

# Family function, Parenting Style and Broader Autism Phenotype as Predicting Factors of Psychological Adjustment in Typically Developing Siblings of Children with Autism Spectrum Disorders

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**Objective:** Siblings of children with autism are at a greater risk of experiencing behavioral and social problems. Previous researches had focused on environmental variables such as family history of autism spectrum disorders (ASDs), behavior problems in the child with an ASD, parental mental health problems, stressful life events and "broader autism phenotype" (BAP), while variables like parenting style and family function that are shown to influence children's behavioral and psychosocial adjustment are overlooked. The aim of the present study was to reveal how parenting style and family function as well as BAP effect psychological adjustment of siblings of children with autism.

**Method:** The Participants included 65 parents who had one child with an Autism Spectrum Disorder and one typically developing child. Of the children with ASDs, 40 were boys and 25 were girls; and they were diagnosed with ASDs by a psychiatrist based on DSM-IV-TR criteria and Autism Diagnostic Interview-Revised (ADI-R). The Persian versions of the six scales were used to collect data from the families. Pearson's correlation test and regression analysis were used to determine which variables were related to the psychological adjustment of sibling of children with ASDs and which variables predicted it better .

**Results:** Significant relationships were found between Strengths and Difficulties Questionnaire (SDQ) total difficulties, prosocial behaviors and ASDs symptoms severity, parenting styles and some aspects of family function. In addition, siblings who had more BAP characteristics had more behavior problems and less prosocial behavior. Behavioral problems increased and prosocial behavior decreased with permissive parenting style. Besides, both of authoritarian and authoritative parenting styles led to a decrease in behavioral problems and an increase in prosocial behaviors. Our findings revealed that some aspects of family function (affective responsiveness, roles, problem solving and behavior control) were significantly correlated with behavioral problems and prosocial behaviors in typically developing (TD) siblings of children with ASDs.

**Conclusion:** Siblings of children with ASDs, due to genetic liability, are at a greater risk of psychological maladjustment. Furthermore, environmental factors like parenting styles and family function also have a significant effect on psychological maladjustment.

**Keywords:** *Autism spectrum disorders (ASDs), broader autism phenotype, sibling, parenting style, psychological adjustment*

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Autism spectrum disorders (ASDs) are developmental disorders characterized by restricted interests and repetitive behaviors, impairments in social interaction and verbal and nonverbal communication (1-4). Previous studies have shown that family members of people with ASDs have personality features like inflexibility, aloofness and hypersensitivity to criticism (5, 6), interpersonal difficulties such as deficits in the number and quality of friendships (7-17), cognitive deficits such as

impaired executive functioning (18, 19), weak central coherence (20) and pragmatic language deficits (21) what are known as the Broader Autism Phenotype (BAP). The Broader Autism Phenotype (BAP) has been used to describe personality characteristics that are subtly similar to individuals diagnosed with autism and often found in relatives of individuals with ASD which represents a genetic liability for the disorder (15).

It is also revealed that siblings of people with ASDs are at a greater risk of experiencing behavioral problems (22-24) and social impairment (25). Recently, some researchers, using diathesis-stress model, have investigated the risk factors that increase the probability of mental health problems in siblings of children with ASDs to recognize how genetic vulnerabilities and environmental variables may place certain siblings at a greater risk of psychological maladjustment (26, 27).

Orsmond and Seltzer examined a diathesis-stress model of well-being for siblings who have a brother or sister with an autism spectrum disorder (ASD). Based on their study, the level of symptoms of depression and anxiety were higher in typically developing (TD) sisters than brothers and the presence of family history of ASD was linked to depressive symptoms. Another finding of their study was that an increase in the level of maternal depression was associated with an increase in depressive and anxiety symptoms. Their findings, in recognition of diathesis-stress model, showed that interaction between broader autism phenotype and stressful life events increases depressive and anxiety symptoms in TD siblings (27).

In another study, Petalas et al. investigated the effects of interaction between BAP in TD siblings and family-environmental risk factors on siblings' functioning and psychological well-being. Behavior problems in the ASDs siblings and BAP in the TD siblings were predictors of siblings' adjustment. They also found that an increase in the severity of BAP in TD siblings and behavior problems in ASDs siblings led to an increase in the level of behavior problems in TD siblings. In addition, more conflict was seen in the siblings' relationship in those siblings who had more BAP and parents with mental health problems (26).

According to the literature, some other environmental factors that influence children's behavior and psychosocial adjustment are parenting style and family function (28-31). Baumrind (32) developed a model including three parenting styles. An authoritarian parenting style, in which parents are highly demanding (high control) and low in responsiveness (low warmth), was found to associate with poorer child behavior outcomes than the authoritative style (high control, high warmth) or a permissive style (low control, high warmth) (33-35). Other studies have demonstrated that parents who were highly critical, disapproving and generally rejecting of their children tended to have children who behaved in hostile and aggressive ways (30-36). On the other hand, positive practices such as warmth and affective expressiveness were inversely associated with both internalizing and externalizing problems (31, 37 and 38). It has also been shown that the presence of warmth and positivity and the absence of criticism in the family environment were associated with fewer behavioral problems (39).

As mentioned previously, former researches on the siblings of individuals with autism, using diathesis-stress model, had focused on environmental variables such as family history of ASDs, behavior problems in the child with an ASD, parental mental health problems and stressful life events (26, 27), while variables like parenting style and family function that have a great influence on children's behavior and psychosocial adjustment (28-39) have been overlooked. In the present study, we aimed to find a relationship between parenting style and family function as well as BAP, how influence on psychological adjustment of siblings of children with autism.

## Material and Methods

### *Participants*

Participants were families ( $n = 65$ ) who had received psychiatric services from a child psychiatric clinic in Tehran in the fall of 2012, and had one child with an autism spectrum disorders (ASDs) and one typically developing (TD) child. Of the children with ASDs, 40 were boys and 25 were girls who had been diagnosed by a child psychiatrist based on DSM-IV criteria and Autism Diagnostic Interview-Revised (ADI-R) with an age range of 3.4 and 8 years and with a mean age of 5.35 years ( $SD = 1.37$ ). The typically developing siblings whose age ranged from 6 to 13 years (mean age = 10.84,  $SD = 1.76$ ) were 35 boys and 30 girls who did not have any disability or psychiatric condition based on the parental report. Five siblings were younger than the child with an ASD and sixty were older. All of the siblings were biologically related.

### *Measures*

The Persian versions of the six tests were used to gather data from the participants. All tests were answered by mothers. Two questionnaires of Strengths and Difficulties Questionnaire (SDQ) and The Autism Spectrum Quotient—Children's Version (AQ-Child) were used to measure emotional and behavioral adjustment and autistic traits in the typically developing siblings of children with ASDs, respectively. Two other questionnaires, Family Assessment Device (FAD) and Baumrind's parenting style scale, were used to assess family function and parenting style in the families, respectively.

Autism Diagnostic Interview-Revised (ADI-R) and Childhood Autism Rating Scale were used to diagnosis and determine the severity of symptoms in ASDs children, respectively.

All tests had been administered and scored by a trained psychologist.

Strengths and Difficulties Questionnaire (SDQ) is a 25 item screening measure with four problem domains, assessing emotional problems, conduct problems, hyperactivity and peer relationship problems, as well as a positive behavior domain (prosocial behavior). A total difficulties score is derived by summing the total ratings of the four problem domains. It has been shown

to be as effective as the Child Behavior Checklist and the Rutter Scales in identifying clinically significant levels of behavioral disturbances in children (40, 41). Ghanizadeh et al. investigated the validity and reliability of the Persian version of the Strengths and Difficulties Questionnaire (SDQ). Their study showed that the Persian version of the SDQ has adequate psychometric properties of the instrument (42). Cronbach's alpha coefficient for the current sample of TD siblings of children with ASDs on the total items was 0.70.

The Autism Spectrum Quotient—Children's Version (AQ-Child) is a parent-report questionnaire that aims to quantify autistic traits in children. The range of scores on the AQ-Child is 0–150. The AQ-Child is a 50-item questionnaire, comprising of five domains: social skills, attention to switching, attention to detail, communication and imagination, each of which is assessed through 10 questions. The AQ-Child shows high specificity (0.95) and sensitivity (0.95), and 95% of the individuals with an ASD diagnosis scored at or above the cut-off score (76) used. The AQ-Child has good levels of internal consistency (Cronbach's alpha coefficients for all the five domains ranged from 0.80 to 0.90, and for the AQ-Child the total score was 0.97) and high test-retest reliability ( $r = 0.85$ ) (43). Cronbach's alpha coefficient for the current sample for the AQ-Child total score was 0.86.

Family Assessment Device (FAD) was developed by Epstein, Bishop and Baldwin (44) to describe the structural and organizational features of the family and was derived from McMaster's model. It shows six specific and one general aspect of family performance including: problem solving, relationship, roles, emotional support, emotional conflict, controlling behavior and general performance. This questionnaire consists of 60 questions which are graded on a 4-degree continuum from absolutely agree to absolutely disagree. Higher scores in any aspect of family performance indicate higher degrees of disorder in that respect. The Cronbach's alpha coefficient was estimated 0.83 to 0.90 by the developers (44). This measure was translated for an Iranian population and its psychometrics were measured and confirmed. The Cronbach's alpha coefficient for the Iranian population was 0.71 to 0.77 (45) and in this study for the total items was 0.78.

Baumrind's Parenting Style Scale comprises of 30 items including 10 items for authoritative, 10 for authoritarian and 10 items for permissive parenting styles. Response choices ranged from "Completely disagree" to "Completely agree" on a 5-point scale. In a study, test-retest reliability of the Persian version of this scale after a two-week interval was 0.74 (46). In this study, the Cronbach's alpha coefficient for the total items was 0.79.

Childhood Autism Rating Scale (CARS) consists of 15-item rating scales completed by a practitioner or a Parent/Caregiver. The CARS is used for children younger than 6 years of age and those with

communication difficulties or below-average cognitive ability. The CARS includes 15 items addressing the following functional areas: relating to people, imitation, emotional response, body use, object use, adaptation to change visual response, listening response, taste, smell and touch response and use, fear or nervousness, verbal communication, nonverbal communication, activity level, level and consistency of intellectual response and general impression (47). In this study, the Cronbach's alpha coefficient for the total items was 0.76.

Autism Diagnostic Interview-Revised (ADI-R): The Persian version of ADI-R has been standardized on 100 children with ASDs, 9 children with intellectual disability and 100 typically developing children. For the present behaviors, Chronbach's alpha was 0.85. The test-retest reliability on a sample of 33 children with a 4-6 week interval was 0.99 for unusual social interaction, 0.99 for language and communication and 0.96 for repetitive and stereotyped behavior(48).

#### *Data Analysis*

Data were entered to SPSS-19, and Pearson's correlation test and regression analysis were used to determine which variables were related to the psychological adjustment of the siblings of children with ASDs and which ones predicted it better.

To investigate the effect of environmental and biological factors on psychological adjustment of siblings of children with ASDs, we examined parenting style, family function and severity of symptoms in ASDs siblings as environmental factors. The scores obtained from Baumrind's parenting style scale (three scores, one for each subscale), those from Family Assessment Device (seven scores, one for each subscale) and the scores of children with ASDs in CARS were entered separately in the regression models as environmental factors. As a biological factor, the scores of typically developing siblings in AQ-child were entered in the regression models joined with each environmental factors.

## **Result**

The findings of the present study revealed significant associations between SDQ total difficulties, prosocial behaviors and severity of symptoms in ASDs siblings and parenting styles and some aspects of family function in the typically developing siblings of children with ASDs (Table 1). As demonstrated in Table 2, the regression models with TD siblings' AQ scores as genetic vulnerability and severity of symptoms in siblings with ASD as the measure of environmental stressor were significant predictors of sibling SDQ total difficulties and prosocial behavior. The severity of symptoms in the brother or sister with ASDs did not have a direct effect on TD siblings' SDQ total difficulties or prosocial behavior and did not interact with sibling' genetic vulnerabilities to predict siblings' psychological adjustment.

**Table 1: Correlation between Strengths and Difficulties Questionnaire (SDQ) total difficulties, prosocial behaviors and biological and environmental factors**

			SDQ. total	SDQ. prosocial
1	TP. Sib AQ	r	0.926**	-0.845**
		p	<0.001	<0.001
2	ASD Sib symptom severity	r	0.289*	-0.332**
		p	0.019	0.007
3	Permissive parenting	r	0.305*	-0.170
		p	0.013	0.176
4	Authoritarian parenting	r	-0.223	0.506**
		p	0.075	<0.001
5	Authoritative parenting	r	-0.390**	0.411**
		p	0.001	0.001
6	Problem Solving	r	-1.00	0.014
		p	0.428	0.910
7	Communication	r	0.411**	-0.592**
		p	0.001	<0.001
8	Roles	r	0.124	0.337**
		p	0.325	0.006
9	Affective Responsiveness	r	0.608**	-0.701**
		p	<0.001	<0.001
10	Affective Involvement	r	0.672**	-0.485**
		p	<0.001	<0.001
11	Behavior Control	r	0.449**	-0.376**
		p	<0.001	0.002
12	General Functioning	r	0.605**	-0.501**
		p	<0.001	<0.001

\*\*correlation is significant at the 0.01 level (2-tailed).

\*correlation is significant at the 0.05 level (2-tailed).

**Table 2: Regression analysis with sibling AQ\* scores and severity of symptoms in the brother or sister with an ASDs**

Predictor	Sibling SDQ total difficulties <sup>a</sup>		Sibling prosocial behavior <sup>b</sup>	
	B	p	β	p
Sibling AQ	0.738	<0.001	-0.768	< 0.001
Child with an ASD symptom severity	0.081	0.423	-0.058	0.700
Sibling AQ × Child with an ASD symptom severity	0.237	0.058	-0.081	0.660

\*Autism Spectrum Quotient—Children's Version (AQ)

<sup>a</sup> Model R = .934, R<sup>2</sup> = .872, F (3, 61) = 137.996, p < .001.

<sup>b</sup> Model R = .845, R<sup>2</sup> = .714, F (3, 61) = 50.801, p < .001.

**Table 3: Regression analysis with sibling AQ\* scores and parenting styles**

Predictor	Sibling SDQ total difficulties <sup>a</sup>		Sibling prosocial behavior <sup>b</sup>	
	B	p	β	p
Sibling AQ	0.754	< 0.001	-1.296	< 0.001
Permissive parenting style	0.954	< 0.001	-0.646	< 0.001
Authoritarian parenting style	-0.418	< 0.001	1.120	< 0.001
Authoritative parenting style	-0.238	< 0.001	1.143	< 0.001
AQ × Permissive parenting style	0.881	< 0.001	-0.930	< 0.001
AQ × Authoritative parenting style	0.378	< 0.001	.	.
AQ × Authoritarian parenting style	.	.	-1.086	< 0.001

\*Autism Spectrum Quotient—Children's Version (AQ)

<sup>a</sup> Model R = .984, R<sup>2</sup> = .968, F (6, 58) = 293.313, p < .001.

<sup>b</sup> Model R = .999, R<sup>2</sup> = .998, F (6, 58) = 4426.011, p < .001.

Table 4: Regression analysis with sibling AQ\* scores and family function

Predictor	Sibling SDQ total difficulties <sup>a</sup>		Sibling prosocial behavior <sup>b</sup>	
	$\beta$	p	$\beta$	p
Sibling AQ	0.241	< 0.001	-0.836	< 0.001
Affective Responsiveness	1.039	< 0.001	-0.507	< 0.001
Roles	-0.920	< 0.001	0.253	< 0.001
Problem Solving	-0.241	< 0.001	.	.
Behavior Control	.	.	0.239	< 0.001
AQ x Roles	-1.350	< 0.001	.	.
AQ x Affective Responsiveness	0.632	< 0.001	-0.188	< 0.001
AQ x Problem Solving	.	.	0.658	< 0.001

Autism Spectrum Quotient—Children's Version (AQ)

<sup>a</sup> Model R = .999, R<sup>2</sup> = .998, F (6, 58) = 6428.415, p < .001.

<sup>b</sup> Model R = 1.000, R<sup>2</sup> = 1.000, F (6, 58) = 35737.258, p < .001.

In this regression model, AQ scores of ASDs siblings, as genetic vulnerability, had a significant direct positive effect on siblings' SDQ total difficulties ( $\beta = 0.738$ ,  $p < 0.001$ ) and a negative effect on prosocial behavior ( $\beta = -0.768$ ,  $p < 0.001$ ). Based on the second regression model, AQ scores of ASDs siblings and parenting styles were significant predictors of SDQ total difficulties and prosocial behavior in TD siblings (predictor variables that were remained in the model after the stepwise regression analyses presented in Table 3). Permissive parenting style had a direct positive effect on SDQ total difficulties ( $\beta = 0.954$ ,  $p < 0.001$ ) and a negative effect on prosocial behavior ( $\beta = -0.646$ ,  $p < 0.001$ ) in TD siblings. Authoritarian parenting style had a direct negative effect on SDQ total difficulties ( $\beta = -0.418$ ,  $p < 0.001$ ) and a positive effect on prosocial behavior ( $\beta = 1.120$ ,  $p < 0.001$ ) in TD siblings. Authoritative parenting style had a direct negative effect on SDQ total difficulties ( $\beta = -0.238$ ,  $p < 0.001$ ) and a positive effect on prosocial behavior ( $\beta = 1.143$ ,  $p < 0.001$ ) in TD siblings. Furthermore, the AQ scores of ASDs siblings had a significant direct positive effect on SDQ total difficulties ( $\beta = 0.754$ ,  $p < 0.001$ ) and a negative effect on prosocial behavior ( $\beta = -1.296$ ,  $p < 0.001$ ) in TD siblings. In addition, AQ scores of ASDs siblings interacted with parenting styles and significantly predict both SDQ total difficulties and prosocial behavior in TD siblings. According to the third regression model (Table 4), AQ scores of ASDs siblings and family function were significant predictors of SDQ total difficulties and prosocial behavior in TD siblings. The AQ scores of ASDs siblings had a significant direct positive effect on SDQ total difficulties ( $\beta = 0.241$ ,  $p < 0.001$ ) and a negative effect on prosocial behavior ( $\beta = -0.836$ ,  $p < 0.001$ ) in TD siblings. Within the subscales of family function, "affective responsiveness" had a direct positive effect on SDQ total difficulties ( $\beta = 1.039$ ,  $p < 0.001$ ) and a negative effect on prosocial behavior ( $\beta = -0.646$ ,  $p < 0.001$ ) in TD siblings, while "roles" and "problem solving" had negative effects on SDQ total difficulties (respectively,  $\beta = -0.920$ ,  $p < 0.001$  and  $\beta = -0.241$ ,  $p < 0.001$ ) in TD siblings. "Roles" and "behavior control" had positive effects on prosocial behavior (respectively,  $\beta = 0.253$ ,  $p < 0.001$  and  $\beta = 0.239$ ,

$p < 0.001$ ) in TD siblings. In addition, AQ scores of ASDs siblings interacted with parenting styles and significantly predicted both SDQ total difficulties and prosocial behavior in TD siblings.

### Discussion

The results of the present study are in line with those of previous researches. Based on our findings, factors such as autistic symptoms severity in the child with ASDs were correlated with an increase in behavior problems and a decrease in prosocial behaviors in the typically developing siblings. Another factor that significantly correlated with behavior problems and prosocial behavior was genetic liability (AQ score of TD sibs). The siblings, who had more BAP characteristics, had more behavior problems and less prosocial behavior. This finding is supported by the results of previous studies; for example, Petalas et al.'s study showed that psychological adjustment in the sibling of children with ASDs was associated with the extent of the sibling's Broad Autism Phenotype (BAP) features (26). This is also mentioned in Orsmond and Seltzer's study (27).

To compare the effect size of autistic symptoms severity in ASD siblings and BAP characteristics in TD sibling in psychological adjustment (behavior problems and prosocial behavior) of TD siblings, these two factors were entered into the regression model. The results of the regression analysis showed a significant effect for BAP characteristics (AQ score) ( $p < 0.001$ ), but not for autistic symptoms severity in ASD sibling ( $p > 0.05$ ). This finding is in line with Orsmond and Seltzer's study that revealed no significant relationship between behavioral problems in brother/sister with ASD and psychological well-being (depressive and anxiety symptoms) of TD siblings (27).

The other factors explored in the current study were parenting styles. According to the results of the present study, behavioral problems increased and prosocial behavior decreased with permissive parenting style. In addition, both of authoritarian and authoritative parenting styles led to a decrease in behavioral problems and an increase in prosocial behaviors. These findings are supported by previous researches. Authoritative parents are high on warmth and firm control, authoritarian parents are high on restrictiveness

and firm control and low on warmth, and permissive parents are high on warmth and low on both types of control (49); Children who have permissive parents demonstrate higher levels of impulsivity and aggressiveness and lack self-control and independence (50) and higher levels of aggression and externalizing anti-social behaviors (51). Authoritative parenting is negatively associated with internalizing and externalizing problems in childhood and adolescence (52, 53). In regards to authoritarian parenting, several studies have shown that a high level of behavioral control is related to low levels of externalizing problems, such as antisocial behavior and conduct disorders, both among adolescents (54-57) and among elementary school children (58, 59).

In respect to interaction between parenting style (as an environmental factor) and AQ scores (as a genetic liability) in predicting psychological adjustment of TD siblings, the results of the present study showed that genetic liability (BAP) in TD siblings has a determinant role. AQ scores when interact with parenting styles, change their effect. As mentioned previously, authoritative parenting style has a negative effect on behavioral problem itself but when interact with BAP, turns to a positive effect like BAP (Table 3). In contrast, authoritarian parenting style has a positive effect on prosocial behavior but when interacts with BAP, it turns to a negative effect like BAP (Table 3). This is in line with researches that have suggested that BAP characteristics in families of people with ASDs put them at a greater risk of psychological and interpersonal problems (5-25).

Another variable that the present study has focused on was family function. Several longitudinal studies have demonstrated that aspects of family functioning are important predictors of problem behavior and change and persistence of psychopathology in children (60-69). Our finding revealed that some aspects of family function (affective responsiveness, roles, problem solving and behavior control) significantly correlated with behavioral and prosocial behaviors in TD siblings of children with ASDs (Table 4). Higher scores of "roles" and "problem solving" were correlated with the decreases in behavioral problems as well as scores in "roles" and "behavior control" which were positively correlated with the increases in prosocial behaviors (Table 4). This result may be explained by the fact that parental support and demanding control are related to positive developmental outcomes in children (29, 70 and 71). Investigating the interaction between family function and BAP (Table 4) revealed that some aspects of family function moderate the effect of BAP on behavioral problems in TD siblings; however, BAP itself lead to an increase in behavioral problems, interacting with "roles" inactive its effect.

A limitation of this study is that all the questionnaires were filled out by mothers and we did not have any perception about the point of views of other family members. For example, parenting styles may be different between mothers and fathers. Future

researches should therefore concentrate on the investigation of parenting style and family function with the focus on all family members. Other limitations of this study were small sample size and lack of a control group.

## Conclusion

The results of the current study demonstrated that TD siblings of children with ASDs, due to genetic liability, are at a greater risk of psychological maladjustment; besides this fact, environmental factors like parenting styles and family function also have a significant effect on psychological maladjustment. Therefore, to prevent psychological problems in TD siblings of children with ASDs, family training and individualized psychological interventions should be taken into account by child and family psychologists.

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