

# Strengths and Difficulties Regarding Attention Deficit Hyperactivity Disorder: Correlation with Social Responsiveness and Disorder Severity

## Dikkat Eksikliği Hiperaktivite Bozukluğunda Güçler ve Zorluklar: Sosyal Cevaplılık ve Bozukluk Şiddeti ile İlişkisi

Pınar AYDOĞAN AVŞAR<sup>1</sup>, Tayfun KARA<sup>2</sup>, Orhan KOCAMAN<sup>2</sup>, Tacettin KURU<sup>3</sup>

<sup>1</sup>Department of Child and Adolescent Psychiatry, Alanya Education and Research Hospital, Antalya, Türkiye

<sup>2</sup>Department of Child and Adolescent Psychiatry, Faculty of Medicine, Alanya Alaaddin Keykubat University, Antalya, Türkiye

<sup>3</sup>Department of Psychiatry, Alanya Education and Research Hospital, Antalya, Türkiye

### ABSTRACT

**Objective:** Children with neurodevelopmental disabilities often experience social difficulties. Children with attention deficit hyperactivity disorder (ADHD) are more likely to experience peer rejection and cognitive, academic, family, and professional difficulties. This investigation aimed to identify the predictors of difficulties faced by children and adolescents with ADHD.

**Material and Methods:** We established ADHD diagnoses based on DSM-5 criteria. Moreover, every participant had a diagnostic evaluation by a child and adolescent psychiatrist using the Kiddie Schedule for Affective Disorders and Schizophrenia (K-SADS-PL) and a detailed sociodemographic form documented. Parents completed the Turgay DSM IV-Based Child and Adolescent Behavioural Disorders Screening and Rating Scale (T-DSM-IV-S), the Strengths and Difficulties Questionnaire (SDQ), and the Social Responsiveness Scale (SRS) for their children.

**Results:** The study included 99 children, 59 in the ADHD group and 40 in the control group. There was no significant difference between the groups regarding gender and age. The mean scores of T-DSM-IV-S [Attention deficit (AD), Hyperactivity/impulsivity (H/I), Oppositional defiant disorder (ODD), Conduct disorder (CD)], SDQ, and SRS were significantly higher in the ADHD group than in the control group. Among the independent variables in the regression model, SRS total scores significantly predicted SDQ-total ( $\beta = 0.238$ ,  $p = 0.033$ ) and SDQ-emotion ( $\beta = 0.439$ ,  $p = 0.001$ ) scores in the ADHD group.

**Conclusion:** Children diagnosed with ADHD may have more receptive deficits in mutual interactions than their peers, which greatly impacts their social behaviors. Early social skills training for social functioning impairments may reduce the condition's social impact.

**Key Words:** ADHD, Neurodevelopmental Disorders, SDQ, SRS

### ÖZ

**Amaç:** Nörogelişimsel bozukluğu olan çocuklar sıklıkla sosyal zorluk yaşarlar. Dikkat eksikliği hiperaktivite bozukluğu (DEHB) olan çocukların akran reddi ve bilişsel, akademik, ailevi ve mesleki zorluklar yaşama olasılığı daha yüksektir. Bu araştırma, DEHB'li çocuk ve ergenlerin günlük yaşamlarında karşılaştığı zorlukların belirleyicilerini tespit etmeyi amaçlamıştır.



0000-0001-5938-3243 : AYDOĞAN AVŞAR P  
0000-0002-2156-3457 : KARA T  
0000-0002-7504-5604 : KOCAMAN O  
0000-0002-0313-558X : KURU T

**Conflict of Interest / Çıkar Çatışması:** On behalf of all authors, the corresponding author states that there is no conflict of interest.

**Ethics Committee Approval / Etik Kurul Onayı:** This study was conducted in accordance with the Helsinki Declaration Principles. The study was approved by Alaaddin Keykubat University Faculty of Medicine Ethics Committee (10354421-2023/5-09).

**Contribution of the Authors / Yazarların katkısı:** **AYDOĞAN AVŞAR P:** Constructing the hypothesis or idea of research and/or article, Planning methodology to reach the Conclusions, Taking responsibility in patient follow-up, collection of relevant biological materials, data management and reporting, execution of the experiments, Taking responsibility in necessary literature review for the study, Taking responsibility in the writing of the whole or important parts of the study, Reviewing the article before submission scientifically besides spelling and grammar. **KARA T:** Taking responsibility in patient follow-up, collection of relevant biological materials, data management and reporting, execution of the experiments, Reviewing the article before submission scientifically besides spelling and grammar. **KOCAMAN O:** Organizing, supervising the course of progress and taking responsibility of the research/ study, Taking responsibility in logical interpretation and conclusion of the results, Reviewing the article before submission scientifically besides spelling and grammar. **KURU T:** Taking responsibility in logical interpretation and conclusion of the results, Reviewing the article before submission scientifically besides spelling and grammar.

**How to cite / Atıf yazım şekli :** Aydoğan Avşar P, Kara T, Kocaman O and Kuru T. Strengths and Difficulties Regarding Attention Deficit Hyperactivity Disorder: Correlation with Social Responsiveness and Disorder Severity. Turkish J Pediatr Dis 202X;

Correspondence Address / Yazışma Adresi:

**Pınar AYDOĞAN AVŞAR**  
Department of Child and Adolescent Psychiatry,  
Alanya Education and Research Hospital, Antalya, Türkiye  
E-posta: dr\_pinaraydogan@hotmail.com

Received / Geliş tarihi : 04.04.2024

Accepted / Kabul tarihi : 29.05.2025

Online published : 31.07.2024

Elektronik yayın tarihi

DOI: 10.12956/tchd.1464417

**Gereç ve Yöntemler:** DEHB tanıları DSM-5 kriterlerine göre belirlenmiştir. Ayrıca, her katılımcı bir çocuk veya ergen psikiyatristi tarafından Okul Çağı Çocukları için Duygulanım Bozuklukları ve Şizofreni Görüşme Çizelgesi- Şimdi ve Yaşam Boyu Şekli- (ÇDŞG-ŞY-T) kullanılarak tanısal bir değerlendirmeye tabi tutulmuş ve ayrıntılı bir sosyodemografik form belgelenmiştir. Ebeveynler çocukları için Turgay DSM IV Tabanlı Çocuk ve Ergen Davranış Bozuklukları Tarama ve Derecelendirme Ölçeğini (T-DSM-IV-S), Güçler ve Güçlükler Anketini (SDQ) ve Sosyal Duyarlılık Ölçeğini (SRS) doldurmuştur.

**Bulgular:** Bu çalışmaya 99 çocuk dahil edilmiştir. DEHB grubunda 59 ve kontrol grubunda 40 çocuk. Gruplar arasında cinsiyet ve yaş açısından anlamlı bir fark yoktu. T-DSM-IV-S (AD, H/I, ODD, CD), SDQ ve SRS ortalama puanları DEHB grubunda kontrol grubuna göre anlamlı derecede yüksektir. DEHB grubunda oluşturulan regresyon modelindeki bağımsız değişkenler arasından SRS toplam skoru toplam SDQ ( $\beta = 0.238$ ,  $p = 0.033$ ) ve SDQ-duygu alt ölçeği ( $\beta = 0.439$ ,  $p = 0.001$ ) skorlarını anlamlı şekilde yordamıştır.

**Sonuç:** DEHB tanısı alan çocuklar, karşılıklı etkileşimlerde akranlarına göre daha fazla alıcı eksikliğe sahip olabilir ve bu da sosyal davranışlarını büyük ölçüde etkiler Sosyal işlevsellik bozuklukları için erken sosyal beceri eğitimi, durumun etkisini azaltabilir.

**Anahtar Sözcükler:** DEHB, Nörogelişimsel Bozukluklar, SDQ, SRS

## INTRODUCTION

Attention deficit hyperactivity disorder (ADHD) and autism spectrum disorder (ASD) are neurodevelopmental disorders that frequently occur concurrently. In addition, these two developmental disorders share overlapping behavioral characteristics and common etiological factors (1). The most prevalent mental illness in childhood, ADHD, has a lifetime incidence of 5 to 7%. The symptoms of ADHD include inattention, hyperactivity, and impulsivity, which include challenges with maintaining focus, being still, and waiting one's turn (2). On the other hand, with a frequency of approximately 2%, ASD is thought to be a rarer disease (3). In addition to so-called restricted, repetitive, and stereotyped behaviors and limited interests (RRBIs), the behavioral symptoms of ASD include difficulties with social communication and interaction. Researchers and clinical professionals have long acknowledged that there is significant overlap between ASD and ADHD, despite these behaviors that seem to be distinct from one another. According to formal studies, 20–80% of children diagnosed with ASD also fulfill the DSM-IV criteria for ADHD. Actually, among children with ASD, ADHD is the most prevalent comorbid mental disorder. Subsequently, 30–60% of individuals diagnosed with ADHD also had clinical signs of ASD. It is worth noting that these difficulties involve every characteristic of ASD, such as difficulties in social interaction and communication as well as RRBIs (4). Until the implementation of the Diagnostic and Statistical Manual of Mental Disorders 5 (DSM-5), individuals diagnosed with ASD could not also be diagnosed with ADHD (5). Multiple DSM-5 clinical classification-based neurocognitive studies have demonstrated that individuals with ADHD and ASD have more attention difficulties than those with ASD alone (6). Furthermore, ADHD accompanied by autism symptoms results in greater deficits in adaptive functioning, as well as more severe social and cognitive difficulties (7). These findings offer substantiation for the notion that these disorders are distinct. In previous versions of the DSM, ADHD, and ASD were considered mutually exclusive diagnoses. However, the DSM-5 now permits the co-occurrence of ADHD and ASD (8).

Approximately one-third of children diagnosed with ADHD exhibit symptoms that are diagnostic of ASD (4). Reports indicate that, similar to children diagnosed with ASD, the majority of children

diagnosed with ADHD exhibited social deficits. Likewise, difficulties in nonverbal communication and stereotypical hand and body movements also have been observed in children with ADHD (9). It was reported that 59% of children with ADHD exhibited moderate autistic-like behaviors, whereas 7% of these children displayed severe ASD symptoms (10). ADHD is characterized by social interaction and communication deficits, but these deficits are less pronounced than those of ASD. Social skill deficits associated with ADHD have substantial implications for an individual's cognitive abilities (11). Additionally, research suggests that frontal cortex abnormalities are present in both ADHD and ASD (12). This suggests that deficits in executive functioning are associated with both conditions (13). The examination as mentioned above of behavioral, cognitive, neuropsychological, and neurobiological data indicates that the symptom concurrence observed in individuals with ASD and ADHD is indicative of a co-morbid condition.

There is a prevalent association between children who have developmental disorders and increased susceptibility to social impairment. Children who have ADHD or ASD are at an increased risk of encountering higher levels of peer rejection and experiencing impairments in cognitive, academic, familial, and occupational domains. Children diagnosed with both ASD and ADHD exhibit more pronounced impairments in social and adaptive skills when compared to children with ASD alone (14). Furthermore, deficits in social functioning are significant contributors to the adverse consequences of ADHD, both in the short and long term (15). The idea of social functioning is founded on cognitive and social skills and is influenced by both personal traits and contextual variables. Among the more advanced social abilities that contribute to the development of social competence are the ability to interact with others and discern their intentions, emotions, and facial expressions (16). Social reciprocity is an integral aspect of social functioning. Social competence is the ability to establish and sustain reciprocal connections while effectively adapting to social circumstances. Children diagnosed with ADHD have notable challenges in their social interactions. Approximately 50–60% of children with ADHD are rejected by their classmates, compared to just 13–16% of children in primary school classes (17,18).

In children with ADHD, being domineering, intrusive, rigid, controlling, rude, explosive, argumentative, quickly irritated, inattentive during organized sports or games, and breaching game regulations may lead to rejection (19).

In both clinical and population samples, oppositional defiant disorder (ODD) and conduct disorder (CD) are reported to often coexist with ADHD (20). These coexisting conditions are known to be associated with a more unfavorable outcome of ADHD. In a ten-year follow-up study, major depression was linked to ODD comorbidity, whereas CD comorbidity was associated with a significantly increased risk of illegal substance use disorders, smoking, and bipolar disorder in children with ADHD (21). Additionally, compared to children with ADHD alone, children with ADHD with CD comorbidity are more likely to participate in criminal activity, have driving-related consequences, and develop antisocial personality disorder as adults (22). Other research has indicated that children with ADHD and ODD exhibit a higher percentage of ADHD symptoms and neuropsychological deficits than those without ODD. The findings of the study also suggest that emotional dysregulation and social impairment are more prevalent in individuals with comorbid ODD (23).

Upon examining the literature, we found some research investigating deficits in social functioning in ADHD primarily concentrates on co-occurring disorders, and other investigations discuss theories regarding etiology. The goal of this study was to determine whether the Social Responsiveness Scale (SRS) scores, which measure the presence and severity of social impairment and the Turgay DSM IV-Based Child and Adolescent Behavioural Disorders Screening and Rating Scale (T-DSM-IV-S) scores, which serve as a measurement tool for screening and diagnosing children with ADHD, could predict the total and subscale scores of the strengths and difficulties questionnaire as indicators of the daily life challenges faced by children with ADHD. We hypothesized that worse social functioning is associated with greater difficulties in the daily lives of children with ADHD and aim to examine this association in light of sociodemographic data.

## MATERIALS and METHODS

This study was conducted between December 2023 and February 2024 at Alanya Training and Research Hospital. Children and adolescents ( $n=59$ , 17 girls and 42 boys) between the ages of 6 and 18 who volunteered and had an ADHD diagnosis based on DSM-5 criteria have been included in the research. The patients received the diagnosis of ADHD for the first time, and medical treatment was not initiated. Exclusion criteria for the ADHD group included comorbid diagnoses of psychosis, mental retardation, other neurodevelopmental disorders such as ASD and specific learning disorder (SLD), oppositional defiant disorder (ODD), conduct disorder (CD), any mood or anxiety disorder, and a history of systemic illness. The

control group consisted of 40 (16 girls and 24 boys) age- and gender-matched healthy children who applied to the pediatric outpatient clinic at Alanya Training and Research Hospital for regular care and had no current illness or mental problem.

The researchers have documented sociodemographic and clinical information using a questionnaire. Every participant had a diagnostic evaluation by a child/adolescent psychiatrist using the Schedule for Affective Disorders and Schizophrenia for School-Aged Children, Present and Lifetime Version (K-SADS-PL). ADHD diagnoses were made based on the criteria established in the DSM-5 (24). Parents completed the Turgay DSM IV-Based Child and Adolescent Behavioural Disorders Screening and Rating Scale (T-DSM-IV-S), the Strengths and Difficulties Questionnaire (SDQ), and the Social Responsiveness Scale (SRS) for their children (25-27).

The study was approved by Alaaddin Keykubat University Faculty of Medicine Ethics Committee (10354421-2023/5-09). We received the written informed consent from the parent and the verbal consent from the children.

## Statistical Analyses

Frequency and percentage values for categorical data and mean and standard deviations for continuous variables were calculated. The normal distribution of the data for the control and ADHD groups was evaluated by analyzing the kurtosis-skewness values and graphs (Q-Q plot, histogram). The results within the range of  $\pm 1.5$  for kurtosis-skewness values were considered to have a normal distribution. The homogeneity of variances was examined by Levene's test. Multicollinearity was tested by VIF values ( $VIF < 10$ ). In the comparison of the research scale results for ADHD and the control group, the Mann Whitney U test was used. The chi-square test was used to compare categorical variables. Spearman correlation coefficients were used for the relationship between variables. Regression analysis was tested in which, the mean SDQ-total and subscale score results were dependent and the mean scores of AD (attention deficit), H/I (hyperactivity-impulsivity), ODD (oppositional defiant disorder), CD (conduct disorder) of the T-DSM-IV-S scale, and the SRS scale were independent variables. Analyses were performed with Jamovi (Version 2.4) and  $p < 0.05$  values were considered significant.

## RESULTS

We conducted the study with 99 volunteers who provided their informed consent. Total 59 (59.6%) of the participants were diagnosed with ADHD, and the mean age of the participants was  $9.88 \pm 1.48$ . Total 33 (33.3%) of the participants were girls, and 66 (66.7%) of the participants were boys. Table I displays the sociodemographic characteristics of the control and ADHD groups. Accordingly, no significant difference was found between the groups in terms of gender ( $p = 0.247$ ) or age ( $p =$

**Table I: Comparison of Demographic Characteristics of ADHD and Control Groups**

|   | ADHD         | Control      | $\chi^2$ or U | p                  |
|---|--------------|--------------|---------------|--------------------|
| Gender*                                       |              |              |               |                    |
| Female  | 17 (28.8)    | 16 (40)      | 1.342         | 0.247 <sup>†</sup> |
| Male  | 42 (71.2)    | 24 (60)      |               |                    |
| Maternal Education*                           |              |              |               |                    |
| Until middle school                           | 31 (53.4)    | 19 (52.8)    | 0.004         | 0.950 <sup>‡</sup> |
| High school/ above                            | 27 (46.6)    | 17 (47.2)    |               |                    |
| Paternal Education*                           |              |              |               |                    |
| Until middle school                           | 28 (48.3)    | 15 (41.7)    | 0.391         | 0.532 <sup>‡</sup> |
| High school/ above                            | 30 (51.7)    | 21 (58.3)    |               |                    |
| Age <sup>†</sup>                              | 9.881±1.480  | 9.940±1.585  | 1160          | 0.886 <sup>§</sup> |
| Maternal Age <sup>†</sup>                     | 35.797±5.527 | 36.750±5.271 | 1029          | 0.282 <sup>§</sup> |
| Paternal Age <sup>†</sup>                     | 39.034±6.544 | 40.200±5.140 | 973           | 0.140 <sup>§</sup> |
| Paternal-Maternal Age difference <sup>†</sup> | 3.237±3.486  | 3.450±3.029  | 1107          | 0.603 <sup>§</sup> |

\*: n(%), †: mean±SD, ‡: Chi-Square, §: Mann Whitney U

**Table II: Comparison of Scale Scores of ADHD and Control Groups**

|                | n  | Mean Rank | Sum of Rank | U    | Z      | p      | ES    |
|----------------|----|-----------|-------------|------|--------|--------|-------|
| T-DSM-IV-S AD  |    |           |             |      |        |        |       |
| ADHD           | 59 | 69.01     | 4071.50     | 58.5 | -8.007 | <0.001 | 0.805 |
| Control        | 40 | 21.96     | 878.50      |      |        |        |       |
| T-DSM-IV-S H/I |    |           |             |      |        |        |       |
| DEHB           | 59 | 68.36     | 4033.50     | 96.5 | -7.738 | <0.001 | 0.778 |
| Control        | 40 | 22.91     | 916.50      |      |        |        |       |
| T-DSM-IV-S ODD |    |           |             |      |        |        |       |
| DEHB           | 59 | 64.34     | 3796.00     | 334  | -6.042 | <0.001 | 0.607 |
| Control        | 40 | 28.85     | 1154.00     |      |        |        |       |
| T-DSM-IV-S CD  |    |           |             |      |        |        |       |
| ADHD           | 59 | 61.59     | 3634.00     | 496  | -5.190 | <0.001 | 0.522 |
| Control        | 40 | 32.90     | 1316.00     |      |        |        |       |
| SRS Total      |    |           |             |      |        |        |       |
| ADHD           | 59 | 68.20     | 4024.00     | 106  | -7.661 | <0.001 | 0.770 |
| Control        | 40 | 23.15     | 926.00      |      |        |        |       |
| SDQ Total      |    |           |             |      |        |        |       |
| ADHD           | 59 | 67.93     | 4008.00     | 122  | -7.556 | <0.001 | 0.759 |
| Control        | 40 | 23.55     | 942.00      |      |        |        |       |

**ES:** Effect Size, **ADHD:** Attention-deficit/hyperactivity disorder, **AD:** Attention deficit, **H/I:** Hyper-activity-impulsivity, **ODD:** Oppositional defiant disorder, **CD:** Conduct disorder, **SRS:** Social Responsiveness Scale, **SDQ:** Strengths and difficulties questionnaire, **T-DSM-IV-S:** Turgay DSM IV-Based Child and Adolescent Behavioural Disorders Screening and Rating Scale, Mann Whitney-U.

0.886). Similarly, no significant difference was found between the two groups in terms of, maternal age (U = 1029.000 p=0.282, z=-1.079), paternal age (U = 973.000 p=0.140, z=-1.479) and paternal-maternal age difference (U = 1107.000 p=0.603, z=-0.524) (Table I).

In comparison to the control group, the ADHD group exhibited significantly higher scores in all sub-scales of the T-DSM-IV-S scale (AD, p<0.001; H/I, p<0.001; ODD, p<0.001; CD, p<0.001) and the total scores of the SRS (p<0.001) and the SDQ (p<0.001) (Table II).

**Table III: Correlation coefficients of scales in the ADHD Group**

|                          | T-DSM-IV-H/I       | T-DSM-IV-CD <sup>1</sup> | T-DSM-IV-AD        | T-DSM-IV-ODD       | SRS Total          |
|--------------------------|--------------------|--------------------------|--------------------|--------------------|--------------------|
| T-DSM-IV-H/I             | —                  |                          |                    |                    |                    |
| T-DSM-IV-CD <sup>1</sup> | 0.295*             | —                        |                    |                    |                    |
| T-DSM-IV-AD              | 0.385 <sup>†</sup> | 0.268*                   | —                  |                    |                    |
| T-DSM-IV-ODD             | 0.433 <sup>‡</sup> | 0.756 <sup>‡</sup>       | 0.277*             | —                  |                    |
| SRS Total                | 0.294*             | 0.266*                   | 0.250              | 0.284*             | —                  |
| SDQ Total                | 0.459 <sup>‡</sup> | 0.547 <sup>‡</sup>       | 0.421 <sup>‡</sup> | 0.549 <sup>‡</sup> | 0.404 <sup>‡</sup> |

\*: p < 0.050, †: p < 0.010, ‡: p < 0.001 = Spearman's RHO

**Table IV: Regression Analysis for SDQ-emotion Subscale Score**

| Predictor                  | Unstd Coef | SE    | Stand. Coef | t      | p     |
|----------------------------|------------|-------|-------------|--------|-------|
| T-DSM-IV-S-AD              | -0.003     | 0.052 | -0.006      | -0.048 | 0.962 |
| T-DSM-IV-S-H/I             | 0.021      | 0.055 | 0.056       | 0.387  | 0.700 |
| T-DSM-IV-S-ODD             | 0.062      | 0.064 | 0.175       | 0.957  | 0.343 |
| T-DSM-IV-S-CD <sup>1</sup> | -0.052     | 0.107 | -0.084      | -0.490 | 0.626 |
| SRS Total                  | 0.054      | 0.016 | 0.439       | 3.399  | 0.001 |

**Unstd Coef:** Unstandardized Coefficients

**Table V: Regression Analysis for SDQ-conduct Subscale Score**

| Predictor                  | Unstd. Coef | SE    | Stand. Coef | t     | p     |
|----------------------------|-------------|-------|-------------|-------|-------|
| T-DSM-IV-S-AD              | 0.055       | 0.042 | 0.143       | 1.310 | 0.196 |
| T-DSM-IV-S-H/I             | 0.024       | 0.045 | 0.064       | 0.531 | 0.598 |
| T-DSM-IV-S-ODD             | 0.082       | 0.052 | 0.236       | 1.559 | 0.125 |
| T-DSM-IV-S-CD <sup>1</sup> | 0.259       | 0.087 | 0.422       | 2.981 | 0.004 |
| SRS Total                  | 0.002       | 0.013 | 0.016       | 0.150 | 0.881 |

**Unstd Coef:** Unstandardized Coefficients

Except for the correlation between the T-DSM-IV-S-AD subscale scores and the total SRS scores (r=0.250, p=0.056), all scale scores showed significant correlations with each other (Table III). The regression model was tested with the scores of SDQ total and subscales as the dependent variable. VIF values were reviewed for multicollinearity. VIF values were found to be in the range of 1.17–2.38. The model in which T-DSM-IV-S-AD, T-DSM-IV-H/I, T-DSM-IV-S-ODD, T-DSM-IV-S-CD, and total SRS scores were independent variables and SDQ-peer and SDQ-prosocial subscale scores were the dependent variables, were non-significant (F(5.53) = 0.913 p=0.473, F(5.53) = 1.449 p=0.222 respectively). The model in which T-DSM-IV-S-AD, T-DSM-IV-H/I, T-DSM-IV-S-ODD, T-DSM-IV-S-CD, and total SRS scores were independent variables and the mean SDQ-hyperactivity score was the dependent variable was significant, F(5.53) = 3.733 p=0.006. However, although the model was significant, no independent variable could significantly predict SDQ-hyperactivity scores (p>0.050). The model in which T-DSM-IV-S-AD, T-DSM-IV-H/I, T-DSM-IV-S-ODD, T-DSM-IV-S-CD, and total SRS scores were

**Table VI: Regression analysis for SDQ Scale Total Score**

| Predictor                  | Unstd Coef | SE    | Stand. Coef | t    | p     |
|----------------------------|------------|-------|-------------|------|-------|
| T-DSM-IV-S-AD              | 0.143      | 0.095 | 0.167       | 1.50 | 0.139 |
| T-DSM-IV-S-H/I             | 0.164      | 0.100 | 0.200       | 1.64 | 0.108 |
| T-DSM-IV-S-ODD             | 0.143      | 0.118 | 0.187       | 1.21 | 0.230 |
| T-DSM-IV-S-CD <sup>1</sup> | 0.273      | 0.196 | 0.202       | 1.40 | 0.169 |
| SRS Total                  | 0.063      | 0.029 | 0.238       | 2.19 | 0.033 |

**Unstd Coef:** Unstandardized coefficients

independent variables and SDQ-emotion score was the dependent variable was significant,  $F(5.53) = 3.630$   $p=0.007$ . Approximately 18.5 % of the variance in SDQ-emotion score was explained by the independent variables in the model. Among the independent variables in the model, only the SRS total score ( $\beta = 0.439$ ,  $p < 0.001$ ) significantly predicted the SDQ-emotion score (Table IV).

The model in which T-DSM-IV-S-AD, T-DSM-IV-H/I, T-DSM-IV-S-ODD, T-DSM-IV-S-CD, and total SRS results were independent variables and SDQ-conduct result was a dependent variable was significant,  $F(5.53) = 10.154$   $p < 0.001$ . Approximately 44% of the variance in SDQ-conduct was explained by the independent variables in the model. Among the independent variables in the model, only the T-DSM-IV-S-CD score ( $\beta = 0.422$ ,  $p = 0.004$ ) significantly predicted the SDQ-conduct score (Table V).

The model in which T-DSM-IV-S-AD, T-DSM-IV-H/I, T-DSM-IV-S-ODD, T-DSM-IV-S-CD, and total SRS scores were independent variables and total SDQ-total score was the dependent variable was significant,  $F(5.53) = 9.351$   $p < 0.001$ . Approximately 42% of the variance in the SDQ total was explained by the independent variables in the model. Among the independent variables in the model, only the total SRS score ( $\beta = 0.238$ ,  $p = 0.033$ ) significantly predicted the SDQ total score (Table VI).

## DISCUSSION

The current research investigated the hypothesis that children and adolescents diagnosed with ADHD may have autism-like symptoms and more impaired social responsiveness than their peers, resulting in challenges in their daily lives. Consistent with our hypotheses, the study results revealed that children and adolescents with ADHD exhibited more impaired social responsiveness and encountered greater difficulties than their peers. Moreover, there is significant evidence indicating that social responsiveness is a reliable predictor of emotional symptoms and total difficulties experienced by children and adolescents with ADHD.

It is well known that comorbidities are often present with ADHD in childhood (20). When the literature is examined, it is seen that ADHD is accompanied by oppositional defiant disorder in approximately 30-50% and conduct disorder in 5% (28). Multiple studies have proven that when ODD and/or CD accompany ADHD, it exacerbates the clinical presentation

and leads to further decline in the child's functioning (29). In a longitudinal prospective study, CD symptoms were identified as the most reliable predictor of severe antisocial behavior, while ODD symptoms predicted persistent involvement in the juvenile justice system in children with ADHD. Additionally, the onset of internalizing and social problems was independently predicted by ODD symptoms (30). When ADHD co-occurs with behavioral symptoms of ODD and CD, the child's problematic behavior intensifies, leading to more incidences of peer bullying and exclusion. According to reports, the prognosis for an individual with both ADHD and ODD diagnosis is significantly worse than if they were to be diagnosed with a single disorder. This is because individuals who have both disorders are more likely to suffer from anxiety, depression, conduct disorder, and antisocial personality disorder in later life (31). Additionally, there is a higher likelihood of experiencing physical and psychological violence within the family which leads to more life challenges (32). The literature above indicates that individuals with ADHD face greater challenges in their daily lives as the severity of disruptive behavioral symptoms accompanying ADHD increases throughout childhood. In the same vein, our investigation uncovered that the ADHD group exhibited significantly higher scores on the ODD and CD subscales of the Turgay DSM IV-Scale at the symptom level, albeit not at the diagnostic level, in comparison to the control group. Additionally, we found elevated scores on the strengths and difficulties questionnaire among children diagnosed with ADHD compared to healthy controls in our study. These scores serve as indicators of the difficulties that individuals face in their daily lives, in interpersonal relationships, and their overall functioning. A statistically significant correlation was found between the T-DSM-IV-S, disruptive behaviors OD, and CD subscale scores and the total scores of SDQ. Furthermore, regression analysis demonstrated that SDQ-conduct subscale scores were significantly predicted by T-DSM-IV-S CD subscale scores indicating that CD symptoms accompanying ADHD lead to more challenges in conduct domains.

Among the mental disorders that are frequently observed during childhood, ADHD and social functioning impairment are closely related. Prior research indicates a higher prevalence of autistic traits in individuals diagnosed with ADHD (33,34). Our research also revealed that children diagnosed with ADHD had higher SRS total scores compared to the control group as an indicator of social impairment. Although social difficulties are not an essential diagnostic criterion for ADHD, children with the disorder often struggle with interpersonal relationships. These challenges are often seen as a direct consequence of the core symptoms of ADHD. Inattentive behaviors may cause a child to fail to notice social signs, impulsiveness can lead to harming peers, and hyperactivity can hamper participation in planned activities and result in avoiding classmates (1). Approximately 50-60% of children with ADHD are reported to face rejection from their peers resulting in difficulties for children and adolescents with ADHD in their daily lives. Many children with

ADHD are despised within minutes of their first social encounter and denied further chances to improve social skills, which leads to additional rejection (35). Poor emotional regulation, deficits in conversation and reciprocity, social-cognitive biases, and a high incidence of intrusive behavior all appear to be associated with these social difficulties (36). Alternately stated, social difficulties associated with ADHD may result from deficiencies in internal regulatory mechanisms (37). Aligned with this data, the findings of our study indicate a significant correlation between the total scores of the SRS and the SDQ scores in children and adolescents with ADHD. Moreover, regression analyses revealed that the total SRS score which measures social responsiveness, emerged as a significant predictor of the emotional and overall difficulties these individuals faced, as determined by the SDQ. The difficulties that children with ADHD experience seem to be more closely associated with autistic symptoms than with AD, HI, and OD symptoms.

Based on all the data above, children diagnosed with ADHD may experience much more receptive impairments in mutual relationships than their peers, which significantly affects their social behavior. It makes it challenging for these children to offer appropriate emotional responses to events and adjust to their circumstances. Implementing intervention programs, such as early social skills training for deficiencies in social functioning in certain areas, may lessen the negative social implications of the condition in adulthood. Comorbid symptoms of disruptive disorders also should be included in interventions in addition to the diagnosis of ADHD, and if required, extra treatments for these disorders.

## CONCLUSION

The cross-sectional nature of our research, its limited scope at a single site, and the small sample size may hinder the applicability of the findings to a broader population. We only obtained the data for our study from parental reports. Consequently, it is believed that including the designated factors about the social responsiveness of children in assessments would enhance the efficacy of prospective studies, and multicenter research may provide more accurate findings on this topic.

## REFERENCES

1. Leitner Y. The co-occurrence of autism and attention deficit hyperactivity disorder in children - what do we know? *Front Hum Neurosci* 2014;8:268.
2. Polanczyk G, Jensen P. Epidemiologic Considerations in Attention Deficit Hyperactivity Disorder: A Review and Update. *Child Adolesc Psychiatr Clin N Am* 2008;17:245–60.
3. Kang L, Liu J, Liu Y, Liang W, Yang F and Liu M. Global, regional, and national disease burden of autism spectrum disorder among children under 5 years from 1990 to 2019: An analysis for the Global Burden of Disease 2019 Study. *Asian J Psychiatr* 2023;79:103359.
4. Deserno MK, Bathelt J, Groenman AP, Geurts HM. Probing the overarching continuum theory: data-driven phenotypic clustering of children with ASD or ADHD. *Eur Child Adolesc Psychiatry* 2023;32:1909–23.
5. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders*. 5<sup>th</sup> ed. Washington, DC: APA 2013.
6. Sprenger L, Bühler E, Poustka L, Bach C, Heinzel-Gutenbrunner M, Kamp-Becker I, et al. Impact of ADHD symptoms on autism spectrum disorder symptom severity. *Res Dev Disabil* 2013;34:3545–52.
7. Cooper M, Martin J, Langley K, Hamshere M, Thapar A. Autistic traits in children with ADHD index clinical and cognitive problems. *Eur Child Adolesc Psychiatry* 2014;23:23–34.
8. Antshel KM, Russo N. Autism Spectrum Disorders and ADHD: Overlapping Phenomenology, Diagnostic Issues, and Treatment Considerations. *Curr Psychiatry Rep* 2019;21:1–11.
9. Mayes SD, Calhoun SL, Mayes RD, Molitoris S. Autism and ADHD: Overlapping and discriminating symptoms. *Res Autism Spectr Disord* 2012;6:277–85.
10. Mulligan A, Anney R, O'Regan M, Chen W, Butler L, Fitzgerald M, et al. Autism symptoms in Attention-Deficit/Hyperactivity Disorder: a familial trait which correlates with conduct, oppositional defiant, language and motor disorders. *J Autism Dev Disord* 2009;39:197–209.
11. Happé F, Booth R, Charlton R, Hughes C. Executive function deficits in autism spectrum disorders and attention-deficit/hyperactivity disorder: examining profiles across domains and ages. *Brain Cogn* 2006;61:25–39.
12. Eliez S, Reiss AL. Annotation: MRI Neuroimaging of Childhood Psychiatric Disorders: A Selective Review. *J Child Psychol Psychiatry* 2000;41:679–94.
13. Geurts HM, Verté S, Oosterlaan J, Roeyers H, Sergeant JA. How specific are executive functioning deficits in attention deficit hyperactivity disorder and autism? *J Child Psychol Psychiatry* 2004;45:836–54.
14. Rao PA, Landa RJ. Association between severity of behavioral phenotype and comorbid attention deficit hyperactivity disorder symptoms in children with autism spectrum disorders. *Autism* 2014;18:272–80.
15. Greene RW, Biederman J, Faraone SV, Ouellette , Penn C and Griffin SM. Toward a new psychometric definition of social disability in children with attention-deficit hyperactivity disorder. *J Am Acad Child Adolesc Psychiatry* 1996;35:571–8.
16. Wyman PA, Sandler I, Wolchik S, Nelson, K. Resilience as cumulative competence promotion and stress protection: Theory and intervention. In Cicchetti D, Rappaport J, Sandler I, Weissberg RP (Eds.), *The promotion of wellness in children and adolescents* In 2000:133-84.
17. Barkley RA. *Attention-deficit hyperactivity disorder: A handbook for diagnosis and treatment*. 3<sup>rd</sup> Edition, Guilford Press, New York USA 2006.
18. Terry R, Coie JD. A Comparison of Methods for Defining Sociometric Status Among Children. *Dev Psychol* 1991;27:867–80.
19. Carpenter Rich E, Loo SK, Yang M, Dang J, Smalley SL. Social functioning difficulties in ADHD: Association with PDD risk. *Clin Child Psychol Psychiatry* 2009;14:329.
20. Pliszka SR. Comorbidity of attention-deficit/hyperactivity disorder with psychiatric disorder: An overview. *J Clin Psychiatry* 1998;59:50–8.
21. Biederman J, Petty CR, Dolan C, Hughes S, Mick E, Monuteaux MC, et al. The long-term longitudinal course of oppositional

- defiant disorder and conduct disorder in ADHD boys: findings from a controlled 10-year prospective longitudinal follow-up study. *Psychol Med* 2008;38:1027–36.
22. Gnanavel S, Sharma P, Kaushal P, Hussain S. Attention deficit hyperactivity disorder and comorbidity: A review of literature. *World J Clin Cases* 2019;7:2420.
  23. Kim H, Jung E, Lee T, Kim S, Kim HW. Impact of Comorbid Oppositional Defiant Disorder on the Clinical and Neuropsychological Characteristics of Korean Children With Attention-Deficit/Hyperactivity Disorder. *Psychiatry Investig* 2023;20:962.
  24. Gökler B, Ünal F, Pehlivan Türk B, Kültür EC, Akdemir D, Taner Y. Reliability and validity of schedule for affective disorders and schizophrenia for school age children-present and lifetime version-turkish version (k-sads-pl-t). *Turk J Child Adolesc Ment Health* 2004;11:109-16.
  25. Ercan ES, Amado S, Somer O and Çıkoğlu S. Development of A Test Battery for the Assessment of Attention Deficit Hyperactivity Disorder. *Turk J Child Adolesc Ment Health* 2001; 8:132-44.
  26. Güvenir T, Özbek A, Baykara B, Arkar H, Şentürk B, İncekaş S. Psychometric properties of the Turkish version of the Strengths and Difficulties Questionnaire (SDQ). *Turk J Child Adolesc Ment Health* 2008;15: 65-74.
  27. Ünal S, Güler AS, Dedeoğlu C, Taşkın B and Yazgan Y. Dikkat Eksikliği Hiperaktivite Bozukluğu tanısı olan klinik örnekleme sosyal karşılıklık: Okul örnekleminde elde edilen kontrol grubu ile karşılaştırma. Poster bildirisi. 19. Ulusal Çocuk ve Ergen Ruh Sağlığı ve Hastalıkları Kongresi. Hatay 2009.
  28. Spencer TJ. ADHD and Comorbidity in Childhood. *J Clin Psychiatry* 2006;67:27-31.
  29. Johnston C. Parent characteristics and parent-child interactions in families of nonproblem children and ADHD children with higher and lower levels of oppositional-defiant behavior. *J Abnorm Child Psychol* 1996;24:85–104.
  30. Pardini DA, Fite PJ. Symptoms of Conduct Disorder, Oppositional Defiant Disorder, Attention-Deficit/Hyperactivity Disorder, and Callous-Unemotional Traits as Unique Predictors of Psychosocial Maladjustment in Boys: Advancing an Evidence Base for DSM-V. *J Am Acad Child Adolesc Psychiatry* 2010;49:1134-44.
  31. Noordermeer SDS, Luman M, Weeda WD, et al. Risk factors for comorbid oppositional defiant disorder in attention-deficit/hyperactivity disorder. *Eur Child Adolesc Psychiatry* 2017;26:1155-64.
  32. İmren SG, Rodopman Arman A, Gümüştas F, Yulaf Y, Çakıcı Ö. Family Functioning in Attention Deficit Hyperactivity Disorder with or without Oppositional Defiant Disorder/Conduct Disorder Comorbidity. *Cukurova Med J* 2013;38:22–30.
  33. Reiersen AM, Constantino JN, Todd RD. Co-occurrence of motor problems and autistic symptoms in attention-deficit/hyperactivity disorder. *J Am Acad Child Adolesc Psychiatry* 2008;47:662–72.
  34. AB Ayaz, M Ayaz, Yazgan Y. Alterations in Social Reciprocity in Attention-Deficit Hyperactivity Disorder *Türk Psikiyatri Dergisi* 2013;24:101-10.
  35. Pelham WE, Bender ME, Caddell J, Booth S, Moorer SH. Methylphenidate and children with attention deficit disorder. Dose effects on classroom academic and social behavior. *Arch Gen* 1985;42:948–52.
  36. Guevremont DC, Dumas MC. Peer Relationship Problems and Disruptive Behavior Disorders 1994;2:164–72.
  37. Stroes A, Alberts E, Van Der Meere JJ. Boys with ADHD in social interaction with a nonfamiliar adult: an observational study. *J Am Acad Child Adolesc Psychiatry* 2003;42:295–302.