p
First-middle	223.3	20.8	723	10.754	<.0001
First-last	209.1	20.3	723	10.278	<.0001
Middle-last	-14.2	19.2	723	-0.74	0.4598

Adult Behaviors scores of first-born students differed significantly compared to the others for this sub-dimension.

Adult Cognition Sub-dimension;

Sibling relation scores of the *Adult Cognition* sub-dimension are given below for the categories formed by three independent variables.

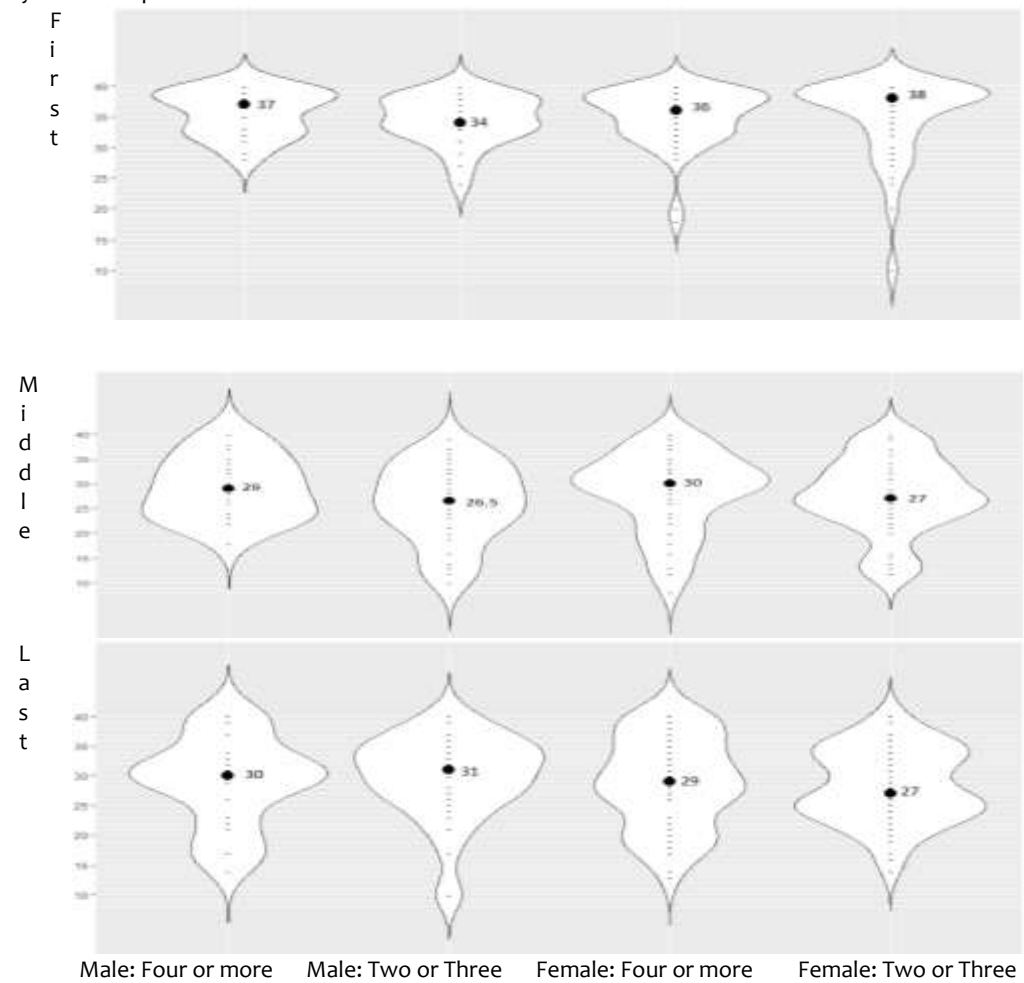


Figure 4. Analysis of Adult Cognition sub-dimension score according to BirthOrder:Gender:NOofsiblings variables

Regarding Figure 4, the median of Adult Cognition score is the highest for first-born female students with two or three siblings, whereas the lowest is for middle-born male students with two or three siblings. In addition, the scores of first-born students are slightly higher in this sub-dimension. The significance of the difference between category scores was tested. The ANOVA table obtained for Adult Cognition scores of the Lifelong Sibling Relations Scale is as follows.

Table 10: Three-Factor ART ANOVA output for Adult Cognition scores

Sibling relations	df	Df. Res	F	p	η^2_{partial}
BirthOrder	2	723	63.141070	< 2e-16**	0.14869
Gender	1	723	0.905570	0.341611	0.00125
NOofsiblings	1	723	3.344620	0.067837	0.00460
BirthOrder:Gender	2	723	1.683490	0.186451	0.00464
BirthOrder:NOofsiblings	2	723	0.875700	0.417013	0.00242
Gender:NOofsiblings	1	723	0.349210	0.554747	0.00048
BirthOrder:Gender:NOofsiblings	2	723	0.915050	0.400961	0.00252

Regarding Adult Cognition sub-dimension scores and the difference between categories, there is no significant difference between Adult Cognition of the individuals according to the triple effect ($F_{\text{BirthOrder:Gender:NOofsiblings}} = 0.915$, $p > .00$). In addition, the effect size of the interaction of the three independent variables is quite small ($\eta^2_{\text{BirthOrder:Gender:NOofsiblings}} = 0.0025$). Regarding the main effects, Adult Cognition scores differed significantly according to birth order ($F_{\text{BirthOrder}} = 63.141070$, $p < .00$). The scores were compared for variable categories to see the groups differing according to birth order. The results of the comparisons are given in Table 11.

Table 11: Comparison of Adult Cognition scores by BirthOrder

contrast	estimate	SE	df	T	p
First-middle	221.8	21.1	723	10.53700	<.0001
First-last	189.5	20.6	723	9.183000	<.0001
Middle-last	-32.4	19.4	723	-1.66700	0.0959

Adult Cognition scores of first-born students differed significantly compared to the others for this sub-dimension.

Childhood Emotions Sub-dimension;

Sibling relation scores of the *Childhood Emotions* sub-dimension are given below for the categories formed by three independent variables.

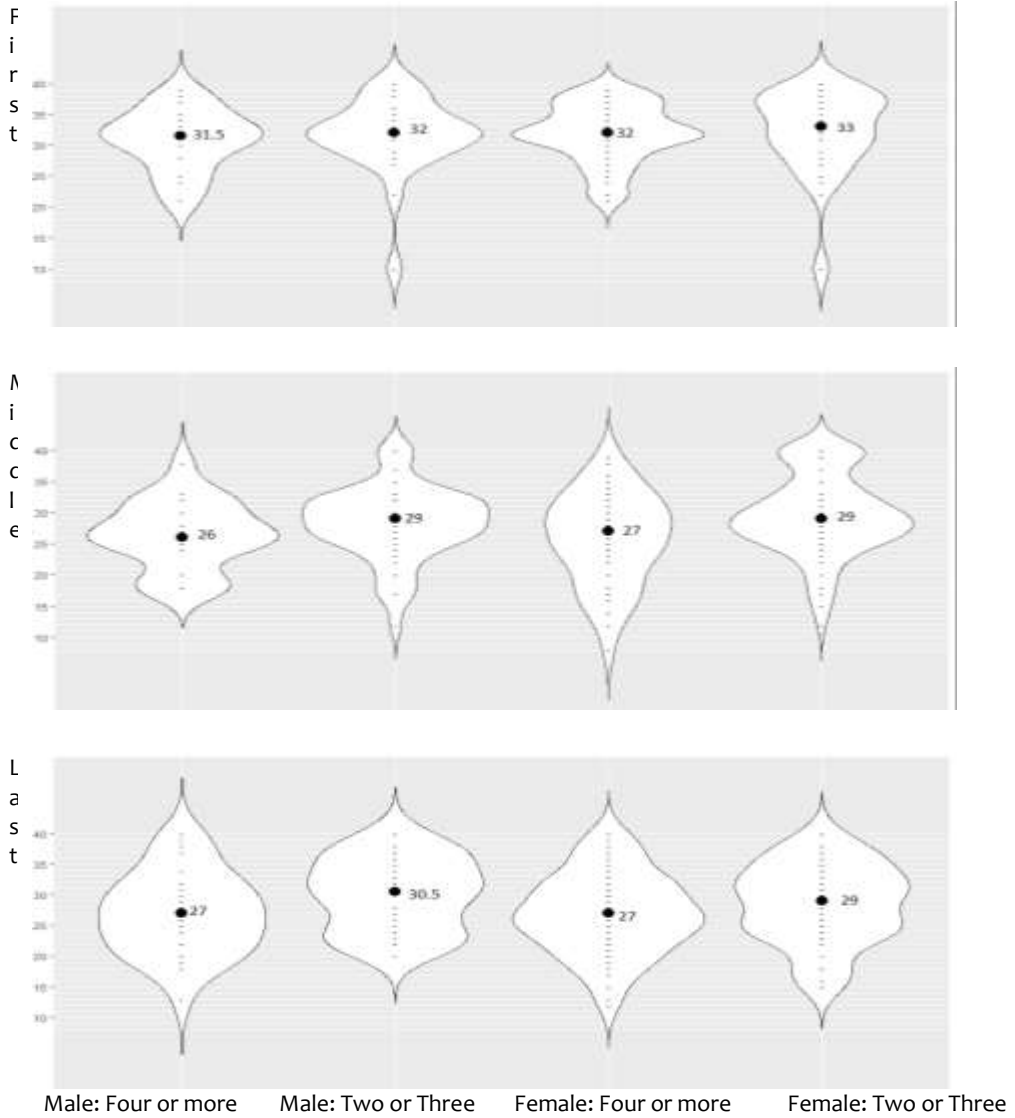


Figure 5. Analysis of *Childhood Emotions sub-dimension* score according to *BirthOrder:Gender:NOofsiblings* variables

Regarding Figure 5, the median of Childhood Emotions score is the highest for first-born female students with two or three siblings, whereas the lowest is for middle-born male students with four or more siblings. The significance of the difference between category scores was tested. The ANOVA table obtained for *Childhood Emotions* scores of the Lifelong Sibling Relations Scale is as follows.

Table 12: Three-Factor ART ANOVA output for *Childhood Emotions* scores

Sibling relations	df	Df. Res	F	p	η^2_{partial}
BirthOrder	2	723	25.489922	2.01E-11*	0.06587
Gender	1	723	0.052113	0.819491	0.00007
NOofsiblings	1	723	10.536241	0.001225*	0.01436

BirthOrder:Gender	2	723	0.795338	0.451823	0.00220
BirthOrder:NOofsiblings	2	723	1.501765	0.223431	0.00414
Gender:NOofsiblings	1	723	0.048354	0.826015	0.00007
BirthOrder:Gender:NOofsiblings	2	723	0.743298	0.475906	0.00205

Regarding Childhood Emotions sub-dimension scores and the difference between categories, there is no significant difference between Childhood Emotions of the individuals according to the dual and triple effect. Regarding the main effects, Childhood Emotions scores differed significantly according to birth order ($F_{\text{BirthOrder}}=25.489922, p<.00$) and the number of siblings ($F_{\text{NOofsiblings}}=10,536241, p<.00$). The comparison of Childhood Emotions scores according to birth order and Number of siblings is given in Table 13.

Table 13. Comparison of Childhood Emotions scores by BirthOrder

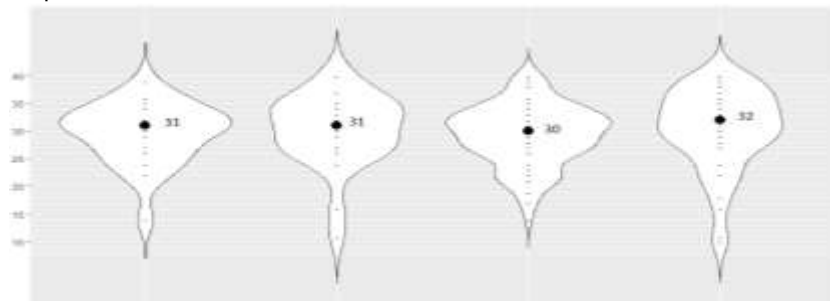
contrast	estimate	SE	df	t	p
BirthOrder					
First-middle	145.1	22.5	723	6.463000	<.0001
First-last	135.5	22	723	6.159000	<.0001
Middle-last	-9.6	20.7	723	-0.46400	0.6431
NOofsiblings					
Four or more - Two or three	-59.7	18.4	723	-3.246	0.0012

Like the Adult Emotions sub-dimension, there are significant differences between the Childhood Emotions of first-borns and the others. Childhood Emotions scores of first-born individuals are higher than others. In addition, considering the NOofsibling variable, the Childhood Emotions scores of the students with two or three siblings are higher than those with four or more siblings, and this difference is significant.

Childhood Behaviors Sub-dimension;

Sibling relation scores of the *Childhood Behaviors* sub-dimension are given below for the categories formed by three independent variables.

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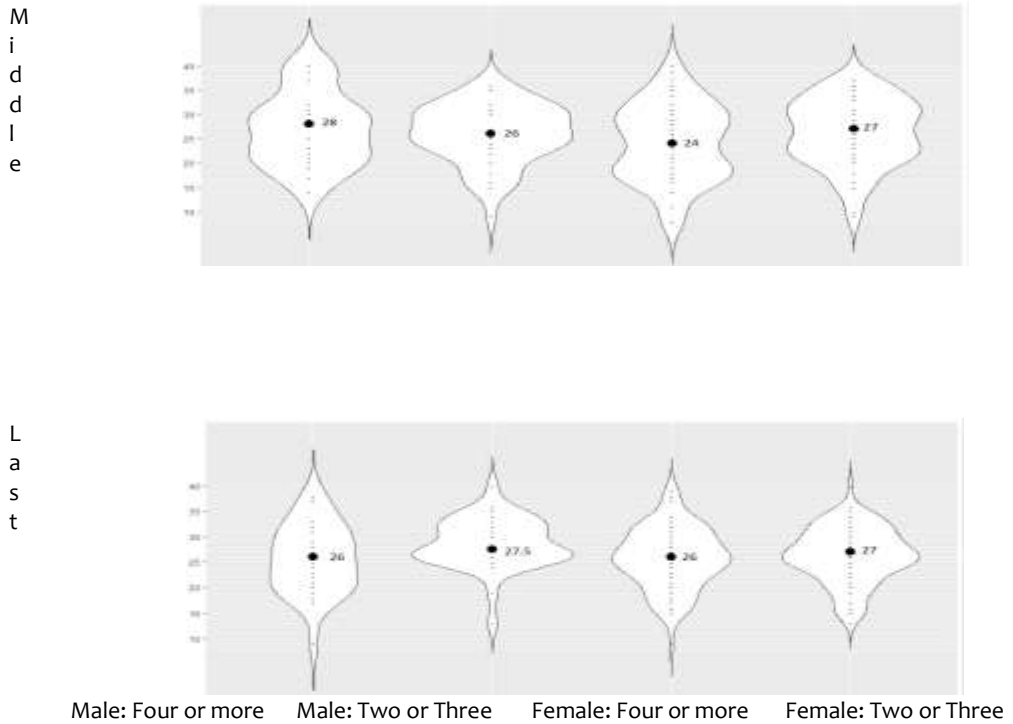


Figure 6. Analysis of **Childhood Behaviors sub-dimension** score according to BirthOrder:Gender:NOofsiblings variables

Regarding Figure 6, the median of Childhood Behaviors score is the highest for first-born female students with two or three siblings, whereas the lowest is for middle-born female students with four or more siblings. The significance of the difference between category scores was tested. The ANOVA table obtained for Childhood Behaviors scores of the Lifelong Sibling Relations Scale is as follows.

Table 14: Three-Factor ART ANOVA output for Childhood Behaviors scores

Sibling relations	df	Df. Res	F	p	η^2_{partial}
BirthOrder	2	723	22.58125	3.07E-10*	0.05879
Gender	1	723	1.067177	0.30193	0.00147
NOofsiblings	1	723	3.266824	0.07111	0.00450
BirthOrder:Gender	2	723	0.405407	0.66686	0.00112
BirthOrder:NOofsiblings	2	723	0.227350	0.7967	0.00063
Gender:NOofsiblings	1	723	0.082597	0.77389	0.00011
BirthOrder:Gender:NOofsiblings	2	723	1.790981	0.16754	0.00493

Regarding Childhood Behaviors sub-dimension scores and the difference between categories, there is no significant difference between Childhood Behaviors of the individuals according to dual and triple effects. Regarding the main effects, Childhood Behaviors scores differed significantly according to birth order ($F_{\text{BirthOrder}} = 22.581252$, $p < .00$). The comparison of Childhood Behaviors scores according to birth order is given in Table 15.

Table 15. Comparison of Childhood Behaviors scores by BirthOrder

contrast	estimate	SE	df	t	p
First-middle	142.6	22.6	723	6.324	<.0001
First-last	120.5	22.1	723	5.454	<.0001
Middle-last	-22.1	20.8	723	-1.062	0.2888

According to birth order, Childhood Behaviors scores of first-born individuals are higher than others; and this difference is significant.

Childhood Cognition Sub-dimension;

Sibling relation scores of the Childhood Cognition sub-dimension are given below for the categories formed by three independent variables.

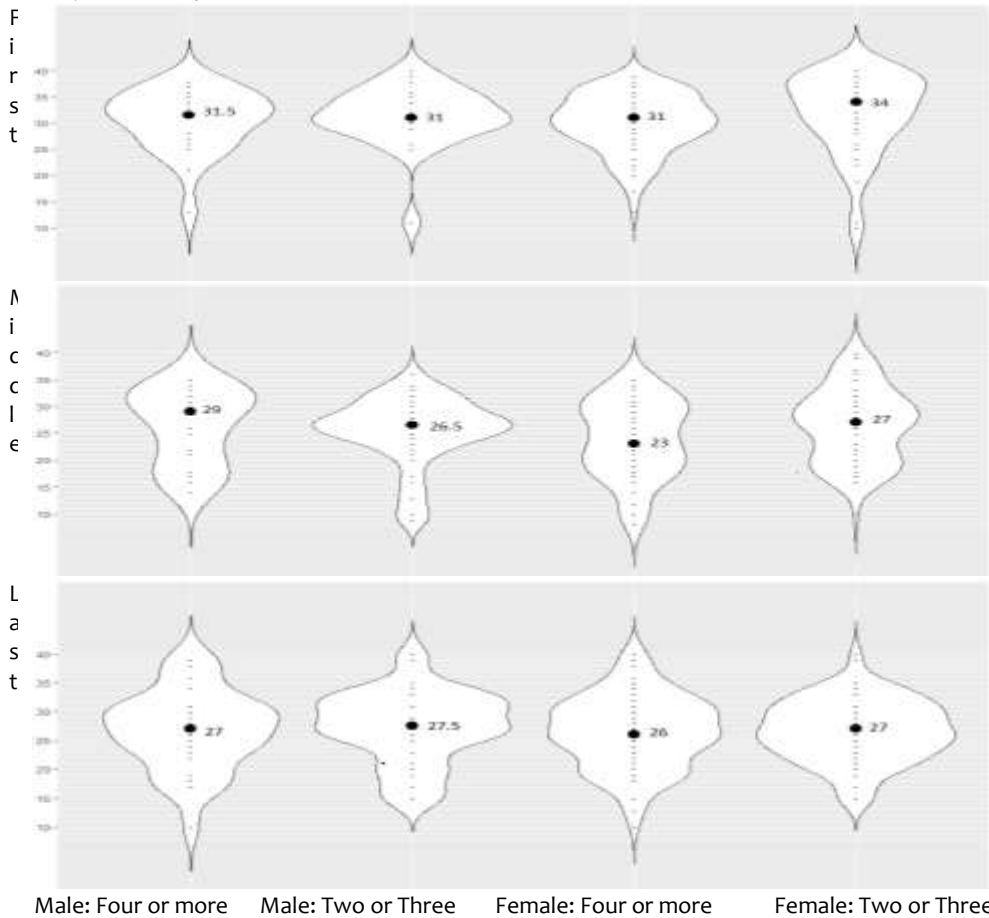


Figure 7. Analysis of Childhood Cognition sub-dimension score according to BirthOrder:Gender:NOofsiblings variables

Regarding Figure 7, the median of Childhood Cognition score is the highest for first-born female students with two or three siblings, whereas the lowest is for middle-born female students with four or more siblings. The significance of the difference between category scores was tested. The ANOVA table obtained for Childhood Cognition scores of the Lifelong Sibling Relations Scale is as follows.

Table 16: Three-Factor ART ANOVA output for Childhood Cognition scores

Sibling relations	Df	Df. Res	F	p	η^2_{partial}
BirthOrder	2	723	34.63839	4.31E-15	0.08744*
Gender	1	723	0.112500	0.73742	0.00016
NOofsiblings	1	723	2.038720	0.15377	0.00281
BirthOrder:Gender	2	723	0.181000	0.83447	0.00050
BirthOrder:NOofsiblings	2	723	0.934120	0.39341	0.00258
Gender:NOofsiblings	1	723	2.327210	0.12757	0.00321
BirthOrder:Gender:NOofsiblings	2	723	0.934570	0.39323	0.00258

Regarding Childhood Cognition sub-dimension scores and the difference between categories, there is no significant difference between Childhood Cognition of the individuals according to dual and triple effects. Regarding the main effects, Childhood Cognition scores differed significantly according to birth order ($F_{\text{BirthOrder}} = 34.638390$, $p < .00$). The comparison of Childhood Cognition scores according to birth order is given in Table 17.

Table 17. Comparison of Childhood Cognition scores by BirthOrder

contrast	estimate	SE	df	t	p
First-middle	174.8	22.1	723	7.92	<.0001
First-last	142.6	21.6	723	6.593	<.0001
Middle-last	-32.2	20.4	723	-1.582	0.1141

According to birth order, Childhood Cognition scores of first-born individuals are higher than others; moreover, this difference is significant.

Discussion

Theories about personal development generally focus on the parent-child relationship and show less interest in sibling relations (Doron, 2009). However, from an early age, children spend most of their time with their siblings (Cicirelli, 1976; McHale & Crouter, 1996); This relationship has a significant impact on their cognitive progress (Brody, 1998), developmental processes (Wagner et al., 1985), and mental health (Van Volcom et al., 2017). These relationships start in early childhood and continue throughout life (Van Volkom et al., 2017). However, the relationships between individuals may differ in different age groups due to different conditions and needs (Sullivan, 1953). Addressing sibling relations, which represent a lifelong relationship, in different life periods is considered necessary at this point. The variables that may affect the relationship between siblings may differ over time (Van Volkom et al., 2017). In this study, gender, birth order, and the number of siblings, which is seen to affect sibling relations of young adults in the literature, and the interactions of these variables are discussed. A scale consisting of six sub-dimensions and an overall score for lifelong sibling relations was used in the study. The differentiation of the total score obtained from the scale and its sub-dimensions according to the variables was analyzed.

The median of sibling relations scores did not differ according to the interaction of the three variables in overall and sub-dimensions. However, they differed significantly according to birth order, which is one of the main effects. This result shows that birth order plays an essential role in sibling relations during young adulthood. In Adler's (2011) theory, birth order was one of the most critical factors affecting the quality of sibling relations, which supports this result. In addition, birth order plays an

essential role in sibling relations in the literature (Pollet & Nettle, 2009; Spitze & Trent, 2006; White, Ensor, Marks, Jacobs, & Hughes, 2014). Birth order affects the characters of individuals (Damian & Roberts, 2015), and first-born individuals are generally seen as superior to other siblings (Pajoluk, 2013). This may create a rivalry between siblings or cause older siblings to give more importance to sibling relations. Many factors such as the closeness of siblings to each other (Adler, 2011), their position in the family (Minuchin, 1984) and their communication with their parents (Bronfenbrenner, 1979) are affected by birth order. Similar to the literature, first-born individuals have a more dominant sibling relation than other individuals (Pollet & Nettle, 2009).

Besides the birth order variable that affects all scores, the Childhood Emotions sub-dimension differs according to the number of siblings. As a result of their studies with young adults, Lee, Mancini and Maxwell (1990) and Bossard and Boll (1956) concluded that the number of siblings affects sibling relations. The number of siblings is one of the factors that affect the closeness and commitment between siblings. According to Adler (2011), the number of siblings is another factor that affects sibling relations. The number of siblings affects parents' behaviour and differentiates the relationships between siblings and the interaction between parents and children. The significant differences in Childhood Emotions according to the number of siblings in this study may be due to the effect of differing parents' attitudes mainly seen in childhood experiences (Erginoglu & Dincer, 2015). This effect shows itself even in young adulthood.

Another result of the research is that first-born females have the highest scores on sibling relations. The main factor affecting the relations of first-born children with their siblings is the expectation of parents from the first child (Noller, 2005; Soysal, 2016). More parenting roles are expected from the first child, especially if the gender of the first child is female (Howe & Bruno, 2010). The results of the current study are consistent with these findings. First-born female youngsters, who are expected to exhibit protective attitudes towards their siblings, have intensive feelings for their siblings. The findings of many researchers in the literature also show that sisters adopt a protective attitude in sibling relations (Garner, Jones, & Miner, 1994; Pulakos, 1990; White et al., 2014).

When the three variables are considered together, the highest sibling relation score for both the overall and the sub-categories belongs to first-born female students with two or three siblings. The lowest scores belong to middle-born students. Adler defines a middle child as a child competing against an older sibling, not having a chance to catch up, and simultaneously facing a younger sibling trying to catch up with him/her (Doron, 2009), supporting this situation.

Middle-born individuals with four or more siblings get the lowest scores in all categories except Adult Cognition. The low sibling relations of the individuals in this category are due to being in the middle and having four or more siblings. Newman (1996) states in his study that the quality of sibling relations may increase with the size of the family, but intrafamilial conflicts may occur in large families. This study shows that the quality of sibling relations may be low in large families, especially for the middle child. In the Adult Cognition sub-dimension, the quality of sibling relations of middle-born individuals with 2 or 3 siblings is lower. This may be due to the effect of parent's parenting style in sibling relations (Van Volkom, Dirmeitis, & Cappitelli, 2019).

Conclusion

According to the results of this study sibling relationships play a crucial role in shaping an individual's social and emotional development in life time. Firstly, parents can promote positive sibling relationships by fostering a sense of equality and fairness among their children. It is crucial to avoid favoritism and ensure that each child feels valued and respected. Encouraging open communication and conflict resolution skills can also contribute to healthier sibling dynamics. Parents can facilitate regular family meetings where siblings can express their thoughts and feelings in a safe and supportive environment. This situation will directly affect sibling bonds and communication in young adulthood.

Learned experiences will also be remembered in young adulthood and will be taken into account in problems experienced in sibling relationships.

Sibling relationships during childhood will continue to develop and change during the school period. So schools can play a vital role in strengthening the bond between sibling relationships and pedagogy. Improving sibling relationships and strengthening the relationship between family and school pedagogy requires a collaborative effort from both parents and educators. By promoting equality, open communication, and shared responsibility, teachers and family members can create an environment that nurtures positive sibling relationships and enhances the educational experience for children. This situation will also affect the experiences and sharings in young adulthood.

According to the study results, the number of siblings and birth order variables are effective on sibling relations. Pedagogical interventions are essential in the entire education system as they enhance teaching and learning practices, support students with diverse needs, and promote active engagement. By implementing these interventions, educators can create a more inclusive and effective learning environment that prepares students for success in their academic and personal lives. At this point of view aid provided at the university level will positively affect the quality of sibling relationships. So psychological help services can be provided individually or in groups to adult individuals who have problems with their family dynamics and negative sibling relationships.

The variables used in the analysis are the ones that the researchers wanted to investigate. In future studies, different variables can be used, and their interactions can be examined.

This research is limited to the students of the İnönü University in Malatya province, who voluntarily participated in the study, and the measurement tools used. For the students with more than one sibling, sibling relations are limited only to the evaluated sibling. Besides, research results are limited to the students who participated in the research and their answers.

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