

Emotional Lability Independently Predicts Functional Impairment in Children with ADHD: A Cross-Sectional Study

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Background: Emotional lability (EL), characterized by excessive emotional fluctuations and intense outbursts, frequently co-occurs with attention deficit hyperactivity disorder (ADHD) and may exacerbate functional impairments. This study aimed to explore the disparities in ADHD-related symptoms and functional impairments in children with ADHD who exhibited EL and those without it and to examine the unique contribution of EL to functional impairments.

Methods: A total of 427 children with ADHD, aged 6–14 years, were recruited from Shenzhen Children's Hospital. EL was assessed using the Conners' Parent Rating Scale, while ADHD-related symptoms were measured using the ADHD Rating Scale (ADHD-RS) and Child Behavior Checklist (CBCL). Functional impairment was assessed using the Weiss Functional Impairment Scale-Parent Form (WFIRS-P). Group comparisons were conducted between ADHD with EL and ADHD without EL, and correlations and multiple linear regressions were performed to explore the associations between EL, ADHD-related symptoms, and functional impairment.

Results: EL prevalence in the study sample was 33.96%. Children with ADHD and EL exhibited significantly higher scores for inattention ($P < 0.001$), hyperactivity/impulsivity ($P < 0.001$), CBCL factors ($P < 0.001$), and all domains of functional impairment ($P < 0.05$) than those without EL. The two groups differed substantially in their distribution of ADHD subtypes ($P = 0.012$). Moderate correlations were found between EL and functional impairment ($r = 0.40\text{--}0.45$, $P < 0.001$). After adjusting for ADHD-related symptoms, EL independently predicted impairments in family ($P = 0.001$), life skills ($P = 0.001$), self-concept domains ($P = 0.001$), and total functional impairment ($P = 0.002$). EL, along with attention scores, social problems, and delinquent behaviors, significantly predicted the overall functional impairment.

Conclusion: EL is a significant contributor to functional impairment in children with ADHD, exerting its influence independently of the core symptoms of ADHD. Our findings highlight the need for targeted interventions to address emotional regulation in ADHD and mitigate long-term functional impairments.

Keywords: attention deficit/hyperactivity disorder, emotional lability, functional impairment

Introduction

Attention deficit/hyperactivity disorder (ADHD) is a childhood-onset neurodevelopmental disorder with core symptoms of inattention, hyperactivity, and impulsivity.¹ It affects approximately 5.29% of school-age children globally.² Despite the tendency for these core symptoms to improve as children age,³ ADHD often co-occurs with other psychiatric disorders, such as conduct disorder, pervasive developmental disorder, oppositional-defiant disorder,⁴ depression and anxiety disorder,^{5,6} which significantly disrupt a child's academic progress, family harmony, and social integration.^{7–9} As a result, children with ADHD are at a high risk of long-term and far-reaching impairments across multiple aspects of their daily lives.



Emotional lability (EL) generally describes exaggerated emotional responses that are disproportionate to the situation, abrupt and unpredictable shifts in mood, and heightened sensitivity to emotional stimuli.¹⁰ EL has also been referred to as mood instability, affective lability, emotional impulsiveness, emotional dysregulation (ED), or deficient emotional self-regulation (DESR).^{11–13} EL is characterized by excessive and rapidly shifting emotions and is often associated with an inappropriately high intensity.^{13–15} In addition to the core symptoms of inattention, hyperactivity, and impulsivity, the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) lists EL symptoms separately as associated features of ADHD,¹ although it is not part of the diagnostic criteria. The neurobiological mechanisms underlying EL in ADHD remain incompletely understood. Two distinct hypotheses have emerged to explain the neurobiological foundations of EL in ADHD: (1) Dyscontrol hypothesis: Posits that EL arises from impaired executive function, particularly deficits in prefrontal cortical regulation of subcortical limbic structures like the amygdala. This model emphasizes top-down regulatory failures that lead to exaggerated emotional responses. (2) Affectivity hypothesis: EL stems from primary abnormalities in emotional processing within the limbic system itself rather than secondary to executive dysfunction. This framework highlights the bottom-up hyper-reactivity of the amygdala to emotional stimuli.^{13,16,17}

EL is common among individuals with ADHD, and a comprehensive review concluded that the prevalence of EL in youth with ADHD ranges from 24% to 50%.¹⁸ However, the clinical characteristics of patients with ADHD and EL, and the differences between those with and without EL are not fully understood. Children with ADHD typically experience functional impairments in various aspects of daily life, extending beyond core symptoms, and a paucity of studies have demonstrated an association between EL and functional impairment in ADHD.^{18,19} However, previous studies have mainly focused on the impact of EL on the social functioning of children with ADHD,^{20–22} neglecting critical domains such as family functioning and adaptive skills; thus, there is an urgent need for more in-depth research to clarify the relationship between EL and other subdomains of functional impairment, such as family relationships, school performance, and life skills, in children with ADHD.

In this study, we set out to achieve two main aims. First, we aimed to compare the severity and functional impairment between children with comorbid ADHD and EL and those with ADHD-only. Second, we sought to examine whether EL independently predicts functional impairment after controlling for core ADHD symptoms and hypothesized that children with ADHD and EL would exhibit more severe symptomatology across behavioral and emotional domains and that EL would have a significant impact on all subdomains of functional impairments in children with ADHD.

Methods

Participants

Children with ADHD were recruited from the Children's Health Care and Mental Health Center at Shenzhen Children's Hospital. The sample size was determined through an a-priori power analysis using G*Power 3.1. Based on a previous study showing a moderate effect size ($d^* = 0.61$) in functional impairment (WFIRS-P) between ADHD with and without EL,²³ with $\alpha = 0.05$ and $1-\beta = 0.90$, the analysis indicated a minimum requirement of 116 participants. Accounting for 20% potential attrition, we planned to recruit 145 participants. During recruitment, we expanded the sample size to enhance generalizability. Figure 1 summarizes the recruitment and screening workflow. Clinicians diagnosed ADHD based on the Schedule for Affective Disorders and Schizophrenia for School-Age Children's Present and Lifetime versions (K-SADS-PL). The diagnosis process was conducted through a semi-structured clinical interview. Eligible children with ADHD were between 6 and 18 years old, with a full-scale IQ of 70 or above, as measured by the Wechsler Intelligence Scale for Chinese Children-IV (WISC-IV). Children were excluded if they met any of the following criteria: having any severe physical illness or neurological irregularities (eg, seizures, brain injury); use of any prescribed medications for ADHD or other medical conditions. A total of 427 samples were included in the analysis for this study, and the project was approved by the Ethics Committee of Shenzhen Children's Hospital. The study was conducted in accordance with the Declaration of Helsinki and complied with the ethical standards of the institutional and/or national research committee for all procedures involving human participants. Written informed consent was obtained from both parents and children.

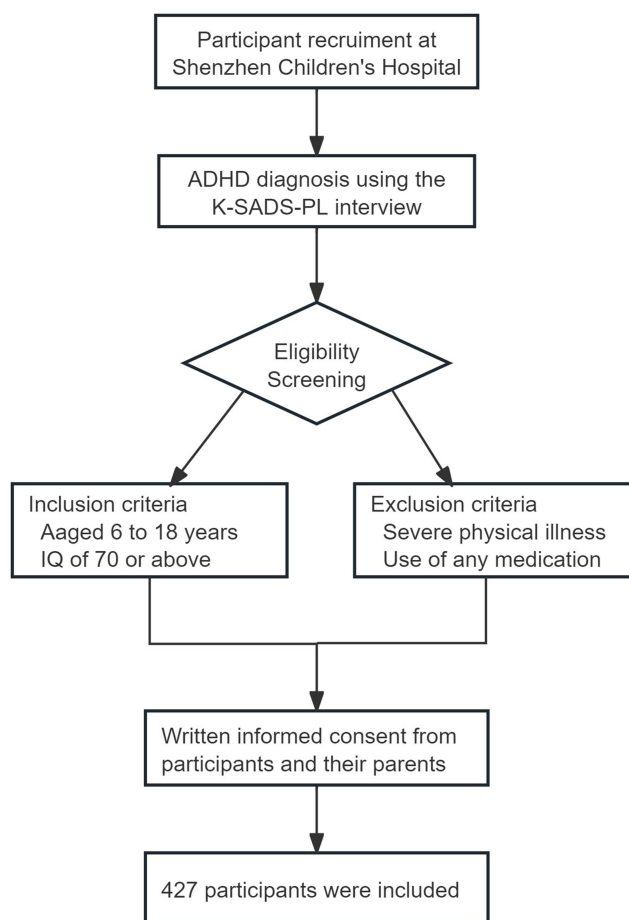


Figure 1 Flowchart of participant recruitment and enrollment for the study.

Evaluation of Emotional Lability (EL)

EL was assessed using Conners' Parents Rating Scale (CPRS). The EL construct was composed of the following items in the CPRS: (a) cries often and easily, (b) has temper outbursts, (c) experiences mood changes quickly and drastically, and (d) gets easily frustrated in effort. The items were rated directly on a 4-point Likert-type scale (0 = never, 1 = sometimes, 2 = often, and 3 = always) by their parents. The EL score was calculated by summing the scores for these four items. A score of 6 or above was used to identify EL cases.²⁴

Evaluation of ADHD Related Symptoms

The core symptoms and severity of ADHD were measured using the ADHD Rating Scale (ADHD-RS), which consists of 18 items and adopts a 4-point Likert scale. The total scores range from 0 to 54, with higher scores indicating more severe ADHD symptoms, comprising two symptom subscales: inattention and hyperactivity-impulsivity (Cronbach's $\alpha=0.746$).²⁵ Child Behavior Checklist (CBCL) was utilized to assess behavior outcomes of children with ADHD. This is a 113-item parent-report measure of behavioral problems in children and adolescents aged 4–16 years. Items are rated on a 3-point Likert-type scale (0 = "Behavior absent", 1 = "Behavior presents sometimes", 2 = "Behavior presents frequently"). It measures children and adolescents' emotional, behavioral, and social problems and consists of eight syndrome scales: withdrawal, somatic complaints, anxiety/depression, social problems, thought problems, attention problems, delinquent behavior, and aggressive behavior (Cronbach's $\alpha=0.797$).²⁶

Evaluation of Functional Impairment

Functional impairment was evaluated using Chinese version of Weiss Functional Impairment Scale-Parent form (WFIRS-P).²⁷ This scale provides a comprehensive evaluation of functional impairment across various aspects of daily life. The scale consisted of six dimensions: family (10 items), learning and school (10 items), life skills (10 items), self-concept (3 items), social activities (7 items), and risk-taking activities (10 items), with a total of 50 items. Each item is rated on a scale from 0 (never) to 3 (always). The average score for each domain is calculated by summing the scores of all rated items within that domain and dividing by the number of valid items (excluding items rated as “not applicable”). A domain average score of ≥ 1.5 indicates the presence of clinically significant functional impairment. The WFIRS-P demonstrated good reliability (Cronbach’s $\alpha=0.768$).

Statistical Analyses

Statistical analyses were performed using SPSS version 24.0. Participants were stratified according to their EL status (CPRS score ≥ 6). Categorical variables were described by reporting frequencies and percentages, and differences among groups were assessed using the chi-square test. Continuous variables were presented as mean and standard deviation, and differences among groups were analyzed using Two Independent samples *T* test (normally distributed continuous variables) or Mann–Whitney *U*-tests (non-normal distributions) for symptom severity and functional impairment (reported as mean \pm SD). Pearson correlations were used to examine bivariate associations between EL, ADHD-related symptoms (ADHD-RS and CBCL), and functional impairment (WFIRS-P). Hierarchical linear regression models quantified EL’s unique contribution to impairment domains after controlling for ADHD core symptoms. Separate regressions were run for each impairment domain. A two-tailed hypothesis test was used for all statistical analysis and $p<0.05$ was set as the level of statistical significance.

Results

Participants’ Characteristics

A total of 427 participants aged 6–14 years were included in the study. The majority of the sample were male (358 individuals, 83.8%). Among the participants, 186 (43.6%) were diagnosed with the predominantly inattentive subtype of ADHD (ADHD-I), and 223 subjects (52.2%) were identified as having a combined subtype of ADHD (ADHD-C). A relatively small number, 18 subjects (4.22%) belonged to the predominantly hyperactive-impulsive subtype of ADHD (ADHD-HI). Notably, 145 participants were classified as having ADHD with EL, accounting for 33.96% of the cohort.

Group Differences in Clinical Characteristics and Functional Impairment

As presented in Table 1, no significant differences were found in sex or age between the ADHD with EL and ADHD without EL groups (all $P>0.05$). However, the groups differed significantly in the ADHD subtype distribution ($P=0.012$).

Table 1 Clinical Characteristics and Functional Impairment in ADHD with and without EL

	ADHD with EL (n=145)	ADHD without EL (n=282)	$\chi^2/t/Z$	p
Gender (male/female,%)	124/21 (85.5/14.5)	234/48 (83.0/17.0)	0.455	0.500
Age (mean [SD])	8.43 (1.82)	8.70 (1.78)	1.474	0.141
ADHD subtypes (%)				
ADHD-I	49 (33.8)	137 (48.6)	8.885	0.012
ADHD-HI	6 (4.1)	12 (4.2)		
ADHD-C	90 (62.1)	133 (47.2)		

(Continued)

Table 1 (Continued).

	ADHD with EL (n=145)	ADHD without EL (n=282)	$\chi^2/t/Z$	p
SNAP-RS				
Inattention score (mean [SD])	18.60 (5.01)	15.60 (4.99)	5.854	<0.001
Hyperactivity/impulsivity score (mean [SD])	16.17 (5.80)	11.88 (5.29)	7.561	<0.001
CBCL factors				
Withdrawal (median [IR])	3.00 (3.00)	2.00 (2.00)	6.078	<0.001
Somatic complaints (median [IR])	1.00 (2.00)	1.00 (1.00)	5.760	<0.001
Anxiety/Depression (mean [SD])	5.65 (3.81)	2.95 (2.73)	7.694	<0.001
Social problems (mean [SD])	4.79 (2.36)	3.69 (2.31)	4.613	<0.001
Thought problems (median [IR])	1.00 (2.00)	1.00 (1.00)	3.964	<0.001
Attention problems (mean [SD])	9.68 (2.71)	7.66 (2.92)	6.926	<0.001
Delinquent behaviors (mean [SD])	4.72 (2.82)	3.35 (2.18)	5.087	<0.001
Aggressive behaviors (mean [SD])	15.64 (6.03)	9.95 (5.02)	9.761	<0.001
Functional Impairment				
Family (mean [SD])	8.67 (4.37)	5.90 (3.63)	6.543	<0.001
School (mean [SD])	8.59 (4.33)	7.33 (4.12)	2.940	0.003
Life skills (mean [SD])	11.00 (4.08)	8.70 (3.65)	5.907	<0.001
Self concept (mean [SD])	3.00 (2.07)	2.07 (1.76)	4.819	<0.001
Social activities (mean [SD])	6.73 (3.79)	5.07 (3.27)	4.468	<0.001
Risky activities (mean [SD])	3.89 (2.59)	2.70 (2.02)	4.843	<0.001
Total (mean [SD])	41.88 (14.70)	31.77 (12.27)	7.098	<0.001

Abbreviations: EL, Emotional lability; ADHD, Attention deficit hyperactivity disorder; SNAP-RS, ADHD Rating Scale; CBCL, Child Behavior Checklist; SD, Standard Deviation; IR, Interquartile range.

Specifically, the ADHD with EL group showed significantly higher scores than the ADHD without EL group in inattention, hyperactivity/impulsivity, and all CBCL factors (all $P < 0.001$). Furthermore, across all functional impairment domains—family, school, life skills, self-concept, social activities, and risky activities—as well as the total score, the ADHD with EL group demonstrated markedly elevated scores relative to the ADHD without EL group (all $P < 0.05$).

Correlation Among Functional Impairment, EL and Symptoms of ADHD

Positive correlations were observed across all domains and total functional impairment scores with EL and ADHD-related symptoms (Table 2). Moderate correlations were found between the total score of functional impairment and EL, inattention scores, social problems, attention problems, delinquent behaviors and aggressive behaviors, with the correlation(r) ranging from 0.40 to 0.45 (all $P < 0.001$). After adjusting for ADHD-related symptoms, EL independently demonstrated positive and significant associations with the scores on the family domain ($P = 0.001$), life-skill domain ($P = 0.001$), self-concept domain ($P = 0.001$), and total score ($P = 0.002$), as shown in Table 3. On average, a 1-point increase in EL score was associated with a 0.75-point increase in total functional impairment score (95% CI, 0.26–1.23). EL, attention scores, social problems, and delinquent behaviors emerged as significant predictors of overall functional impairment with a relatively high coefficient of determination (R^2) of 0.41.

Table 2 Pearson Correlations Between Functional Impairment, EL and ADHD Symptoms

Functional Impairment	EL	SNAP-RS		CBCL							
		Inattention Scores	Hyperactivity/ Impulsivity Scores	Withdrawal	Somatic Complaints	Anxiety/ Depression	Social Problems	Thought Problems	Attention Problems	Delinquent Behaviors	Aggressive Behaviors
Family	0.36***	0.26***	0.26***	0.26***	0.14**	0.26***	0.27***	0.23***	0.29***	0.30***	0.42***
School	0.16***	0.38***	0.25***	0.19***	0.18***	0.20***	0.25***	0.17***	0.33***	0.35***	0.24***
Life skills	0.34***	0.32***	0.18***	0.29***	0.15**	0.27***	0.23***	0.22***	0.28***	0.27***	0.29***
Self concept	0.29***	0.21***	0.13**	0.36***	0.14*	0.37***	0.27***	0.26***	0.28***	0.21***	0.16***
Social activities	0.25***	0.30***	0.31***	0.30***	0.03	0.27***	0.49***	0.20***	0.28***	0.22***	0.28***
Risk activities	0.30***	0.24***	0.34***	0.20***	0.08	0.27***	0.35***	0.25***	0.29***	0.41***	0.43***
Total	0.40***	0.43***	0.35***	0.38***	0.18***	0.38***	0.44***	0.31***	0.42***	0.42***	0.45***

Note: * <0.05 , ** <0.01 , *** <0.001 .

Abbreviations: EL, Emotional lability; ADHD, Attention deficit hyperactivity disorder; SNAP-RS, ADHD Rating Scale; CBCL, Child Behavior Checklist.

Table 3 Summary of Multiple Linear Regression Results of EL, ADHD-Related Symptoms on Functional Impairments

Functional Impairment	Predictors	Unstandardized Coefficients	Standardized Coefficients	R ²	P	95% CI for the Unstandardized Coefficients		Collinearity Statistics	
						Lower Limit	Upper Limit	Tolerance	VIF
Family	Constant	1.45		0.23	0.027	0.16	2.74		
	EL	0.26	0.17		0.001	0.10	0.42	0.62	1.60
	Attention scores	0.09	0.12		0.048	0.001	0.19	0.49	2.01
	Social problems	0.23	0.13		0.016	0.04	0.42	0.57	1.74
	Aggressive problems	0.18	0.26		<0.001	0.09	0.27	0.39	2.53
School	Constant	1.29		0.22	0.059	-0.04	2.64		
	Attention scores	0.23	0.28		<0.001	0.13	0.33	0.49	2.01
	Delinquent behaviors	0.43	0.25		<0.001	0.24	0.62	0.56	1.77
Life skills	Constant	4.26		0.20	<0.001				
	EL	0.26	0.18		0.001	0.10	0.42	0.62	1.60
	Attention scores	0.22	0.28		<0.001	0.12	0.31	0.49	2.01
	Hyperactivity/impulsivity scores	-0.09	-0.13		0.028	-0.17	-0.01	0.48	2.06
Self concept	Constant	0.55		0.21	0.077	-0.06	1.17		
	EL	0.12	0.17		0.001	0.04	0.20	0.62	1.60
	Withdrawal	0.12	0.14		0.017	0.02	0.23	0.50	1.97
	Anxiety/Depression	0.13	0.22		<0.001	0.06	0.19	0.50	1.98
	Aggressive behaviors	-0.06	-0.21		0.002	-0.11	-0.02	0.39	2.53
Social activities	Constant	0.99		0.33	0.062	-0.05	2.03		
	Attention scores	0.09	0.13		0.021	0.01	0.16	0.49	2.01
	Hyperactivity/impulsivity scores	0.09	0.15		0.007	0.02	0.16	0.48	2.06
	Withdrawal	0.21	0.13		0.015	0.04	0.39	0.50	1.97
	Somatic complaints	-0.28	-0.13		0.003	-0.47	-0.09	0.78	1.26
	Social problems	0.72	0.48		<0.001	0.57	0.87	0.57	1.74
	Attention problems	-0.27	-0.23		<0.001	-0.42	-0.13	0.40	2.46
Risk activities	Constant	0.14		0.28	0.696	-0.56	0.84		
	Hyperactivity/impulsivity scores	0.05	0.12		0.031	-0.01	0.09	0.48	2.06
	Social problems	0.23	0.24		<0.001	0.12	0.33	0.57	1.74
	Delinquent behaviors	0.18	0.20		<0.001	0.08	0.28	0.56	1.77
	Aggressive behaviors	0.05	0.15		0.021	0.01	0.10	0.39	2.53

(Continued)

Table 3 (Continued).

Functional Impairment	Predictors	Unstandardized Coefficients	Standardized Coefficients	R ²	P	95% CI for the Unstandardized Coefficients		Collinearity Statistics	
						Lower Limit	Upper Limit	Tolerance	VIF
Total	Constant	8.70		0.41	<0.001	4.83	12.57		
	EL	0.75	0.14		0.002	0.26	1.23	0.62	1.60
	Attention scores	0.68	0.25		<0.001	0.39	0.96	0.49	2.01
	Social problems	1.46	0.24		<0.001	0.88	2.03	0.57	1.74
	Delinquent behaviors	0.83	0.14		0.003	0.28	1.38	0.56	1.77

Note: All models used the enter method.

Abbreviations: EL, Emotional lability; ADHD, Attention deficit hyperactivity disorder; CI, Confidence Interval; VIF, Variance inflation factor.

Discussion

Principal Findings

This study investigated the demographic and clinical characteristics of children with ADHD, focusing on the functional impairment differences between ADHD groups with and without EL. Additionally, it explored the associations among functional impairment, EL, and ADHD symptoms, and found that EL was prevalent among participants with ADHD and exhibited significant differences in ADHD subtype distribution. Compared to children with ADHD alone, those with EL displayed greater severity in ADHD-related symptoms and functional impairment. After adjusting for ADHD-related symptoms, EL remained independently and positively associated with multiple subdomains and the total score of functional impairment. This suggested that EL exerts a unique influence on functional impairment, extending beyond the influence of ADHD symptoms alone.

Epidemiology of EL in ADHD

Our study found that the prevalence of EL was 33.96% among participants with ADHD. This finding is consistent with previous research, although the reported prevalence rates vary.^{13,18,28,29} For instance, one study defined EL as a T-score ≥ 65 on emotional lability items of the parent completed Conners' Rating Scale-Revised (CRS-R) and reported a prevalence of 46.92% in children with ADHD, compared with 15.38% of their non-ADHD siblings.¹⁹ Similarly, two other studies used parent-rated items from the CBCL anxious-depressed, attention, and aggression scales to assess EL, which was defined as positive if a subject's sum of attention, aggression, and anxious/depressed CBCL scales was > 180 (> 60 on average on each scale) but < 210 (average t-score of $> 60 < 70$ on each scale). They found that 40.4–44.0% of children with ADHD exhibited EL, while only 2–3.5% of controls did.^{30,31} Turkia et al defined severe EL as a child with an aggregated cut-off score of > 210 on the attention, aggression, and anxious/depressed CBCL, and found that 63% of children with ADHD had a severe EL.²⁸ These discrepancies may have arisen from differences in assessment tools and sample characteristics; although the prevalence of EL in our study was slightly lower than in some previous studies, the results collectively underscore the high prevalence of EL in individuals with ADHD.

In this study, the ADHD with EL group exhibited a lower proportion of the ADHD-I subtype (33.79%) than did the ADHD without EL group (48.58%), whereas the ADHD-C subtype was more prevalent in the ADHD with EL group (62.07% vs 47.17%). These findings challenge the traditional view of ADHD subtypes as being independent of emotional factors.¹ Previous research demonstrated that EL was more strongly associated with hyperactive-impulsive than with inattentive symptoms.^{14,15,29,32} Hyperactivity-impulsivity symptoms may lead to more frequent emotional fluctuations and difficulties in self-regulation, thereby increasing the likelihood of EL. In contrast, individuals with ADHD-I may exhibit more internalizing symptoms such as inattention and daydreaming, which may have less direct impact on emotional expression. Traditionally, ADHD subtypes (ADHD-I, ADHD-HI, ADHD-C) are mainly classified based on

behavioral symptoms, and emotional factors (such as EL) are not included in the classification criteria.¹ However, our findings indicate that EL may be closely related to specific subtypes (eg, ADHD-C), highlighting the potential significance of emotional factors in ADHD subtype classification.

Impact of EL on Functional Impairment in Children with ADHD

Our findings showed that the ADHD with EL group scored significantly higher on inattention, hyperactivity/impulsivity, and all factors of the CBCL compared to ADHD without EL group. This aligns with the hypothesis that EL exacerbates ADHD symptoms and is consistent with prior studies,^{15,29,32} indicating that EL may exacerbate the core symptoms of ADHD and additional emotional and behavioral difficulties. The worsening of inattention and hyperactivity/impulsivity symptoms may be due to EL interfering with patients' self-regulation abilities, making it more difficult for them to control their behavior and attention. Moreover, the higher scores on all CBCL factors in the ADHD with EL group further indicated that EL can trigger or intensify broader emotional and behavioral challenges in patients, which include increased internalizing (eg, anxiety, depression) and externalizing (eg, aggression, rule-breaking) problems. While our findings suggest that EL may exacerbate ADHD symptoms, an equally plausible interpretation is that core ADHD symptoms-particularly hyperactivity-impulsivity (HI) may directly contribute to EL.³³ This aligns with evidence that HI disrupts prefrontal-amygdala connectivity, impairing emotion regulation.^{34,35} However, as our study is cross-sectional, causal inferences remain tentative. Future longitudinal or experimental designs are needed to disentangle this relationship. This bidirectional possibility warrants further longitudinal investigation. In terms of functional impairment, the ADHD with EL group scored higher in various domains, including family, school, life skills, self-concept, social activities, risky activities, and overall total scores. This clearly demonstrates that EL has a more extensive and severe effect on daily functioning in patients with ADHD. These findings are consistent with the notion that EL in ADHD is a marker for greater overall impairment.^{18,20,36} Recent studies have highlighted that EL exacerbates functional deficits across multiple domains, including family, school, social activities, and risk-taking behaviors.^{11,37} The pervasive nature of these difficulties underscores the importance of addressing EL in ADHD interventions,³⁸ as it may contribute to more severe symptomatology and poorer functional outcomes.

The findings of the study reveal significant positive correlations between EL and all domains of functional impairment, and moderate correlations were identified between the total score of functional impairment and EL, inattention scores, social problems, attention problems, delinquent behaviors, and aggressive behaviors. The consistent associations between EL and various domains of functional impairment highlight the pervasive impact of EL on daily functioning in individuals with ADHD. Notably, even after adjusting for ADHD-related symptoms, EL independently demonstrated significant positive relationships with functional impairment in the family domain, life-skills domain, self-concept domain, and the total score. This finding underscores the unique contribution of EL to functional impairment beyond the effects of core ADHD symptoms. Previous studies have similarly highlighted the role of EL in ADHD, noting its association with poorer outcomes in the academic, social, and family domains.^{11,18,36} For instance, EL may lead to heightened interpersonal conflict, reduced ability to cope with stress, and difficulties in maintaining consistent performance on daily tasks. These findings align with our results, particularly the strong association between EL and family functioning, which may reflect the disruptive impact of emotional outbursts or mood instability on family dynamics.^{21,39,40} Furthermore, the observed link between EL and life skills deficits likely reflects shared reliance on executive functions. Elevated EL may overwhelm cognitive resources (eg, working memory, inhibitory control), impairing planning and self-care.⁴¹ Alternatively, executive dysfunction in ADHD could predispose individuals to both EL (via poor emotion regulation) and life skills deficits.⁴² Therefore, the inclusion of EL in predictive models of functional impairment could enhance the identification of individuals at risk of severe outcomes and inform the development of targeted interventions. For example, interventions that focus on improving emotion regulation skills, such as mindfulness-based therapies or cognitive-behavioral strategies, may help mitigate the negative impact of EL on daily functioning.⁴³⁻⁴⁵

Limitations

This study has some limitations. First, the cross-sectional design restricts its ability to establish causal relationships. Future longitudinal studies are needed to determine whether EL directly contributes to the development or exacerbation of functional impairment in patients with ADHD. Second, the sample was mainly from a specific region, which may limit the generalizability of the results. Broader sampling from different geographical areas and cultural backgrounds enhanced the external validity of the findings. Third, the lack of a non-ADHD control group precludes conclusions about whether the observed EL levels are ADHD-specific or reflect general variability. Future studies should include non-ADHD controls to establish normative benchmarks for EL and symptom levels. This would help distinguish disorder-specific effects from general individual differences.

Conclusions

This study emphasizes the need to assess EL, and highlights EL as a clinically significant correlation of multidimensional impairment in ADHD. Interventions targeting emotion regulation, such as cognitive-behavioral therapy (CBT) or emotion-focused strategies, may be particularly beneficial for this population.⁴⁶ Future research should explore the mechanisms underlying the relationship between EL and functional impairment as well as the long-term effects of interventions targeting EL in ADHD.

Abbreviations

ADHD, attention-deficit/hyperactivity disorder; EL, emotional lability; CPRS, Conners' Parents Rating Scale; SNAP-RS, ADHD Rating Scale; CBCL, Child Behavior Checklist; WFIRS-P, Weiss Functional Impairment Scale-Parent Form; SD, Standard Deviation; IR, Interquartile range.

Data Sharing Statement

The data are available under reasonable request to the corresponding author.

Ethics Approval

This study was approved by the Ethics Committee of Shenzhen Children's Hospital (201701805) and written informed consent was obtained from all participants and legal guardians.

Consent to Participate

Informed consent was obtained from all participants or their legal guardians before filling the questions in the survey was completed. Participants were informed that their personal information was not identified or collected, and that all data were anonymous.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

The authors declare that they have no conflicts of interest in this work.

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