

Emotion Regulation and Behavioral Problems in Children with Autism Spectrum Disorder: A University Hospital Based Cross-Sectional Study

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ABSTRACT

Objective: The objectives of this study were to investigate behavioral problems and emotion regulation in children with autism spectrum disorder (ASD) with and without psychiatric comorbidities, and to assess the correlation between emotion regulation and behavioral problems.

Materials and Methods: Participants included 65 children with ASD (ASD group) and 65 children with ASD and psychiatric comorbidities (ASD+CPD group), aged 6 to 12, and their caretakers. Emotion regulation was assessed by the Emotion Regulation Checklist (ERC). Behavioral problems were assessed by the Strengths and Difficulties Questionnaire (SDQ).

Results: An independent sample T-test revealed that the ASD+CPD group had poorer emotion regulation, greater emotion lability/negativity, and a higher total difficulty score when compared to the ASD group. The Pearson's Correlation Coefficient indicated that emotion regulation ($r = -0.47, p < 0.05$) and lability/negativity ($r = 0.65, p < 0.05$) correlated with the total difficulties score of the SDQ. A multiple regression analysis revealed that lower emotion regulation and higher emotion lability/negativity predicted an increase in behavioral problems ($R^2 = 0.44, p < 0.05$).

Conclusion: We found that children with ASD and psychiatric comorbidities had poorer emotion regulation and more behavioral problems than those without comorbidities, and that poorer emotion regulation predicts behavioral problems. These results indicate that children with ASD should be assessed for psychiatric comorbidities, particularly those who have emotional dysregulation and behavioral problems.

Keywords: Autism spectrum disorder; behavioral problems; emotion regulation; psychiatric comorbidities (Siriraj Med J 2023; 75: 218-223)

INTRODUCTION

Autism spectrum disorder (ASD) is a complicated neurodevelopmental disorder characterized by early onset of social communication deficits, repetitive patterns of behavior and restricted interests.¹ Previous studies have reported the prevalence of comorbid psychiatric disorders (CPD) in ASD at around 50-70% (e.g., attention deficit/hyperactivity disorder (ADHD), intellectual disability (ID),

and anxiety disorders), with around 40-90% having two or more comorbid disorders.¹⁻⁴ Based on the high prevalence of comorbidities in ASD, research has started to focus on identifying the consequences of the comorbidities and discovered that the presence of additional psychiatric disorders leads to more severe impairment due to behavioral and emotional problems that interfere with daily life activities, including social, academic, or work

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performance.⁵⁻¹¹ Research in this field has demonstrated that behavioral problems in children with ASD are related to their emotional problems. For instance, Mazefsky and Herrington proposed that behavioral problems in this population stem from underlying impairment in emotion regulation making them react negatively and impulsively to emotional stimuli.¹² However, the relationship between comorbid psychiatric disorders and emotional and behavioral difficulties have been limited.¹²⁻¹⁴ The primary objective of this study was to investigate emotion regulation and behavioral problems in children with autism, with and without psychiatric comorbidities. The secondary objective was to assess the relationship between emotion regulation and behavioral problems. The results of this study have a potential benefit in emphasizing clinicians who take care of children with ASD to look for psychiatric comorbidities, especially in cases that presented with emotional or behavioral problems.

MATERIALS AND METHODS

A cross-sectional study was conducted between 2020 and 2021. Participants were recruited from the Child and Adolescent Psychiatric Clinics at the Department of Psychiatry and the Department of Pediatrics, Siriraj Hospital, Mahidol University, Thailand. The study protocol was approved by the Siriraj Institutional Review Board (COA no. Si 666/2020).

Participants

The sample size was calculated based on the results from the study of Berenguer et al.¹⁵ which indicated that children with ASD had SDQ mean scores 30% lower than children with ADHD and comorbidities (17.43 ± 6.04 vs. 22.63 ± 5.24). In this study, it was hypothesized that children

with ASD would have similar SDQ mean scores of 17.43 and children with ASD and psychiatric comorbidities would have 20% higher SDQ mean scores which would be 20.92 [120% of 17.43]. Standard deviation (SD) of the two groups is estimated to be 6.04, with Type I error (α) = 0.05 and Type II error (β) = 0.1 [power of the test = 90% in order to increase the probability of detecting a difference]. The calculated sample per group of participants with ASD and those with ASD and comorbidities was 64. During the study period, primary caretakers of 150 children aged 6-12 years with the diagnosis of ASD (75 children with ASD and 75 children with ASD and psychiatric comorbidities) were invited to participate in the study. The diagnosis of ASD and comorbid psychiatric disorders was made by the treating child and adolescent psychiatrists, based on the Diagnostic and Statistical Manual of Mental Disorder, 5th edition; DSM-5 criteria.¹ Exclusion criteria included children with serious medical conditions and caretakers who were not able to complete questionnaires. Of the invited 150 caretakers, 130 agreed to participate in the study. This included 65 caretakers of children with ASD without comorbidities (ASD group) and 65 of children with ASD and psychiatric comorbidities (ASD+CPD group). The caretakers were asked to complete questionnaires to evaluate the children's emotion regulation and behavioral problems (Fig 1).

Instruments

Emotion Regulation Checklist (ERC)

ERC is a parent-reported screening measure comprising of 24 items used to assess emotion regulation capacity in children aged between 6 to 12. It is divided into 2 subscales as follows: 1) Emotion regulation subscale (ERC-ER) and 2) Lability/Negativity subscale (ERC-LN). The ERC-ER evaluates a child's expression of emotions,

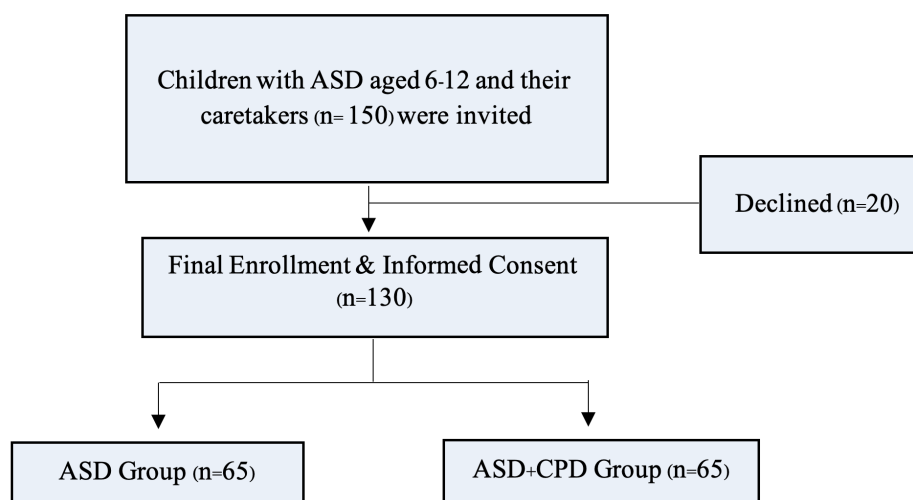


Fig 1. Flow diagram for participant recruitment and retention.

Abbreviations: ASD, autism spectrum disorder; CPD, comorbid psychiatric disorders

emotional self-awareness, and ability to display appropriate emotions. Higher scores on the ERC-ER reflect higher levels of emotion regulation ability. The Lability/Negativity Subscale (ERC-LN) assesses a child's inflexibility, variation in mood and emotional states, and dysregulation in negative effects. Higher scores on the ERC-LN reflect higher levels of emotional dysregulation. The internal consistency for both subscale is high; $\alpha = 0.83$ for ERC-ER and $\alpha = 0.96$ for ERC-LN.¹⁶ Permission to use the ERC in the study was obtained from Dante Cicchetti, Ph.D. The ERC was translated into Thai by the investigator (TB) and then back translated by a qualified translator from the Translation and Interpretation Center, Faculty of Liberal Arts, Mahidol University for validation.

Strengths and Difficulties Questionnaire (SDQ)

SDQ is a parent-reported questionnaire designed to assess behavioral problems in children aged 4 to 16. It comprises of 25 items with five subscales, including hyperactivity/inattention scale, emotional problems scale, peer relationship problems scale, conduct problems scale, and prosocial behavior scale. Summation of all the subscales, except the prosocial behavioral scale, yields a total difficulties score. Higher scores indicate greater behavioral difficulties, except for the prosocial behavioral scale where higher scores reflect positive behavior attributes. This study used the Thai version of SDQ which demonstrated good reliability at $\alpha = 0.76$.¹⁷⁻¹⁹

Data analyses

All statistical analyses were done based on a 95% confidence interval, $p < 0.05$. Descriptive statistics were used to explain demographic data. Pearson's Chi-Square test was performed to examine categorical variables such as gender, education type, education level, and medication. An independent sample T-test was performed to compare emotion regulation, emotion lability/negativity, and behavioral problems between children with and without comorbidities. The association between emotion regulation, emotion lability/negativity, and behavioral problems were examined using the Pearson's Correlation Coefficient. A multiple linear regression analysis for the predictive variable of behavioral problems was also conducted.

RESULTS

Participant characteristics

The mean age of the children was 8.7 years ($SD = 2.97$), with the range of 6 to 12 years. Eighty three percent of the children ($n = 108$) were males. In the ASD+CPD group, 44 children (67.7%) had one comorbidity and 21 children (33.3%) had more than one comorbidity. Fifty

three children (81.5%) had attention deficit/hyperactivity disorder (ADHD), 6 children (9.25%) had intellectual disability (ID), and 6 children (9.25%) had other comorbid diagnoses.

There were no significant group differences in gender, education type, or education level ($p > 0.05$) between the ASD group and the ASD+CPD group. Children in ASD+CPD group were on medication at a significantly higher rate compared to those in the ASD group ($p < 0.05$) (Table 1).

Emotion regulation

Children in the ASD+CPD group had significantly lower Emotion Regulation Subscale (ERC-ER) scores and significantly higher Lability/Negativity Subscale (ERC-LN) scores ($p < 0.01$) than children in the ASD group (Table 2).

Behavioral problems

Children in the ASD+CPD group had significantly higher scores on all SDQ subscales and the total difficulties score ($p < 0.01$), and significantly lower prosocial behavior scores ($p < 0.05$) than children in the ASD group (Table 2).

Correlation between the ERC and the SDQ

ERC-ER correlated negatively with the total difficulties scores, emotional problems scores, hyperactivity scores, and peer problems scores of the SDQ, and correlated positively with prosocial behavior scores. There was no correlation between ERC-ER and conduct problems scores (Table 3).

ERC-LN correlated positively with the total difficulties scores, emotion problems scores, conduct problem scores, hyperactivity scores, and peer problems scores of the SDQ. There was a negative correlation between ERC-LN and prosocial behavior scores (Table 3).

Predictors of behavioral problems

A multiple linear regression analysis was used to predict behavioral problems of a child's emotion regulation and emotion lability/negativity. The collinearity of emotion regulation and emotion lability/negativity was assessed. Results showed that Tolerance = 0.861 and VIF = 1.162. Therefore, emotion regulation and emotion lability/negativity have no multicollinearity problems. A significant regression equation was found to predict behavioral problems ($R^2 = 0.44$, $F = 50.87$, $p < 0.01$), thus explaining the 44% variance in behavioral problems. When ERC-ER increases 10.54 scores, the Total Difficulties Score decreases one score. When ERC-LN increases

TABLE 1. Demographic characteristics of children with ASD (ASD group) and children with ASD and psychiatric comorbidities (ASD+CPD group).

	ASD Group (N=65)	ASD+CPD Group (N=65)	P-value
Age: Mean (SD)	8.5 (2.4)	9.0 (2.2)	0.18
Gender: n (%)			
Male	55 (84.6)	53 (81.5)	0.64
Education type: n (%)			
Mainstream	42 (64.6)	38 (58.5)	0.70
Inclusive classroom	5 (7.7)	9 (13.8)	
Special education	11 (16.9)	10 (15.4)	
Not in school	7 (10.8)	8 (12.3)	
Education level: n (%)			
Kindergarten	13 (20.0)	10 (15.4)	0.77
Primary school	31 (47.7)	35 (53.8)	
Secondary school	3 (4.6)	4 (6.2)	
Special education	11 (16.9)	8 (12.3)	
Not in school	7 (10.8)	8 (12.3)	
Medication: n (%)			
On medication	25 (38.5)	51 (78.5)	<0.05*
Not on medication	40 (61.5)	14 (21.5)	

* $p < 0.05$ **TABLE 2.** Emotion Regulation Checklist and Strengths and Difficulties Questionnaire scores in children in the ASD and ASD+CPD groups.

	ASD Group	ASD + CPD Group	P-value
ERC: mean (SD)			
Emotion Regulation Subscale (ERC-ER)	23.7 (3.65)	21.4 (3.63)	<0.01**
Lability/Negativity Subscale (ERC-LN)	30.5 (5.12)	36.3 (5.71)	<0.01**
SDQ: mean (SD)			
Total difficulties score	14.70 (5.05)	20.0 (4.40)	<0.01**
Emotional problems	2.8 (1.87)	4.3 (2.14)	<0.01**
Conduct problems	2.1 (1.46)	3.2 (1.86)	<0.01**
Hyperactivity	5.4 (2.0)	7.01 (1.58)	<0.01**
Peer problems	4.4 (1.85)	5.4 (1.94)	<0.01**
Prosocial behavior	5.7 (2.25)	4.9 (2.23)	<0.05*

* $p < 0.05$, ** $p < 0.01$

TABLE 3. Correlation between ERC and SDQ.

	Total difficulties	Emotional problems	Conduct problems	Hyperactivity	Peer problems	Prosocial behavior
ERC-ER	-.47*	-.45*	-.12	-.35*	-.39*	.64*
ERC-LN	.65*	.42*	.56*	.47*	.36*	-.34*

* $p < 0.05$

16.46 scores, the Total Difficulties Score increases one score.

The predictive equation is Total Difficulties Score = $18.17 - 10.54 (\text{ERC-ER}) + 16.46 (\text{ERC-LN})$.

DISCUSSION

The results of this study showed that children with ASD who had comorbid psychiatric disorders had more behavioral problems and poorer emotion regulation abilities, as well as greater emotion lability/negativity than those without comorbidities. These results are in line with existing research highlighting the impact of psychiatric comorbidities on additional impairment in psychological profile and overall function in children with ASD.^{3,5,6,8}

The high percentage of ADHD diagnosis in this study is congruent with previous studies exploring the rate of ADHD in the ASD population. Epidemiology data from the United States and Europe indicates that 37% to 85% of children with ASD present with core symptoms of ADHD.^{3,5,6,20-22} Children with ASD and ADHD symptoms often exhibit greater behavioral problems (including temper tantrums, conduct problems, physical aggression, self-injury), severe social impairment and delays in adaptive functioning than children with ASD without ADHD.^{22,23} This may explain why children in the ASD+ CPD group in this study had more behavioral problems. The higher rate of emotional difficulties in the ASD+CPD group is also supported by previous studies which show greater both behavioral and emotional problems in children who were diagnosed with ASD and ADHD.^{5,20,22-24} Since children with ADHD alone can have emotion regulation problem, the high percentage of ADHD comorbidity in this population could be a confounding factor. The further study investigating emotion regulation and behavioral problems among children with ASD, ASD and ADHD, and ASD and other psychiatric comorbidities might be warranted.

We also found a significant relationship between emotion regulation, emotion lability/negativity, and behavioral problems. Multiple regression analysis indicated

that both emotion regulation and emotional lability/negativity were predictors of variance in behavioral problems. This supports our hypothesis and is congruent with previous studies which also found a relatively strong association between emotional dysregulation, emotion lability and externalizing behaviors.^{14,25} This suggests that children diagnosed with ASD who have lower emotion regulation abilities or more emotional labile will generally exhibit more behavioral problems. However, we did not see a correlation between emotion regulation abilities and conduct problems. This result is in contrast to the result from a study by Guttman-Steinmetz et al. that showed a link between emotional dysregulation and aggressive behavior, including conduct problems.²⁵ This might be due to the difference in conduct problems measured in each study.

There were some limitations in this study, firstly, we did not control the children's IQ levels and the intervention program, which could potentially affect the intensity and frequency of reported behavior and emotional problems. Secondly, not all children were given standardized IQ tests, therefore comorbid intellectual disability might be under diagnosed. Third, the population in this study was tertiary hospital-based that clinical presentations may be more severe. Then, generalization of the results to other clinical settings might be limited. Finally, 11.5% of children in our study were not currently in school, therefore certain questions about school behaviors were not be applicable to them. Despite these limitations, our study demonstrated higher rate of behavioral and emotional problems in children with ASD who had psychiatric comorbidities and a correlation between emotion regulation and behavioral problems. We recommend that clinicians should pay more attention to psychiatric comorbidities in children with ASD who presented with emotional difficulties or behavioral problems.

CONCLUSION

Children with ASD and comorbid psychiatric disorders had poorer ability to regulate emotions and more behavioral problems than those without comorbidities. We also

found that poor emotion regulation predicts behavioral problems. Therefore, we suggest that all children with ASD should be evaluated for psychiatric comorbidities, especially those who show extensive behavioral problems and poor emotional regulation that exceeds what is typically seen in children with ASD alone. Interventions targeting emotion regulation in these children should also be further studied.

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