

## Emotional and Behavioural Problems among Siblings of Children with Autism Spectrum Disorder-Parent Reported

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### ABSTRACT

**Background:** Among the neurodevelopmental disorders, prevalence of autism spectrum disorder (ASD) is increasing throughout the world, so on in Bangladesh. Siblings of children with ASD who share common genetic and environmental background are at risk for developing mental illnesses. Most of the time their condition is not being explored and they are needed to be brought under the umbrella of mental health service. **Aim of the study:** To identify the emotional and behavioral problems among 4-17 years siblings of children with autism spectrum disorder using Strengths and Difficulties Questionnaire-Parent Version. **Methods:** This was a cross-sectional, descriptive study carried out at the Department of Psychiatry and Institute for Pediatric Neurodisorder and Autism (IPNA) at BSMMU during the period of October 2021 to September 2023. In total, 60 parents (father/mother) who had children with ASD were purposefully enrolled for the study. After taking their informed written consent, they were interviewed using a semi-structured sociodemographic and relevant information questionnaire along with the Strengths and Difficulties Questionnaire – Parent Version. Interview was carried out in face-to-face self-report format. Ethical clearance was taken from Institutional Review Board of BSMMU and ethical issues were addressed throughout the study. Data were collected by the researcher and analyzed using SPSS 28.0 software. All comparisons were considered significant if  $p < 0.05$ . **Result:** Mean age of the siblings was  $10.07 \pm 3.05$  years with a range between 4 to 17 years. In terms of difficulty sub-scales of Strengths and Difficulties Questionnaire, conduct problems were present in 28.3% siblings, emotional

problems in 25%, hyperactivity problems in 15%, peer problems in 11.7%. As per parent's report and after considering impact score, 6.7% of siblings had emotional disorder, 8.3% conduct disorder and 15% had hyperactivity disorder. Female siblings were more likely to have emotional disorder while male siblings were more likely to have conduct disorder and hyperactivity disorder. Factors such as age for conduct disorder, having just one sibling with autism for emotional and hyperactivity disorder, increased caregiving time for the ASD child and family history of mental illness contributed to the risk of developing specific disorders. First born siblings also had increased risk of hyperactivity disorder. **Conclusion:** The findings indicate that emotional disorder, conduct disorder and hyperactivity disorder were present in much higher proportions among these siblings. It highlights the importance of understanding the specific risks and needs of siblings in families affected by autism.

**Keywords:** Emotional and behavioral problems, siblings, autism, SDQ.

## INTRODUCTION

Autism spectrum disorder (ASD) is a childhood neurodevelopmental condition characterized by a deficit in social development, set of repetitive behaviors, severely constrained interests, and/or sensory behaviors that start from the early neurodevelopmental period of life [1]. One to three years are the earliest ages at which this disorder's early signs can be recognized [2]. The prevalence of ASD is increasing in Asia and it was shown 0.51%, 0.31%, and 0.35% respectively in East Asia, South Asia, and West Asia [3]. In Bangladesh, the majority of children diagnosed with autism spectrum disorder are between 2 to 5 years of age with male predominancy and most of the patients are found in middle to the higher-income group, from urban areas and from nuclear families [4]. Autism spectrum disorder presents with varieties of symptoms. Usually associated with multiple co-morbidities and behavioural issues and ultimately it becomes a burden to the family [5]. Caregivers of ASD children show higher levels of burden affecting their overall quality of life of them [6]. Along with the caregiver's individual burden it brings difficulties in marital relationships and the whole family also has to face these challenges [7]. The relationship between siblings is one of the most significant predecessors of relationships between peers and adults. It also symbolizes one of the strongest bonds and human interactions because siblings serve as friends, teachers, and surrogate parents [8]. Sibling connections may be even more significant than parent-child interactions. Sometimes, siblings spend more time together than with their parents. Through sibling relationships that involve negotiation, cooperation, and competition, kids can learn some of the first lessons about sharing, rivalry, and compromise. For young children, sibling relationships appear to be especially crucial [9]. But there is a lack of normal sibling relationship in case of chronic illness or having a neurodevelopmental disease like intellectual disability. The same impairment occurs in the case of siblings of children with autism spectrum disorder due to its unique core feature [10]. Since the family system is an emotional unit and the framework in which the child patient exists, it is difficult to view a single family member isolatedly [11]. Emotional problems can be defined as the notion that stresses could be turned inwards or internalized leading to worries, fear, misery and multiple somatic complaints. Behavioral problems are derived from the notion that stresses can alternatively be turned outwards or externalized, resulting in disruptive, defiant, aggressive or antisocial behaviour that impinges

on others [12]. Sometimes siblings of children with neurodevelopmental disorders like autism spectrum disorder have feelings of guilt and resentment; they are at risk of psychological problems like insomnia, depression, and enuresis, showing overt behavioral symptoms such as aggression, developing anxious personality traits and low self-esteem [13]. As per the researcher's knowledge, there are very limited data in our country regarding this matter. The aim of this study was to identify emotional and behavioral problems among siblings of children with autism spectrum disorder-parent reported.

## METHODOLOGY & MATERIALS

This was a descriptive, cross-sectional study conducted from October 2021 to September 2023 at the Child and Adolescent Mental Health Clinic (CAMH), Department of Psychiatry, BSMMU, and the Institute of Paediatric Neurodisorder and Autism (IPNA), BSMMU. The study population comprised siblings aged 4–17 years of children diagnosed with Autism Spectrum Disorder (ASD). A total of 60 participants were recruited using purposive sampling after fulfilling the inclusion and exclusion criteria.

### Inclusion Criteria:

1. Parents (father or mother) of children with ASD who had at least one additional child aged 4–17 years of either sex.

### Exclusion Criteria:

1. Siblings with chronic physical illness, major psychiatric illness, ASD, or intellectual disability.

### Diagnosis and Data Collection

Diagnosis of autism spectrum disorder (ASD) in the index child was established by experienced consultant psychiatrists at the Child and Adolescent Mental Health (CAMH) Clinic, Department of Psychiatry, BSMMU, or by pediatric neurologists at the Institute of Paediatric Neurodisorder and Autism (IPNA), BSMMU, following the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) criteria. Data on siblings were collected using two research instruments. A semi-structured socio-demographic questionnaire, developed after extensive literature review and expert consultation, gathered information on age, sex, religion, parental education and occupation, family income and type, and family psychiatric history. The questionnaire was piloted for clarity, sequencing, and ease of administration. Emotional and behavioral problems in siblings aged 4–17 years were assessed using the Bangla parent version of the Strengths and Difficulties Questionnaire (SDQ), a validated 25-item tool measuring emotional symptoms, conduct problems, hyperactivity/inattention, peer problems, and prosocial behavior. Total difficulties scores were categorized as Normal (0–13), Borderline (14–16), or Abnormal (17–40). Pretesting was conducted on five participants (≈10% of the sample) to ensure feasibility. Eligible parents were approached during clinic hours, informed about the study, and provided written consent. Data were collected via face-to-face interviews, with items read aloud when necessary, and securely stored using unique study identification numbers.

### Statistical analysis

Collected data were checked for completeness and consistency, edited, coded and entered into a computer database. Data analysis was performed using IBM SPSS Statistics for Windows, Version 28.0. Descriptive statistics (frequencies, percentages, means  $\pm$  standard deviations where appropriate) were calculated to summarise sociodemographic characteristics and SDQ outcomes. For inferential analysis, associations between categorical variables (for example, sociodemographic factors and SDQ categories) were assessed using Chi-square tests (or Fisher's exact test where cell counts were small). Statistical significance was set at  $p < 0.05$  and 95% confidence intervals were reported where appropriate. Missing data were handled by case-wise deletion for analyses in which the variable of interest was missing.

### Ethical Considerations

The study protocol was approved by the Institutional Review Board (IRB) of BSMMU. Informed written consent was obtained from all participants. Measures were taken to ensure confidentiality, voluntary participation, and non-interference with ongoing treatment. No financial benefits were provided, and the study did not involve collection of biological samples. Participants had the right to refuse participation at any stage.

### RESULT

Table 1 presented the baseline sociodemographic characteristics of the siblings ( $N = 60$ ) as reported by parents. More than half of the siblings were aged 10–17 years (55%). The majority were males (60%) and lived in nuclear families (68.33%). Most families had only one child other than the child with ASD (73.33%). 41.67% of fathers had completed honors or higher education compared to 38.33% of mothers. A family history of mental illness was present in 25% of cases. Most siblings were first-born (70%), and the majority were almost always involved in caring for their ASD sibling (86.67%). The mean total SDQ score was  $10.77 \pm 5.29$ , with 16.67% of siblings scoring in the abnormal range. Emotional problems were abnormal in 25% of siblings, conduct problems in 28.33%, and hyperactivity issues in 15%. Peer problems were the least prevalent (11.67% abnormal), while prosocial behavior was normal in 90% of siblings (Table 2). Emotional disorder was suggested in 6.67% of siblings, conduct disorder in 8.33%, and hyperactivity disorder in 15% (Table 3). Table 4 showed that emotional disorders were present in 6 out of 60 siblings. A statistically significant association was found with gender ( $p = 0.040$ ), where emotional problems were more frequent among males (97.22%) than females (87.50%). The number of siblings also showed a significant association ( $p = 0.049$ ), with emotional disorders observed only among those with a single sibling, whereas none were reported in families with two or more children. Conduct disorders were detected in 9 siblings. Age was significantly associated ( $p = 0.024$ ), with a higher proportion of conduct problems among younger siblings aged 4–9 years (96.3%) compared to those aged 10–17 years (87.9%). Male siblings exhibited significantly higher conduct issues ( $p = 0.015$ ), whereas none of the female siblings had conduct problems (Table 5). Hyperactivity was present in 51 siblings. Birth order showed a significant relationship ( $p = 0.032$ ), with second-born children showing a higher prevalence of hyperactivity. A strong association was observed with family history of mental illness ( $p = 0.003$ ), where hyperactivity was more frequent in those with a positive family history (40%) (Table 6). Peer problems were identified

in 9 siblings. Time spent caring for the ASD sibling approached significance ( $p = 0.053$ ) (Table 7).

**Table 1: Baseline demographic characteristics of siblings described by parents (N=60)**

Characteristic	Frequency (n)	Percentage (%)
Age (year)		
4-9	27	45.00
10-17	33	55.00
Gender		
Male	36	60.00
Female	24	40.00
Family type		
Nuclear	41	68.33
Extended	19	31.67
Number of siblings		
One	44	73.33
Two	12	20.00
Three or more	4	6.67
Father's occupation		
Laborer	4	6.67
Business	21	35.00
Service	30	50.00
Others	5	8.33
Mother's occupation		
Housewife	49	81.67
Service	10	16.67
others	1	1.67
Educational status of Father		
No Formal Education	1	1.67
Primary	5	8.33
Secondary	16	26.67
Higher Secondary	13	21.67
Honors and above	25	41.67
Educational status of Mother		
Primary	2	3.33
Secondary	30	50.00
Higher Secondary	5	8.33
Honors and above	23	38.33
Religion		
Islam	53	88.33
Others	7	11.67

Monthly income of parents		
10-30 K	35	58.33
>30 K	25	41.67
Family history of mental illness		
Present	15	25.00
Absent	45	75.00
Birth order		
First	42	70.00
Second	15	25.00
Third	3	5.00
Time spent for care of ASD child		
Occasionally	8	13.33
Almost always	52	86.67

**Table 2: The distribution of SDQ scores of siblings (parent reported) and the prevalence of abnormal, borderline and normal scores**

Scales*	Mean $\pm$ SD	Normal n (%)	Borderline n (%)	Abnormal n (%)
Total score (0–40)	10.77 $\pm$ 5.29	41 (68.33)	9 (15.00)	10 (16.67)
Emotional problems	3.32 $\pm$ 2.02	32 (53.33)	13 (21.67)	15 (25.00)
Conduct problems	2.38 $\pm$ 1.86	30 (50.00)	13 (21.67)	17 (28.33)
Hyperactivity problems	3.63 $\pm$ 2.66	45 (75.00)	6 (10.00)	9 (15.00)
Peer problems	1.43 $\pm$ 1.30	49 (81.67)	4 (6.67)	7 (11.67)
Prosocial behaviors	7.83 $\pm$ 2.01	54 (90.00)	2 (3.33)	4 (6.67)

**Table 3: Prevalence of emotional, conduct and hyperactivity disorders in siblings after considering both abnormal and impact scores**

Suggested diagnosis	Present n (%)	Absent n (%)
Emotional disorder	4 (6.67)	56 (93.33)
Conduct disorder	5 (8.33)	55 (91.67)
Hyperactivity disorder	9 (15.00)	51 (85.00)

**Table 4: Association of different variables with emotional disorder in siblings**

Characteristic	Present n (%)	Absent n (%)	P value
Age (year)			
4-9	25 (92.59)	2 (7.41)	0.614
10-17	31 (93.94)	2 (6.06)	
Gender			
Male	35 (97.22)	1 (2.78)	0.040*
Female	21 (87.50)	3 (12.50)	
Family type			

Nuclear	38 (92.68)	3 (7.32)	0.623
Extended	18 (94.74)	1 (5.26)	
Number of siblings			
One	40 (90.91)	4 (9.09)	0.049*
Two	12 (100.00)	-	
Three or more	4 (100.00)	-	
Father's education			
None	1 (100.00)	-	0.971
Primary	5 (100.00)	-	
Secondary	15 (93.75)	1 (6.25)	
Higher secondary	12 (92.31)	1 (7.69)	
Honors	23 (92.00)	2 (8.00)	
Mother's education			
Primary	2 (100.00)	-	0.884
Secondary	28 (93.33)	2 (6.67)	
Higher secondary	5 (100.00)	-	
Honors	21 (91.30)	2 (8.70)	
Monthly income			
10-30 K	32 (91.43)	3 (8.57)	0.443
>30 K	24 (96.00)	1 (4.00)	
Family history of mental illness			
Present	15 (100.00)	-	0.306
Absent	41 (91.11)	4 (8.89)	
Birth order			
First	38 (90.48)	4 (9.52)	0.399
Second	15 (100.00)	-	
Third	3 (100.00)	-	
Time spent for care of ASD child			
Occasionally	7 (87.50)	1 (12.50)	1.00
Almost always	49 (94.23)	3 (5.77)	

**Table 5: Association of different variables with conduct disorder in siblings**

Characteristic	Present n (%)	Absent n (%)	P value
Age (year)			
4-9	26 (96.3)	1 (3.7)	0.024*
10-17	29 (87.9)	4 (12.1)	
Gender			
Male	31 (86.1)	5 (13.9)	0.015*
Female	24 (100)	-	
Family type			
Nuclear	40 (97.6)	1 (2.4)	0.031*
Extended	15 (78.9)	4 (21.1)	



Number of siblings			
One	39 (90.9)	5 (9.1)	0.541
Two	12 (100)	-	
Three or more	4 (100)	-	
Father's education			
None	1 (100)	-	0.639
Primary	5 (100)	-	
Secondary	14 (87.5)	2 (12.5)	
Higher secondary	13 (100)	-	
Honors	22 (88)	3 (12)	
Mother's education			
Primary	2 (100)	-	0.884
Secondary	26 (86.7)	4 (13.3)	
Higher secondary	5 (100)	-	
Honors	22 (95.7)	1 (4.3)	
Monthly income			
10-30 K	32 (91.4)	3 (8.6)	0.443
>30 K	23 (92)	2 (8)	
Family history of mental illness			
Present	14 (93.3)	1 (6.7)	0.633
Absent	41 (91.1)	4 (8.9)	
Birth order			
First	38 (90.5)	4 (9.5)	0.817
Second	14 (93.3)	1 (6.7)	
Third	3 (100)	-	
Time spent for care of ASD child			
Occasionally	8 (100)		0.043*
Almost always	47 (90.4)	5 (9.6)	

**Table 6: Association of different variables with hyperactivity disorder in siblings**

Characteristic	Present n (%)	Absent n (%)	P value
Age (year)			
4-9	23 (85.2)	4 (14.8)	0.63
10-17	28 (84.8)	5 (15.2)	
Gender			
Male	29 (80.6)	7 (19.4)	0.020*
Female	22 (91.7)	2 (8.3)	
Family type			
Nuclear	38 (92.7)	3 (7.3)	0.023*
Extended	13 (68.4)	6 (31.6)	
Number of siblings			
One	36 (81.8)	8 (18.2)	0.035*



Two	11 (91.7)	1 (8.3)	
Three or more	4 (100)	-	
Father's education			
None	1 (100)	-	0.578
Primary	5 (100)	-	
Secondary	12 (75)	4 (25)	
Higher secondary	12 (92.3)	1 (7.7)	
Honors	21 (84)	4 (16)	
Mother's education			
Primary	2 (100)	-	0.595
Secondary	24 (80)	6 (20)	
Higher secondary	5 (100)	-	
Honors	20 (87)	3 (13)	
Monthly income			
10-30 K	30 (85.7)	5 (14.3)	0.566
>30 K	21 (84)	4 (16)	
Family history of mental illness			
Present	9 (60)	6 (40)	0.003
Absent	42 (93.3)	3 (6.6)	
Birth order			
First	38 (90.5)	4 (9.5)	0.032*
Second	10 (66.7)	5 (33.3)	
Third	3 (100)	-	
Time spent for care of ASD child			
Occasionally	8 (100)	-	0.249
Almost always	43 (82.7)	9 (17.3)	

**Table 7: Association of different variables with peer problems in siblings**

Characteristic	Present n (%)	Absent n (%)	P value
Age (year)			
4-9	23 (85.19)	4 (14.81)	0.69
10-17	30 (29.21)	3 (9.09)	
Gender			
Male	30 (83.33)	6 (16.67)	0.225
Female	23 (95.83)	1 (4.17)	
Family type			

Nuclear	35 (85.37)	6 (14.63)	0.414
Extended	18 (94.74)	1 (5.26)	
Number of siblings			
One	38 (86.36)	6 (13.64)	0.799
Two	11 (91.67)	1 (8.33)	
Three or more	4 (100.00)	-	
Father's education			
None	1 (100.00)	-	0.287
Primary	5 (100.00)	-	
Secondary	16 (100.00)	-	
Highersecondary	10 (76.92)	3 (23.08)	
Honors	21 (84.00)	4 (16.00)	
Mother's education			
Primary	2 (100.00)	-	0.56
Secondary	28 (93.33)	2 (6.67)	
Higher secondary	4 (80.00)	1 (20.00)	
Honors	19 (82.61)	4 (17.39)	
Monthly income			
10-30 K	31 (88.57)	4 (11.43)	1.00
>30 K	22 (88.00)	3 (12.00)	
Family history of mental illness			
Present	14 (93.33)	1 (6.67)	0.668
Absent	39 (86.67)	6 (13.33)	
Birth order			
First	35 (83.33)	7 (16.67)	0.183
Second	15 (100.00)	-	
Third	3 (100.00)	-	
Time spent for care of ASD child			
Occasionally	5 (62.50)	3 (37.50)	0.053
Almost always	48 (92.31)	4 (7.69)	

## DISCUSSION

This study assessed the emotional and behavioral problems among siblings of children with ASD. This study found in terms of four difficulties sub-scales of SDQ, conduct problems were present in 28.3% siblings, emotional problems in 25%, hyperactivity problems in 15%, peer problems in 11.7%. These findings found consistent to an Italian study where emotional problems found 28.3% and hyperactivity 11.3% [14]. However, this study found much higher rate regarding conduct problems among siblings of children with autism. As children with ASD supposed to be paid more attention in a family, their siblings might receive less attention from their parents and could find that acting out is a useful way to express their needs [15]. Also, inadequate supervision from parents may play an important role in conduct problems in such cases. Parent-reported questionnaires especially data filled up by mothers revealed an increased rate of conduct problems in such siblings [16] and the majority of our responders were mothers. Though several studies showed a significant level of peer problems in typically developing

siblings of children with ASD [14,17]. Our study found peer problems 11.7% which found comparatively low and consistent with findings of a study where mainly adolescent siblings of children with disability had 15.4% at risk and 3.8% clinical range discomfort in peer problems. Those siblings might have empathy and altruism, increased maturity sense and responsibility towards their affected siblings [15]. It is found that compared to siblings of typically developing children, siblings of children with ASD expressed more respect for their sibling and less competition in their relationships [18]. In comparison to general rate, the figure found several times higher for siblings of ASD children. For instance, in the National Mental Health Survey (2019) of Bangladesh low mood 22%, disobedience (3.3-16) %, hyperactivity 3.3% were found as presenting symptoms among child and adolescent group in general [19]. This study used same age group and the same tool showed siblings of children with ASD have more problems in emotional, conduct and hyperactivity domains conducted research in three tertiary-level hospitals in Dhaka, focusing on children and adolescents [20]. The study revealed that 18% of the participants were diagnosed with a psychiatric disorder. Within this group, 9% exhibited behavioral disorders, 15% had emotional disorders and 0.4% presented with neurodevelopmental disorders. A study of school going adolescent at Bangalore using SDQ self-reported version found emotional problem around 12%, conduct problem 16%, hyperactivity 12% and 6% peer problem [21]. Quatrosi et al. mentioned, sibling with autism face various challenges that impact their psychological well-being and overall quality of life [22]. As in this case bond between siblings significantly hampered so typically developing siblings may experience diverse psychological and sociological outcomes. This study findings suggested 6.7% of siblings had emotional disorder, 8.3% conduct disorder and 15% had hyperactivity disorder considering impact score. Green (2013) conducted a systematic review and concluded - although at-risk siblings of individual with autism may experience some susceptibility to behavioral and emotional challenges, siblings also might have the capacity to adapt and flourish despite the adversity of disability [23]. The mean age of the siblings was around 10 years; as sample participants were taken purposefully between 4 to 17 years of age, this finding is understandable. Our sample was male sibling predominant (60%). Another study also reported male sibling predominance among ASD children [24]. Regarding family type, majority participants (68.3%) resided in nuclear families. As there is increasing number of nuclear families in Bangladesh this finding could be justified. The family income of the participants in the majority of cases was 10-30 thousand BDT. In Bangladesh, autism spectrum disorder prevalently found in middle to higher income families [25]. In this study, 70% of the siblings were first born and ASD children were found later-born. This finding coincides with Alvares et al., where it was reported that with increasing birth order there was an association with the development of cognitive disabilities [26]. Nearly, 90% of the parents in this study reported that they had to take care of the ASD children almost always. As services for children with autism are limited and hardly available in Bangladesh, parents have to spend many hours in taking care of the ASD children by themselves. In this study, female siblings were found to be more likely to have emotional disorder. Sociocultural factors, socialization practices, gender roles, hormonal influence and differences in cognitive and emotional processing between males and females may contributed to gender variations in emotional disorders [27]. When just one sibling was present in the family, then he/she was more likely to have emotional disorder compared to presence of two or more siblings. When sibling relationship is affectionate then it

helps to reduce internalizing symptoms in a stressful life condition [28]. Regarding conduct disorder in siblings, we found, adolescents were more likely to have it than siblings less than 10 years. Previous researchers reported prevalence being 2% in children less than 10 years old and 3%-9% in adolescents [29]. Taanila et al. observed that the highest occurrence of behavioral problems is observed in only children, whereas children from very large families had the lowest prevalence. Having a very large family appeared to be a protective factor against behavioral problems in boys. Result of this study found inconsistent. The possible explanation might be that large family size is often associated with economic difficulties [30]. We detected male siblings, children from extended families, first-born sibling had higher probability of having hyperactivity disorder as per SDQ. Ramtekkar et al. published in general, males have a higher likelihood of being diagnosed with ADHD compared to females [31]. According to a study conducted by Marín et al., firstborn children had a two times higher risk of ADHD compared to children in other birth order positions [32]. Similarly, Reimelt et al. detected extended families have a slightly higher risk of having one child with ADHD [33].

**Limitations of the study:** This study has several limitations. The absence of a control group restricts causal inference between variables. Reliance solely on parent-reported SDQ data may introduce reporting bias, and the lack of teacher or self-reports limits perspective. The purposive sampling and relatively small, single-center sample constrain representativeness and generalizability. Additionally, uncontrolled confounding factors may have influenced the observed associations between socio-demographic or familial variables and the siblings' emotional and behavioural outcomes.

## CONCLUSION AND RECOMMENDATIONS

Siblings of children with autism spectrum disorder exhibit a significantly higher prevalence of emotional and behavioural problems, including emotional symptoms, conduct issues, and hyperactivity. Female siblings were more susceptible to emotional difficulties, while males were more prone to conduct and hyperactivity problems. Key risk factors included having a single sibling with autism, greater caregiving responsibilities, and a family history of mental illness. These findings highlight the importance of systematic screening, parent psychoeducation, structured parent management training, and multi-informant assessments. Longitudinal studies are warranted to clarify long-term outcomes, identify protective and risk factors, and inform the development of targeted interventions for this vulnerable population.

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