

ORIGINAL ARTICLE

Examining Social Barriers in Adults With ADHD: The Role of Autistic Traits, Empathy, Theory of Mind in Social Anxiety and Avoidance

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ABSTRACT

Introduction: This case–control study examined social barriers in adults with ADHD compared to non-neurodivergent adults, focusing on autistic traits, cognitive/affective empathy, theory of mind (ToM), and social anxiety/avoidance.

Methods: A total of 142 adults with ADHD and 104 non-neurodivergent groups were assessed using the following self-report measures: the Adult ADHD Self-Report Scale, the Hospital Anxiety Depression Scale, the Autism Spectrum Quotient, the Empathy Quotient, and the Liebowitz Social Anxiety Scale. ToM was evaluated using the Reading the Mind in the Eyes Test. Additionally, psychiatric interviews were conducted, incorporating diagnostic evaluation via the Structured Clinical Interview for DSM-5 Disorders—Clinician Version, along with collection of sociodemographic and clinical data, and documentation of real-life narratives of social struggles to contextualize and deepen the interpretation of the quantitative findings.

Results: Adults with ADHD exhibited significantly higher levels of autistic traits and social anxiety/avoidance, along with lower cognitive and affective empathy scores, compared to controls, while ToM abilities did not differ significantly between groups. Moreover, regression analyses indicated that challenges in social skills and communication, low cognitive empathy, heightened affective empathy, and difficulties in attention switching accounted for variance in social anxiety/avoidance, independent of confounding sociodemographic and clinical factors, including the presence of co-occurring psychiatric conditions and the severity of ADHD, depression, and anxiety symptoms.

Conclusion: While adults with ADHD exhibit intact basic ToM abilities, challenges in social-cognitive processes are associated with their social barriers. Targeted interventions such as social skills training, executive function coaching, and anxiety management may improve social outcomes and quality of life, as also highlighted by the real-life narratives—although further longitudinal, multi-method research is warranted.

1 | Introduction

ADHD is a common neurodevelopmental disability that typically begins in childhood and is characterized by attention

problems, hyperactivity, and impulsivity. However, it also involves dysfunction in executive function, such as time management and organizational difficulties. ADHD symptoms persist into adulthood in more than 50% of individuals

Significant Outcomes

- Adults with ADHD exhibit higher levels of autistic traits and social anxiety/avoidance, alongside lower cognitive and affective empathy scores, despite intact Theory of Mind abilities.
- Specific challenges—such as low cognitive empathy, high affective empathy, poor social skills, and attention-switching difficulties—uniquely predict social anxiety and avoidance in adults with ADHD.
- Real-life narratives illustrate how social-cognitive challenges translate into daily struggles, highlighting the clinical relevance of personalized interventions.

Limitations

- The cross-sectional design limits inferences about causality and the developmental course of social-cognitive difficulties.
- The use of self-report measures may introduce bias due to limited introspective accuracy or social desirability effects.
- As the sample was recruited from a single clinical center, generalizability to broader ADHD populations may be limited.

with ADHD. Individuals with ADHD experience functional impacts that extend beyond academic and professional life, including mental and physical health and in their social life [1, 2].

Furthermore, due to shared genetic factors, the tendency of ADHD symptoms to overlap with other disabilities, and the negative consequences these symptoms can cause, at least two-thirds of adults with ADHD have at least one co-occurring psychiatric condition, including depression, anxiety disorders or other neurodevelopmental disabilities [3]. Recent studies suggest that ADHD and autism share overlapping neurodevelopmental mechanisms, particularly in domains related to social cognition and executive functioning. Genetic correlations between ADHD and autism traits have been consistently observed, and neuroimaging evidence points to atypicalities in brain networks responsible for social behavior, emotional processing, and attentional control in both conditions [4, 5]. Autistic traits, such as difficulties in social cognition, social skills, and attention biases, can contribute to social functioning challenges in ADHD. A meta-analysis has reported that social cognition difficulties in individuals with ADHD fall on a continuum between those observed in autistic people and neurotypical controls [6].

Social cognition is a broad construct, and researchers do not fully agree on its precise boundaries or definition. However, the process generally includes the following key components: social perception (the ability to detect and recognize social stimuli), social information processing (the ability to reason about social stimuli), and social behavior regulation [7, 8]. When evaluating the components of social cognition, the most commonly used measures are theory of mind (ToM) and empathy assessments. ToM refers to the ability to understand the thoughts, beliefs,

and intentions of others. Empathy, on the other hand, can be considered along two dimensions: affective empathy, which involves having an appropriate emotion in response to the mental state of another person, and cognitive empathy, which refers to the ability to imagine the thoughts and mental states of others [8]. Additionally, assessing communication abilities and social skills can provide insight into the aspects of social cognition that are related to regulating behavior. Social skills are the abilities that allow individuals to effectively interact in social environments. These include communication skills such as active listening, turn-taking in conversation, and ToM—for example, keeping track of what the listener knows and needs to know [9, 10].

Another factor that can affect social functioning is social anxiety, which is characterized by an intense fear of social situations and avoidance of them. Individuals with anxiety disorders are more likely to also have ADHD. In addition, difficulties in social relationships—such as childhood bullying or exclusion—may further exacerbate social anxiety and avoidance among adults with ADHD. The behavioral inhibition observed in social anxiety appears to conflict with the impulsive and talkative nature of some individuals with ADHD, yet the coexistence of these two conditions has not been sufficiently studied, although increased likelihood rates have been reported [11]. A recent study has reported social phobia as the most common anxiety disorder accompanying ADHD in adults [12].

As summarized above, the challenges affecting social functioning in ADHD can be examined in three clusters: (1) ADHD symptoms-related challenges: impatience, interrupting, jumping from topic to topic, and appearing not to listen during interpersonal communication and interactions; difficulties in adhering to appointments and meetings due to challenges with organization, time management, and a tendency toward procrastination. (2) Autistic traits-related challenges in ADHD: relative difficulties in empathy and ToM abilities; challenges in social communication and interaction skills. (3) Social anxiety-related challenges in ADHD: fear and avoidance behaviors in social situations based on the belief of being negatively evaluated. The cumulative interaction of these factors can create a burden that leads individuals with ADHD to experience significant social struggles and barriers.

In this study, we conceptualize these cumulative difficulties as individual-level social barriers—challenges in social functioning arising from the interplay of higher levels of autistic traits, lower empathy and ToM abilities, leading to heightened social anxiety and avoidance—rather than from broader societal or environmental factors.

2 | Aims of the Study

The aim of this study was to examine social communication and interaction difficulties in adults with ADHD compared with a non-neurodivergent group. We also investigated how autistic traits, empathy, ToM, and attention-related factors were associated with social anxiety and avoidance. A further aim was to integrate brief real-life narratives to contextualize these findings within everyday social experiences.

3 | Method

3.1 | Study Center

The study was conducted at the Adult Neurodevelopmental Disorders Clinic of Selçuk University between October 2023 and October 2024, using a cross-sectional design. This clinic is the only specialized center in the city of Konya, located in the Central Anatolia region, with a population exceeding two million, dedicated to the follow-up of adults with ADHD.

3.2 | Participants and Procedure

The clinic follows a diagnostic process consistent with *The Adult ADHD Assessment Quality Assurance Standard* recommended by the United Kingdom Adult ADHD Network [13]. Individuals who were referred with suspected ADHD underwent a comprehensive diagnostic assessment together with their significant others. The assessment followed the clinic's standard procedure and was conducted over a minimum of two sessions, each lasting at least 1 h. A semi-structured diagnostic interview, the Structured Clinical Interview for DSM-5 Disorders—Clinician Version (SCID 5-CV), was used to record both primary and co-occurring psychiatric conditions. Additionally, a sociodemographic and clinical data form was completed. After the diagnostic assessment, an online link with self-report scales prepared for this study was sent to the patients, and they were asked to complete them thoroughly. Only individuals whose ADHD diagnosis was confirmed through the SCID 5-CV were invited to participate in the study.

Individuals diagnosed with intellectual disabilities, autism, or neurocognitive disorders; those with psychotic or bipolar disorders who were not in remission; and individuals with ongoing substance use or regular alcohol consumption (risky drinking) were excluded from the study.

Diagnoses not covered by the SCID 5-CV, such as autism, were evaluated and excluded based on DSM-5 criteria, using developmental history and clinical presentation. In total, $n=172$ individuals with confirmed ADHD diagnoses were invited to participate. Of these, $n=142$ who agreed to participate and completed the forms were included in the ADHD group.

Due to ongoing studies in our clinic, advertisements to participate in the control group were shared. A total of 121 individuals responded to these advertisements. During the screening process, 11 individuals were excluded because a current or past psychiatric disorder (including those in remission) was identified during the SCID-5-CV interview; 2 individuals were excluded due to risky alcohol use; and 4 individuals were excluded because they reported a first-degree relative with a psychiatric disorder. The remaining 104 individuals, who met all eligibility criteria for inclusion in the non-neurodivergent adults (control group), voluntarily agreed to participate and completed all study procedures. All participants provided written informed consent prior to participation, including consent for the anonymous use of their data and illustrative narrative excerpts for research and publication purposes. The study protocol was approved by the Local Ethics Committee of Selçuk University (Decision Number: 2023/437).

3.3 | Measurements

The Adult ADHD Self-Report Scale (ASRS): The ASRS is an 18-item self-report questionnaire designed to assess ADHD symptoms in adults based on DSM-IV-TR criteria [14, 15]. The first nine items assess attention deficit symptoms, while the remaining nine items assess hyperactivity and impulsivity symptoms. Higher scores on the ASRS indicate more severe ADHD symptoms. The validity and reliability of the Turkish version have been confirmed through two studies involving both clinical and non-clinical samples [16, 17].

Hospital Anxiety Depression Scale (HADS): The HADS, developed by Zigmond and Snaith, is a widely used self-report questionnaire designed to assess anxiety and depression [18]. It consists of 14 items, divided into two subscales: anxiety and depression. Each item is scored on a 4-point Likert scale (0–3), with total scores for each subscale ranging from 0 to 21. Higher scores indicate greater levels of anxiety or depression. The HADS has been widely validated across various populations, including those with medical conditions and the general public, demonstrating good reliability and validity, including in the Turkish adaptation study [19].

Autism Spectrum Quotient (AQ): The AQ is a psychometric test designed to measure autistic traits in autistic individuals, other psychiatric conditions, and the general population [20]. The test consists of 50 items, rated on a 4-point Likert scale. The two responses most strongly associated with autism are scored 1 point, while the other two responses score 0 points. As a result, the total score can range from 0 to 50, with higher scores being associated with a higher level of autistic traits. The AQ also includes five subscales: attention to detail, imagination, shifting attention, social skills, and communication. In this study, these subscales were used; however, due to overlapping constructs in the social skills and communication subscales, these two were combined under a single construct labeled “social skills and communication.” The internal consistency for this subscale and for the entire scale is 0.79 and 0.76, respectively, which are considered acceptable levels. The Turkish validation and reliability study of the scale was conducted by Köse et al. [21].

Empathy Quotient (EQ): The EQ is a self-report questionnaire to measure individual differences in empathy and has been widely used in research, particularly in understanding the characteristics of autistic people, where difficulties in empathy are often observed [22]. The original version included 60 items, of which 20 were filler items not scored. The currently used version contains 40 scored items. The EQ includes items assessing *affective empathy* (the ability to share the feelings of others) and *cognitive empathy* (the ability to understand others' mental states and perspectives). Respondents answer on a 4-point scale, ranging from “strongly agree” to “strongly disagree.” The EQ is useful for comparing empathy between autistic and non-autistic individuals and is used in research on other psychological conditions and in the general population. A lower score indicates reduced empathy, often linked to conditions like autism and ADHD, while a higher score reflects a stronger ability to understand and share others' feelings. The Turkish adaptation study was conducted by Bora and Baysan [23]. In this study, the scale demonstrated good internal consistency with a Cronbach's alpha value of 0.88.

The Reading the Mind in the Eyes Test (RMET): The RMET measures an individual's ability to recognize emotions and mental states by observing the eye region of faces in 36 photographs [24]. Participants choose one of four emotion-related labels (e.g., "angry," "happy," "sad," "confused") that best describe the emotion expressed. The test assesses ToM, the ability to understand others' thoughts, feelings, and intentions, and is commonly used in research on social cognition across clinical and non-clinical populations. The RMET has been validated in multiple languages and cultures, including a Turkish adaptation by Yıldırım et al. [25], which includes 32 photographs, and is considered a reliable tool for measuring empathic abilities related to social cognition.

Liebowitz Social Anxiety Scale (LSAS): The LSAS is a 4-point Likert scale used to measure the severity of social anxiety and avoidance, with scores corresponding to 24 different social situations [26]. Higher scores are associated with more severe social anxiety. The Turkish adaptation study found the scale to be valid and reliable [27]. In this study, it demonstrated excellent internal consistency with a Cronbach's alpha of 0.97.

3.4 | Real-Life Narratives

Real-life narratives were drawn from the routine semi-structured diagnostic interviews (SCID-5-CV) conducted as part of the clinic's standard ADHD assessment. During these assessments, clinicians routinely elicit open-ended descriptions of ADHD-related and co-occurring symptoms in daily life. These naturally occurring narratives were retrospectively examined from anonymized clinical notes by two authors (AK, ÖB) independently, and all authors who were also involved in patient care (AK, MEÇ, HS, ÖB, YS) reached consensus on the final excerpts that best illustrated key social themes. These themes corresponded to the main domains assessed quantitatively in this study—social skills and communication, cognitive and affective empathy, ToM, and social anxiety/avoidance. Accordingly, the narratives serve an illustrative, ecologically valid complement to the quantitative findings and do not constitute a formal qualitative analysis (e.g., no thematic coding was undertaken). Participant confidentiality was fully preserved by referring to individual accounts in the text using anonymized identifiers (e.g., participant #132), which correspond to entries in Table 4.

3.5 | Statistical Analysis

Data entry and analyses were performed using the Statistical Package for the Social Sciences version 29. Cronbach's alpha values were calculated to evaluate the reliability of the measurement tools. Skewness and kurtosis values between -2 and $+2$ were used to assess normality [28]. After descriptive statistics, an independent samples *t*-test was used to compare the group means between the two groups, and the chi-square test was applied for categorical data comparisons. Effect sizes were estimated using Cohen's *d* for parametric and non-parametric comparisons, and Cramer's *V* for categorical variables. Effect sizes were interpreted as ≥ 0.8 large, 0.5 – 0.79 intermediate, 0.2 – 0.49 small, and < 0.2 indicating no effect

[29, 30]. Pearson correlation analysis was used to assess the correlation of numerical values. Fisher's *r*-to-*z* transformation was applied to statistically compare the correlation coefficients between the ADHD and non-neurodivergent group. Finally, a linear regression model was conducted with LSAS scores as the dependent variable to assess the factors associated with social anxiety/avoidance. Sociodemographic data, clinical data, and related symptoms were added as independent variables. Multicollinearity was checked using "Variance Inflation Factor (VIF)" and "tolerance" values. The G*Power software was used for post hoc power analysis with an alpha error probability of 0.05. Risk values were determined using a 95% confidence interval, and statistical significance was set at $p < 0.05$.

4 | Results

The mean age of the adults with ADHD included in the study was 23.96 ± 6.4 , with 53.2% ($n=75$) being female, while the mean age of the non-neurodivergent adults was 23.97 ± 5.4 , with 58.7% ($n=55$) being female. There was no statistically significant difference between the two groups in terms of years of education. Self-reported levels of ADHD symptoms, anxiety and depression symptoms, autistic traits, and social anxiety severity were significantly higher in the ADHD group. However, empathy scores were higher in the non-neurodivergent group than in the ADHD group. Additionally, there was no significant difference between the two groups on the RMET. A comparison of sociodemographic data and self-report measures between the groups is presented in Table 1.

When examining the clinical data of the ADHD group, 54.2% ($n=77$) reported cigarette use, 46.5% ($n=66$) reported moderate alcohol consumption, and 21.1% ($n=30$) reported a history of substance use. Furthermore, 71.8% ($n=102$) of the ADHD group had at least one co-occurring psychiatric condition, according to the SCID 5-CV. Additionally, 17.6% ($n=25$) had a history of at least one suicide attempt. 42.3% of the adults with ADHD ($n=60$) were currently using ADHD medication, and 29.6% ($n=42$) were using antidepressant medication.

Two separate correlation analyses conducted for each group revealed that, in the non-neurodivergent group, ADHD symptoms were positively correlated with autistic traits ($r=0.32$, $p < 0.01$), negatively correlated with empathy abilities ($r = -0.23$, $p < 0.05$), and positively correlated with social anxiety and avoidance ($r=0.28$, $p < 0.01$). In contrast, within the ADHD group, ADHD symptoms were not significantly correlated with any other symptom, including autistic traits. To test whether the strength of these associations significantly differed between the groups, Fisher's *r*-to-*z* transformation was applied. The strength of the correlations between ADHD symptoms and autistic traits ($z = -2.72$, $p < 0.01$), empathy abilities ($z = 1.74$, $p = 0.04$), and social anxiety/avoidance ($z = -1.87$, $p = 0.03$) significantly differed across groups. In both groups, autistic traits and lower empathy were correlated with greater social anxiety and avoidance. The full correlation matrix is presented in Table 2.

Finally, a linear regression analysis was conducted to evaluate factors associated with social anxiety/avoidance in the ADHD

TABLE 1 | Comparison of demographic and self-report measurements data among groups.

		ADHD group, N = 142		Non- neurodivergent group, N = 104		<i>t</i>	<i>p</i>	Cohen's <i>d</i>
Age (years)	Mean, SD	23.96	6.37	23.97	5.41	-0.01	0.991	0.29
Sex/female ^a	<i>N</i> , %	75	53.2	55	58.7	0.68	0.409	0.05
Education (years)	Mean, SD	14.64	2.66	15.13	2.21	-1.57	0.117	0.11
Adult ADHD self-report scale	Mean, SD	51.42	8.77	25.63	10.36	20.71	< 0.001	2.72
Hospital anxiety and depression	Mean, SD	20.81	7.13	13.10	6.66	8.46	< 0.001	1.11
Autism quotient	Mean, SD	21.81	6.32	16.62	5.40	6.76	< 0.001	0.87
Social skills and communication ^b	Mean, SD	7.85	3.95	4.03	2.83	8.83	< 0.001	1.09
Attention switching ^b	Mean, SD	5.75	1.94	4.78	2.00	3.85	< 0.001	0.50
Attention to detail ^b	Mean, SD	5.13	2.25	5.23	2.29	-0.36	0.361	0.05
Imagination ^b	Mean, SD	2.86	1.75	2.45	1.63	1.86	0.032	0.24
Empathy quotient	Mean, SD	38.54	12.42	47.78	10.71	-6.25	< 0.001	0.79
Cognitive empathy ^c	Mean, SD	10.98	5.96	12.86	5.16	-2.64	0.004	0.33
Affective empathy ^c	Mean, SD	11.78	4.76	13.73	3.80	-3.57	< 0.001	0.45
Reading the mind in the eyes test	Mean, SD	24.42	2.71	24.07	4.31	0.74	0.230	0.10
Social anxiety and avoidance	Mean, SD	106.76	31.22	89.05	21.43	5.27	< 0.001	0.64

Note: Bold values denote statistical significance; effect sizes are reported as Cohen's *d* for continuous variables and Cramer's *V* for categorical variables. Abbreviation: ADHD, attention deficit hyperactivity disorder.

^aFor this categorical data, the Pearson chi-square statistic and Cramer's *V* (as a measure of effect size) were provided.

^bSubscales scores of autism quotient.

^cSubscales of empathy quotient.

TABLE 2 | Pearson product-moments correlation coefficients.

		1	2	3	4	5	6	
1. Adult ADHD Self-Report Scale	ADHD							Non-Neurodivergent
2. Autism Quotient			.32**	.33**	-.23*	.12	.28**	
3. Social Skill and Communication ^a		-.03		.78**	-.41**	-.21*	.46**	
4. Empathy Questionnaire		.06	.84**		-.50**	-.34**	.61**	
5. Reading the Mind in the Eyes Test		-.01	-.39**	-.40**		.39**	-.35**	
6. Liebowitz Social Anxiety Scale		.01	-.12	-.17*	.04		.17	
		.04	.60**	.59*	-.20*	-.19*		

Note: Correlation coefficients for ADHD group are presented below the diagonal, while those for non-neurodivergent group are presented above the diagonal.

Abbreviation: ADHD, attention deficit hyperactivity disorder.

* $p < 0.05$.

** $p < 0.01$.

^aSubscale scores of Autism Quotient.

group. The analysis revealed a statistically significant *F* value (7.53; $p < 0.001$), explaining 42.2% of the variance (adjusted R^2) in social anxiety/avoidance. The Durbin-Watson statistic was 2.084, suggesting that the residuals are not significantly autocorrelated, and the assumption of independent errors holds. To control for potential confounding factors, sociodemographic data such as age, sex, and years of education, as well as clinical

data including the presence of co-occurring psychiatric diagnoses, current ADHD medication, and antidepressant use, and the severity of depression, anxiety, and ADHD symptoms, were included as covariates in the model.

Among these confounders, only the HADS score ($t = 3.09$; $p = 0.03$) was significantly associated with social anxiety/

TABLE 3 | Linear regression analysis on social anxiety/avoidance severity.

	β	t	p	Confidence interval	
				Lower	Higher
Adult ADHD self-report scale	−0.04	−0.50	0.620	−0.65	0.39
Hospital anxiety depression scale	0.22	3.09	0.003	0.35	1.61
Attention switching ^a	0.19	2.48	0.015	0.61	5.48
Attention to detail ^a	0.10	1.49	0.140	−0.44	3.08
Imagination ^a	0.03	0.46	0.649	−2.10	3.36
Social skills and communication ^a	0.41	5.18	< 0.001	2.03	4.55
Cognitive empathy ^b	−0.17	−2.00	0.048	−1.73	−0.01
Affective empathy ^b	0.15	2.00	0.048	0.01	2.00
Reading the mind in the eyes test	−0.09	−1.2	0.233	−2.58	0.64

Note: Bold values denote statistical significance. The model was statistically significant [$F(7.53, p < 0.001)$] and explained unique variance (adjusted $R^2 = 0.422$) in social anxiety/avoidance. The Durbin–Watson statistic was 2.084, indicating no significant autocorrelation among residuals. No multicollinearity was detected—VIFs ranged from 1.07 to 1.62 and tolerances from 0.62 to 0.93. Covariates included sociodemographic variables (age, sex, and years of education) and clinical factors (co-occurring psychiatric conditions, current ADHD medication, and antidepressant use).

Abbreviation: ADHD, attention deficit hyperactivity disorder.

^aSubscales of autism quotient.

^bSubscales of empathy quotient.

avoidance symptoms. Additionally, to test our hypothesis, AQ subscales (social skills and communication, attention to detail, attention switching, imagination), EQ subscales (cognitive empathy and affective empathy), and the RMET were included in the model. Struggles in social skills and communication ($t = 5.17$; $p < 0.001$), attention switching difficulties ($t = 2.48$; $p = 0.015$), low cognitive empathy ($t = -2.00$; $p = 0.048$), and high affective empathy ($t = 1.99$; $p = 0.048$) were all significantly associated with social anxiety/avoidance scores. Multicollinearity was assessed in the linear regression analysis, with “VIF” values (1.07–1.62, min–max) below 5 and “tolerance” values (0.62–0.93, min–max) ranging from 0.2 to 1, indicating no multicollinearity that could affect the model’s power [31]. The regression model is presented in Table 3.

Post hoc power analysis, with an alpha error probability of 0.05, was computed for both the independent samples t -test and the linear regression model, based on sample sizes and effect sizes for social anxiety/avoidance. The achieved power was determined to be 0.99 for both analyses.

Table 4 provides anonymized illustrative narratives that contextualize the quantitative results, showing how the key social domains identified in the analyses appear in everyday life for adults with ADHD.

5 | Discussion

Our study aimed to compare the difficulties in social communication and interaction in individuals with ADHD to non-neurodivergent adults and to investigate the factors associated with anxiety and avoidance behaviors in social situations. Our findings revealed that autistic traits, as well as social anxiety and avoidance, were higher in individuals with

ADHD, while empathy skills were lower. Furthermore, ToM abilities did not differ significantly between the ADHD and non-neurodivergent groups. Interestingly, in people without ADHD, higher subclinical ADHD symptoms tend to correlate with a higher level of autistic traits, greater social anxiety, and lower empathy. In contrast, within diagnosed ADHD populations, such correlations are weaker or absent. Furthermore, difficulties in social skills and communication, attention switching, low cognitive empathy, and high affective empathy in adults with ADHD were found to be associated with social anxiety and avoidance. These findings were independent of sociodemographic and clinical data, including ADHD, depression, and anxiety symptoms.

5.1 | Neurodevelopmental Overlap Between ADHD and Autistic Traits

ADHD and autism share substantial genetic and neurodevelopmental underpinnings. Twin and family studies demonstrate moderate genetic correlations between ADHD and autistic traits, with frequent co-occurrence reported in both clinical and population-based samples [5, 32]. Shared disruptions in brain networks related to social cognition, including the amygdala and temporal cortex, may underlie overlapping social difficulties in both conditions [4]. Executive function difficulties—such as challenges in inhibition, working memory, and cognitive flexibility—have been proposed as one factor that may be related to autism-like traits in ADHD. These difficulties can affect social reciprocity and empathy, which in turn may be associated with higher levels of autistic traits and reduced social competence [33].

Another factor may be altered reward processing. Individuals with ADHD often require more immediate reinforcement and

TABLE 4 | Real-life narratives regarding social struggles from adults with ADHD.

Part.	Real-life narratives	Identified struggles
4	I often interrupt my friends with off-topic comments, making them feel unheard. They say I talk too much but don't listen when they speak. Also, because I'm frequently late to appointments, they think I don't care about them.	Social skills and communication
17	I just can't seem to follow the flow of conversation like everyone else. I always feel like I'm behind the group. When the person I'm talking to speaks quickly, by the time I catch up with their first sentence, they're already on to the next, and for a second, I just wish I could stop them. So, in situations where I feel comfortable, I often stop trying to keep up and let my mind wander in my inner world.	Social skills and communication Social anxiety and avoidance
38	I think people see me as emotionless or arrogant because I speak too directly. I feel like others get too caught up in their emotions, and that makes them weak. It surprises me how easily they get hurt. I feel like I'm on a different wavelength, and maybe that's why it's hard for me to make friends.	Affective empathy Social anxiety and avoidance
55	When I was a kid, I was the popular one at school—doing well in my studies and talking to everyone with confidence. But as time passed, my performance dropped, and so did my self-confidence. Now, I get anxious in social situations. I worry that what I say won't be well received. I fear sounding foolish and have gradually become more withdrawn.	Social skills and communication Social anxiety and avoidance
71	My social battery runs out quickly! Some days, I start social interactions full of energy, but by the end, I feel totally drained. It's because I put so much effort into managing relationships. I think I try harder than others to avoid interrupting, to listen carefully, to understand what my friends are saying, and to keep up with the conversation. Since it feels like a huge task, some days I just choose not to interact at all.	Theory of mind Social skills and communication
86	When I talk to people, I often feel unsure about when to speak or if I'm making sense. One time, when my neighbor knocked on my door, I was so caught up in thinking, 'What will they ask me? How should I respond? What will I even say?' that I ended up crying, trying not to make a sound behind the door.	Cognitive empathy Theory of mind Social skills and communication
110	In meetings, I often have trouble understanding hurtful comments or jokes directed at me. Later, when I talk to a colleague, I realize what they actually meant. Due to the communication issues I've faced at work, I no longer want to attend in-person meetings. While others use their communication style as if it's their first language, I feel like I'm someone trying to learn it as a second language. It feels like there's a barrier between me and others.	Theory of mind Social skills and communication Social anxiety and avoidance
132	Since childhood, I've found it easier to play alone and do things on my own. When I played with others, they sometimes got mad at me because they thought I didn't understand what they were saying or that I was being rude. But I was just trying to make the game better. I didn't want to hurt them, and I didn't realize they were hurt. Since then, I've preferred doing things by myself, such as drawing or spending time online, and I think I express myself better through writing.	Cognitive empathy Theory of mind Social skills and communication

Note: "Part." is an abbreviation for participant number, and all real-life narratives statements have been translated into English by the authors.

may find delayed or subtle social feedback less rewarding, reducing motivation for social engagement [34]. This can lead to social withdrawal or avoidance, particularly in low-stimulation or ambiguous interactions.

Interestingly, while ADHD traits correlate with autistic traits in the general population, these associations often weaken or disappear within ADHD-diagnosed groups. This may result from range restriction, diagnostic heterogeneity, or the influence of other moderating factors such as cognitive profile or comorbid conditions [35]. Once ADHD is present, the degree of social-cognitive difficulty may be shaped less by ADHD severity itself and more by these individual differences.

5.2 | Preserved Theory of Mind Abilities in ADHD

Despite challenges in social functioning, adults with ADHD in our study performed comparably to controls on ToM tasks, indicating preserved mentalizing abilities. Notably, autism research emphasizes that ToM difficulties are a core, defining feature of autism [36]—a feature not shared by ADHD. Thus, our results reinforce the idea that adults with ADHD do not exhibit the kind of primary ToM difficulties seen in autistic people [24]. This aligns with previous research showing that while ToM difficulties may be observed in children with ADHD, such difficulties often diminish or disappear in adulthood [6]. One explanation is that ToM skills improve with age or through compensatory strategies, even

as other social-cognitive domains like empathy or executive function remain impaired. Some authors suggest that apparent ToM difficulties in ADHD may stem more from executive function limitations—such as inattention or poor working memory—than from a core difficulty in understanding others' mental states [37].

Importantly, our correlation analyses revealed distinct patterns between groups. In the non-neurodivergent group, better ToM performance was associated with lower autistic traits and higher empathy, consistent with its role in adaptive social functioning. In contrast, among adults with ADHD, ToM was linked to communication difficulties and social anxiety. This suggests that although ToM may be intact, applying it in real-life contexts can be effortful and emotionally taxing. Participant #71 described social interactions as mentally exhausting, requiring constant self-monitoring and inhibition. Similarly, participant #110 likened social communication to speaking a second language—where implicit cues felt foreign and overwhelming.

A relational perspective consistent with these findings is offered by the *Double Empathy Problem* [38]. This framework suggests that social difficulties do not arise from a unilateral deficit but from reciprocal mismatches in how individuals with ADHD and others interpret and respond to one another's communication. This perspective helps explain why adults with ADHD, despite intact ToM performance on structured tasks, may still experience misunderstandings or feel mentally exhausted during social interactions. Such challenges may reflect mutual misattunements rather than individual-level failures, highlighting the need for interventions that foster reciprocal understanding within social environments.

However, it is important to note that ToM in this study was assessed solely with the RMET, which captures basic emotion-recognition-based mentalizing. It does not assess higher-order ToM skills such as perspective-taking, belief reasoning, or the integration of contextual cues, which are typically evaluated through tasks like the Faux Pas Test or Strange Stories in adults [39, 40]. Recent meta-analytic evidence also indicates that ToM differences in autism vary considerably across task types and individuals, highlighting that mentalizing is a multidimensional construct rather than a uniform deficit [41]. Within this broader context, our finding of preserved RMET performance in adults with ADHD reflects intact performance on this specific component of ToM, rather than global mentalizing ability.

5.3 | Factors Predicting Social Anxiety and Avoidance

Social anxiety and avoidance—central outcomes in this study due to their relevance in daily life and frequent co-occurrence with ADHD—were predicted by several specific factors identified in our findings [11]. The strongest was poor social skills and communication. Participants with greater difficulties in these areas were more likely to avoid social interaction. Participant #17 described feeling left behind in conversations and mentally withdrawing, while participant #55 shared how declining self-confidence led her to fear sounding foolish and avoid social situations. This supports previous findings linking lower social competence with higher social anxiety [42].

Empathy profiles also played a role. Lower cognitive empathy—difficulty understanding others' thoughts—was associated with higher social anxiety, while higher affective empathy—strong emotional responses to others—also predicted greater anxiety and avoidance. This combination appears particularly challenging: individuals may feel overwhelmed by others' emotions while struggling to interpret their intent. Participant #38, for instance, expressed feeling disconnected from others' emotional sensitivity. Similarly, participant #132 described withdrawing into solitary activities after repeated misunderstandings during social play. These narratives mirror meta-analytic findings linking high affective and low cognitive empathy to social anxiety [43].

Attention-switching difficulties were another significant predictor. Those who struggled to shift focus tended to experience more social anxiety, possibly due to increased self-focused attention [44]. Participant #86 illustrated this vividly—feeling overwhelmed by anticipated questions from a neighbor, she froze behind her door rather than engaging. Such attentional rigidity can prevent individuals from noticing reassuring cues, reinforcing avoidance.

Taken together, difficulties in social skills and communication, cognitive empathy, flexible attention, and heightened emotional reactivity were each uniquely associated with social anxiety and avoidance—dependent of overall ADHD, anxiety, or depression symptom severity. These results suggest that social anxiety/avoidance in ADHD is not just a byproduct of broader psychopathology but may reflect specific cognitive-emotional vulnerabilities that warrant targeted intervention.

5.4 | Limitations

While this study sheds light on social barriers faced by adults with ADHD, several limitations must be acknowledged. First, the cross-sectional design limits our ability to draw conclusions about causality or developmental changes. We captured a snapshot of participants' social functioning and related traits at one point in time, but we cannot determine, for example, whether early difficulties in ToM led to later social anxiety or if pre-existing anxiety exacerbated those difficulties. Longitudinal studies following children with ADHD into adulthood would help clarify how social cognition and anxiety evolve and interact over time. Second, our reliance on self-report measures for autistic traits, empathy, and social anxiety raises concerns about response biases and subjective accuracy, as adults with ADHD may under- or over-report their social challenges due to factors such as poor introspection, a desire to please, or memory difficulties. For example, an individual might fail to recognize missed social cues or, conversely, overemphasize their missteps. Although ToM abilities were objectively evaluated using the RMET, the other measures capture only subjective perceptions and may not fully reflect actual social-cognitive performance in real interactions. Additionally, while the RMET is widely used, it assesses only one dimension of ToM—emotion recognition from the eye region—and does not capture more complex, belief-based, or other higher-order mentalizing processes. Thus, multiple mentalizing tasks would provide a more comprehensive understanding of ToM abilities in adults with ADHD. Third, the relatively balanced sex distribution in the ADHD sample (53%

female) may reflect adult referral and diagnostic patterns, with sex ratios in ADHD approaching 1:1 in adulthood, partly due to delayed recognition and diagnosis in females [1]. In addition, although sex was included as a covariate in the regression analysis to control for its confounding effect, this does not fully capture the nuanced impact of sex on social functioning. According to Baron-Cohen's *Extreme Male Brain* theory [45], typical male cognitive profiles favor systemizing over empathizing, which may lead to higher autistic traits and lower empathy in males compared to females. Future research should specifically investigate sex differences in social functioning among individuals with ADHD to further elucidate their contribution to social barriers. Finally, the study sample was drawn from a single, clinic-referred population seeking diagnostic evaluation and support for ADHD, which may lead to an overrepresentation of individuals experiencing more pronounced emotional (e.g., depression or anxiety), social, or functional difficulties. Furthermore, participants who were more willing to elaborate on their social struggles may have contributed disproportionately to the narratives. These factors may limit generalizability to broader community samples, although co-occurring conditions, anxiety/depression severity, and medication status were statistically controlled for in the analyses.

6 | Conclusion

This study underscores that social communication and interaction challenges pose a significant barrier for many adults with ADHD, influenced by a complex interplay of autistic traits, cognitive/affective empathy, ToM, and social anxiety and avoidance; however, ToM abilities remain largely intact in ADHD patients. Additionally, challenges in social skills and communication, reduced cognitive empathy, heightened affective empathy, and difficulties in attention switching uniquely explain the variance in social anxiety and avoidance among adults with ADHD, independent of anxiety, depression, and ADHD symptom severity. Building on these findings, it is anticipated that social outcomes and quality of life for adults with ADHD may be improved through targeted interventions, including social skills training, executive function support, and anxiety management, as well as longitudinal, multi-method research [46]. The real-life narratives shared by participants not only validate the empirical data but also illustrate how individuals with ADHD may feel alienated, misinterpreted, or overwhelmed in social contexts—and with the right support, they can be empowered to overcome these barriers.

Author Contributions

Conceptualization—A.K., C.A. Data curation—M.E.Ç., H.S., Ö.B. Formal analysis—A.K., M.E.Ç., H.S., Ö.B. Project administration—A.K. Investigation—M.E.Ç., H.S., Ö.B. Visualization—A.K. Supervision—C.A., Y.S., S.B.-C. Writing original draft—A.K. Writing review and editing—C.A., Y.S., S.B.-C.

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Ethics Statement

All procedures contributing to this work complied with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008. The study protocol was approved by the Local Ethics Committee of Selçuk University (Decision Number: 2023/437).

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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