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Original Article

Parent–child interaction patterns and adolescent functioning in Saudi families managing ADHD: A cross-sectional study

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الملخص

أهداف البحث: تُعد أنماط التفاعل بين الوالدين والأبناء من العوامل المهمة المؤثرة في نتائج اضطراب فرط الحركة وتشتت الانتباه لدى الأطفال والمراهقين، إلا أن الأدلة البحثية حول هذا الموضوع في السياق السعودي لا تزال محدودة. هدفت هذه الدراسة إلى تقييم أنماط التفاعل بين الوالدين والأبناء في الأسر السعودية التي لديها مراهقون مصابون باضطراب فرط الحركة وتشتت الانتباه، وفحص علاقتها بالأداء الوظيفي للمراهقين، إضافة إلى استكشاف تأثير العوامل الاجتماعية والديموغرافية في هذه العلاقات.

طرق البحث: أُجريت هذه الدراسة المقطعية على 126 ثنائية من مقدمي الرعاية والمراهقين، تم استقطابهم من عيادات متخصصة. أكمل مقدمو الرعاية استبيان ألاباما للممارسات الوالدية لتقييم ممارسات التربية، واستبيان نقاط القوة والصعوبات لتقييم الأداء السلوكي والانفعالي لدى المراهقين. تم تحليل البيانات باستخدام الإحصاءات الوصفية، وتحليل الارتباط، ونماذج الانحدار الخطي المتعدد، مع احتساب أحجام الأثر باستخدام معامل كوهين.

النتائج: بلغ متوسط عمر المراهقين 14.6 سنة، وكان 69.8% منهم من الذكور. كانت ممارسات التربية الإيجابية شائعة، إذ أبلغ 86.5% من مقدمي الرعاية عن مدح المراهق عند قيامه بسلوك جيد، و66.6% عن وجود حوارات ودية مع المراهق. ومع ذلك، أبلغت نسبة ملحوظة عن ممارسات سلبية، مثل الصراخ أو رفع الصوت بنسبة 60.3%، وضعف أو عدم اتساق الإشراف بنسبة 47.6%. كما أظهر المراهقون جوانب قوة وتحديات؛ إذ وُصف 57.1% بأنهم لطفاء مع الأطفال الأصغر سناً، في حين وُصف 65.1% بأنهم يتشتتون بسهولة. أظهرت الارتباطات أن التربية الإيجابية ارتبطت بانخفاض الصعوبات، بينما ارتبطت الممارسات القاسية أو غير المتسقة بزيادة مستوى الصعوبات. وأظهرت نماذج الانحدار أن كون الأم هي مقدمة الرعاية كان مرتبطاً بارتفاع درجات الصعوبات في استبيان نقاط القوة والصعوبات، في حين ارتبط كل من ارتفاع مستوى تعليم الوالدين، وتحسن الأداء المدرسي، وتوفر خدمات الدعم بانخفاض درجات الصعوبات. كما فسّر النموذج الكلي 28% من التباين في الأداء الوظيفي للمراهقين، مما يشير إلى أثر جماعي متوسط إلى كبير.

الاستنتاجات: تؤكد هذه النتائج أهمية التدخلات الأسرية الحساسة ثقافياً التي تعزز ممارسات التربية الإيجابية، وتدعم الاتساق في الانضباط والإشراف، وتحسن الوصول إلى خدمات الدعم المدرسي والنفسي والاجتماعي ضمن برامج رعاية اضطراب فرط الحركة وتشتت الانتباه في المملكة العربية السعودية. وقد تسهم هذه الاستراتيجيات في تقليل الصعوبات السلوكية والانفعالية لدى المراهقين المصابين بهذا الاضطراب، ودعم الأداء الأسري بشكل أفضل. ومع ذلك، ينبغي تفسير النتائج بحذر نظراً للطبيعة المقطعية للدراسة واعتمادها على عينة مستقطبة من عيادات متخصصة، مما يحد من الاستدلال السببي وقابلية تعميم النتائج.

الكلمات المفتاحية: اضطراب فرط الحركة وتشتت الانتباه؛ التفاعل بين الوالدين والأبناء؛ الممارسات الوالدية؛ الأداء الوظيفي للمراهقين؛ المملكة العربية السعودية؛ دراسة مقطعية؛ استبيان ألاباما للممارسات الوالدية؛ استبيان نقاط القوة والصعوبات؛ السياق الثقافي

Abstract

Background: Parent–child interaction patterns are critical for attention-deficit/hyperactivity disorder (ADHD) outcomes but limited relevant research has been conducted in KSA. The present study examined parent–child interaction patterns, their relationships with adolescent functioning, and the influence of sociodemographic factors in Saudi families managing ADHD.

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Methods: This cross-sectional study recruited 126 caregiver–adolescent dyads from specialized clinics. Caregivers completed the Alabama Parenting Questionnaire and Strengths and Difficulties Questionnaire (SDQ). Data were analyzed using descriptive statistics, Pearson correlation coefficients, and multiple linear regression with effect sizes (Cohen's f^2).

Results: Mean adolescent age was 14.6 years (69.8% male). Positive parenting (praise: 86.5%; friendly conversations: 66.6%) was common, but 60.3% reported yelling and 47.6% reported inconsistent supervision. Adolescents had strengths (57.1% kind to younger children) but also challenges (65.1% easily distracted). Correlations indicated that positive parenting was associated with fewer difficulties ($r = -0.28$ to -0.24), while inconsistent/harsh discipline was associated with greater impairment ($r = 0.26$ to 0.42). Regression analyses demonstrated that maternal guardianship was associated with higher SDQ scores ($\beta = 12.097$, $p = 0.019$, $f^2 = 0.15$), while higher parental education ($\beta = -3.017$, $p = 0.021$, $f^2 = 0.09$), better school performance ($\beta = -3.257$, $p = 0.009$, $f^2 = 0.11$), and access to support services ($\beta = -3.157$, $p = 0.006$, $f^2 = 0.12$) were protective. The full model explained 28% of the variance in adolescent functioning ($f^2 = 0.39$), indicating a moderate-to-large collective effect.

Conclusion: Culturally sensitive family-based interventions that strengthen positive parenting, promote consistent discipline, and improve access to school and psychosocial support services should be prioritized in ADHD care programs in KSA. These strategies may help to reduce emotional and behavioral difficulties among adolescents with ADHD and support better family functioning. However, these findings should be interpreted with caution due to the cross-sectional design and clinic-based sampling limiting causal inference and generalizability.

Keywords: ADHD; Adolescent functioning; APQ; Cross-sectional study; Cultural context; Parent–child interaction; Parenting practices; KSA; SDQ

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Introduction

Attention-deficit/hyperactivity disorder (ADHD) is a neurodevelopmental disorder characterized by persistent patterns of inattention, hyperactivity, and/or impulsivity that interfere with functioning or development. Globally, ADHD is estimated to affect 5% of children and adolescents, making it one of the most prevalent childhood psychiatric conditions.[1] Untreated ADHD can have far-reaching consequences, including academic underachievement, interpersonal difficulties, increased risk of comorbid psychiatric conditions, and long-term negative impacts on adult functioning.[2]

The etiology of ADHD is complex and multifactorial, involving a combination of genetic, neurobiological, and environmental influences.[3] Genetic factors are estimated to contribute significantly to the heritability of ADHD, but environmental factors, particularly those within the family environment, play crucial roles in shaping the disorder's expression and course.[4]

Parent–child interactions are dynamic and reciprocal processes that influence both child development and parental well-being. According to social learning theory, behavioral regulation in children develops through reinforcement, modeling, and repeated interaction with caregivers, whereas the transactional model proposes bidirectional influences where child symptoms and parenting behaviors continuously shape one another over time. Considering that most psychosocial treatments for childhood ADHD focus on the modification of child behavior through parent training, parenting practices are an important mechanism that may influence ADHD-related outcomes.[5] In particular, inconsistent discipline, harsh communication, and low parental warmth may contribute to emotional dysregulation, oppositional behavior, impaired social functioning, and worsening expression of ADHD symptoms, whereas positive reinforcement and consistent supervision may support behavioral regulation and adaptive functioning. Conversely, the child's ADHD symptoms can exacerbate parental stress and negative parenting responses, leading to a coercive cycle that perpetuates maladaptive interactions and hinders development.[6]

Research has consistently demonstrated the association between dysfunctional parent–child interaction patterns and negative outcomes in children with ADHD. Studies have linked inconsistent discipline, high levels of parental criticism, and low parental warmth to increased ADHD symptom severity, behavioral problems, and emotional dysregulation in children.[7,8] Conversely, positive parenting practices, such as positive reinforcement, clear communication, and consistent limit setting, are associated with improved child outcomes, including reduced ADHD symptoms, better social skills, and enhanced emotional well-being.[9]

The Alabama Parenting Questionnaire (APQ) is a widely used and well-validated instrument for assessing the various dimensions of parenting practices, including positive involvement, communication, supervision, and discipline strategies. Its multi-faceted approach facilitates comprehensive examination of parent–child interaction patterns within families.[10]

Many previous studies of parent–child interactions and ADHD were conducted in Western cultures, but increasing attention has focused on understanding how different sociocultural contexts shape parenting practices and child behavioral outcomes. In KSA, collectivist family structures, hierarchical parent–child relationships, traditional gender roles, and stigma surrounding mental health conditions may influence both caregiving practices and help-seeking behaviors.[11] These cultural dynamics may simultaneously promote family cohesion and emotional support but also discourage external psychological support or reinforce more authoritarian disciplinary approaches. Despite these potentially important influences, few empirical studies have critically examined how Saudi sociocultural factors interact with parenting behaviors and adolescent ADHD functioning. Therefore, understanding these contextual

influences is important for developing culturally sensitive and family-centered interventions.

This study aimed to address this issue by examining parent–child interaction patterns and their relationship with adolescent functioning in Saudi Arabian families managing ADHD. The present study was conceptually grounded in social learning theory and the transactional model, which posits that child behavior is shaped through family reinforcement and that challenging ADHD symptoms can elicit negative parenting responses, leading to a coercive cycle that exacerbates difficulties.

In particular, the present study examined three primary hypotheses: (1) parents may report high positive involvement (consistent with cultural norms) alongside challenges in consistent discipline (consistent with ADHD literature); (2) positive parenting may be negatively associated with adolescent difficulties, whereas inconsistent and harsh parenting may be positively associated with behavioral and emotional problems; and (3) higher parental education, income, and access to support services will be associated with better outcomes, with family structure moderating these relationships.

Methods

Study design and ethical considerations

The present study employed a cross-sectional design to investigate parent–child interaction patterns and their relationship with adolescent functioning in a sample of families managing ADHD in KSA. Given the cross-sectional nature of the study, the findings should be interpreted as associative rather than causal. Ethical committee approval was secured from the Institutional Review Board (IRB) of King Fahad Medical City (IRB Log Number: 23–550C) before commencing data collection between December 1, 2023, and June 30, 2024. The information was read aloud to participants who were illiterate, and a thumbprint was accepted in lieu of a signature. The study adhered to the ethical principles outlined in the Declaration of Helsinki, ensuring the protection of participants' rights, confidentiality, and informed consent.

Study participants and sampling

The target population comprised caregivers and their adolescent children (aged 12–18 years) diagnosed with ADHD and receiving services at developmental and behavioral pediatrics specialized clinics in KSA. A sample size of 384 caregiver–adolescent dyads was determined a priori using power analysis (medium effect size, $f^2 = 0.15$, $\alpha = 0.05$, power = 0.80). However, due to practical constraints in clinic-based recruitment and the finite sampling frame during the study period, 126 dyads were ultimately enrolled, representing a response rate of 32.8% relative to the target sample. This discrepancy between the target and achieved sample is acknowledged as a limitation; however, the actual sample of 126 provided adequate statistical power (0.80) to detect medium-to-large effects ($f^2 \geq 0.20$) in regression models with up to 10 predictors. Participants were recruited through convenience sampling from the aforementioned clinics, which may have introduced selection bias and limit the generalizability of findings to families not receiving specialized clinical services or those in community settings.

Recruitment procedure

Potential participants were identified by clinic staff and approached by research assistants. Caregivers were provided with a detailed information sheet outlining the study's aims, procedures, potential risks and benefits, and their right to withdraw at any time without consequence. Written informed consent was obtained from all participating caregivers and assent from adolescent participants.

Inclusion and exclusion criteria

The inclusion criteria for caregivers were as follows: (a) primary caregiver or legal guardian of an adolescent aged 12–18 years, and (b) adolescent with a formal diagnosis of ADHD confirmed by a qualified clinician (psychiatrist or developmental pediatrician) using DSM-5 criteria**.** The inclusion criteria for adolescents were: (a) a diagnosis of ADHD as specified above, and (b) aged between 12 and 18 years. The exclusion criteria were: (a) adolescent with a comorbid developmental disorder (e.g., autism spectrum disorder or intellectual disability) that would significantly impact functioning and questionnaire interpretability, and (b) caregiver or adolescent with severe cognitive or communication impairments precluding accurate responses.

Operationalization of constructs

Parent–child interaction patterns were operationalized using the APQ, which assesses five distinct dimensions of parenting. Higher scores on each subscale indicate greater frequency of that parenting behavior. Adolescent functioning was operationalized using the Strengths and Difficulties Questionnaire (SDQ), which measures five domains: emotional symptoms, conduct problems, hyperactivity-inattention, peer problems, and prosocial behavior. Higher scores on the difficulties subscales (emotional symptoms, conduct problems, hyperactivity-inattention, and peer problems) indicate greater impairment, while higher prosocial scores indicate strengths. Both instruments yield continuous scores suitable for parametric analysis.

Data collection instruments

Data were collected using the following two validated questionnaires and administered in Arabic:

APQ[12]**:** A 42-item instrument for assessing parenting practices across multiple dimensions using a 5-point Likert scale (1 = never to 5 = always). The Arabic version of the APQ was previously validated in Arab populations and acceptable internal consistency was demonstrated, with Cronbach's α ranging from 0.67 to 0.80 across subscales.[34] In the current sample, internal consistency was acceptable for all subscales ($\alpha = 0.71$–0.82).

SDQ[13]**:** A 25-item screening tool for assessing behavioral and emotional strengths and difficulties using a 3-point Likert scale (0 = not true to 2 = certainly true). The

Arabic version of the SDQ has demonstrated good psychometric properties in multiple studies, where the total difficulties score has high internal consistency ($\alpha = 0.82$) and established factorial validity in Arab adolescent populations.[35] In the current sample, Cronbach's α for the total difficulties score was 0.79.

Procedure

Participants completed the questionnaires in a quiet, private setting at the clinic. Research assistants were available to answer questions and provide assistance. Questionnaires were administered in both online and paper–pencil format according to the participant's preference. To evaluate potential administration-related response bias, comparisons between administration modes were conducted and no statistically significant differences in response patterns were identified ($p > 0.05$). Data were collected exclusively through caregiver self-report measures, which may have increased the possibility of recall bias and social desirability bias.

Statistical analysis

Descriptive statistics (means, standard deviations (SDs), frequencies, and percentages) were calculated using SPSS version 26 to summarize demographic characteristics and APQ/SDQ scores. Given the cross-sectional design, the analyses were descriptive and associational; therefore, causal inferences could not be drawn from the findings.

Prior to the main analyses, statistical assumptions were tested to ensure the validity of parametric tests. Normality was assessed for continuous variables using Shapiro–Wilk tests and visual inspection of Q–Q plots. Slight deviations were noted but parametric tests were conducted due to their robustness with sample sizes >100. Linearity between predictors and outcome variables was confirmed via scatterplot examination. Multicollinearity was evaluated using variance inflation factors, where all values were below the recommended threshold of 3.5, indicating no concerning multicollinearity among independent variables. Homoscedasticity was verified through visual inspection of residual plots, which demonstrated constant variance across predicted values. Independence of residuals was confirmed using the Durbin–Watson statistic (1.92), which was within the acceptable range (1.5–2.5). All assumptions for multiple linear regression were adequately met. In addition, R^2 and adjusted R^2 values were calculated to quantify the explained variance, and effect sizes using Cohen's f^2 to assess the practical significance of regression models.

To examine the relationships between parenting practices and adolescent functioning, Pearson's correlation coefficients were calculated between APQ subscales and SDQ subscales. This analytic approach was chosen to identify preliminary bivariate associations and inform the selection of predictors for subsequent multivariate models. Multiple linear regression analyses were performed to explore associations between parenting practices (APQ scores) and adolescent behavior (SDQ scores). Multiple regression was selected because it allows simultaneous examination of the unique contribution of each predictor while controlling for covariates, thereby isolating independent effects from interrelated variables.

To address potential confounding, the following covariates were systematically included in all regression models based on their theoretical relevance and prior literature: adolescent's age, adolescent's gender, family income, parental education, parental age, marital status, and access to support services. Covariates were entered simultaneously to adjust for their potential influence on the primary relationships of interest. Effect sizes for regression coefficients were calculated using Cohen's f^2, with values of 0.02, 0.15, and 0.35 interpreted as small, medium, and large effects, respectively. For the overall model, adjusted R^2 values were converted to Cohen's f^2 ($f^2 = R^2/(1 - R^2)$) to quantify the total variance explained. All effect sizes were reported with their corresponding 95% confidence intervals (CIs) to enhance the interpretive depth. Statistical significance was set at $p < 0.05$. All analyses were conducted using SPSS version 26.

Results

This study examined parent–child interaction patterns and their relationship with adolescent functioning in Saudi Arabian families managing ADHD. Descriptive statistics established baseline patterns of parenting and adolescent functioning. Bivariate correlations examined preliminary associations between parenting dimensions and outcomes. Multiple linear regression was then conducted to identify the unique contribution of each predictor to adolescent functioning while controlling for potential confounders because this approach isolates independent effects from interrelated variables. The following sections present the findings related to sociodemographic characteristics, parent–child interactions, adolescent behavior, and the results of regression analyses.

Sociodemographic characteristics

Sample size clarification

The initial target sample size was 384 caregiver–adolescent dyads based on power analysis. However, due to practical constraints in clinic-based recruitment during the seven-month study period, 126 dyads were successfully enrolled, and thus the response rate was 32.8% of the target. All subsequent analyses were based on this actual sample of 126 dyads. The demographic characteristics of the sample are presented in Table 1.

Adolescent demographics

Table 1 summarizes the sociodemographic characteristics of the adolescents. The mean age was 14.6 ± 1.9 years (range: 12–18 years), with 69.8% male and 30.2% female (Figure 1). Most adolescents had two or three siblings (24.6% each), and 43.7% were first-born. Educationally, adolescents were distributed across grades, with 22.2% in Grade 8. Academic performance was reported as average (27.8%), above average (21.4%), excellent (19.8%), or below average (19.0%).

Support services were largely absent (57.9%), with 10.3% receiving private lessons and 6.3% accessing special

Table 1: Sociodemographic Characteristics of Adolescents (N = 126).

	Frequency	Percentage
Age of adolescent (mean ± SD)	14.6 ± 1.9	
Gender of adolescent		
Female	38	30.2
Male	88	69.8
Number of siblings		
0	5	4
1	13	10.3
2	31	24.6
3	31	24.6
4	25	19.8
5 and more	21	16.7
Rank in siblings		
First	55	43.7
Second	22	17.5
Third	20	15.9
Fourth	8	6.3
Fifth	8	6.3
Sixth	8	6.3
Seventh	2	1.6
Eighth	3	2.4
Education		
Grade 6	20	15.9
Grade 7	20	15.9
Grade 8	28	22.2
Grade 9	17	13.5
Grade 10	9	7.1
Grade 11	12	9.5
Grade 12	20	15.9
Rank in school		
Below average	24	19
Weak/poor	15	11.9
Above average	27	21.4
Average	35	27.8
Excellent	25	19.8
Support services received at school		
Other	6	4.8
Individualized education program	6	4.8
Behavioral interventions	6	4.8
Social skills training	2	1.6
Provision of equipment for managing hyperactivity and attention deficit	2	1.6
Counseling or therapy services	5	4
Special education services	8	6.3
Private lessons or academic support	13	10.3
Speech and language therapy	5	4
None	73	57.9
Total N =	126	100%

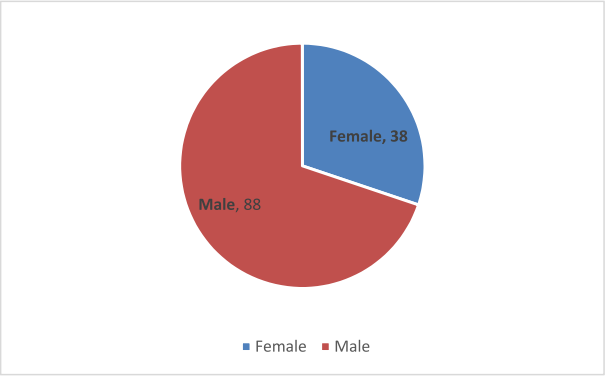


Figure 1: Distribution of Adolescent Participants by Gender (N = 126).

Table 2: Sociodemographic Characteristics of Caregivers (N = 126).

	Frequency	Percentage
Relationship to adolescent		
Mother	94	74.6
Father	26	20.6
Sibling	2	1.6
Other	4	3.2
Age		
Less than 24 years	2	1.6
25–34 years	9	7.1
35–44 years	63	50
45–54 years	45	35.7
55–64 years	6	4.8
65 years and more	1	0.8
Gender		
Female	99	78.5
Male	27	21.5
Marital status		
Single	5	4
Married	107	84.9
Divorced	11	8.7
Widowed	3	2.4
Educational level		
High school level or less	29	23
Diploma	11	8.7
Bachelor's degree	66	52.4
Masters	20	15.9
Job		
Part-time	5	4
Full-time	60	47.6
Unemployed	30	23.8
Retired	9	7.1
Other	22	17.5
Income		
<10,000 Saudi Riyal (SAR)	45	35.7
10,000–30,000 Saudi Riyal (SAR)	61	48.4
30,000–50,000 Saudi Riyal (SAR)	9	7.1
50,000–70,000 Saudi Riyal (SAR)	9	7.1
More than 70,000 Saudi Riyal (SAR)	2	1.6
Language		
English	6	4
Arabic	121	96
Total N	126	100%

C. Caregiver Demographics.

education services. Other services included individualized education programs, behavioral interventions, and speech therapy (each ≤4.8%).

Table 2 shows the sociodemographic characteristics of the caregivers. The majority were mothers (74.6%), aged 35–44 years (50%) and 45–54 years (35.7%). Most were female (78.5%) and married (84.9%). Regarding education, 52.4% held a bachelor's degree, while 23% had high school education or less. In terms of employment status, 47.6% worked full-time, 23.8% were unemployed, and 17.5% reported other jobs. Income ranged primarily between 10,000

and 30,000 Saudi Riyal (48.4%) and <10,000 Saudi Riyal (35.7%). Arabic was the dominant language spoken (96%).

Parent–child interaction patterns (APQ)

Table 3 summarizes the routine interactions between caregivers and their adolescents over the past month. Positive interactions were frequently reported. The majority of caregivers indicated that they often or always had friendly conversations with their adolescent (66.6%) and praised them when they did something good (86.5%). Similarly, 75.4% of caregivers reported asking about their adolescent's day at school, while 59.5% rewarded their adolescent for good behavior. Hugging or kissing adolescents as a form of positive reinforcement was also common (44.4%).

Regarding parental supervision, 76.2% of caregivers reported that their adolescent was never out at night without adult supervision and 73.8% stated that their adolescent never returned home later than expected. However, 47.6% of caregivers acknowledged that they sometimes became too busy to keep track of their adolescent's activities.

Disciplinary measures varied among caregivers. Yelling or screaming at adolescents was reported sometimes or often by 60.3%, while threatening punishment without following through occurred in 44.4% of cases. More severe disciplinary actions were less frequent, where 61.9% of caregivers reported never slapping their adolescent, and 69.0% stated they never hit their adolescent with a belt, stick, or other object. The use of time-out and assigning extra homework as punishment was rare, with 72.2% and 62.7% of caregivers, respectively, indicating never.

In terms of engagement in activities, 38.9% of caregivers reported attending school-related events, while 31.7% indicated that their adolescent helped plan family activities. Volunteer involvement in adolescents' special activities was less common, with 30.2% reporting never participating. The mean total APQ score was 112.4 ± 15.5 (range: 41–168).

Adolescent behavioral and emotional characteristics (SDQ)

Table 4 presents the behavioral characteristics of adolescents as reported by their caregivers. Positive social behaviors were frequently observed. The majority of caregivers reported that their adolescent definitely cared about others' feelings (55.6%), had at least one good friend (57.9%), and was kind to younger children (57.1%). In addition, 47.6% noted that their adolescent often offered to help others, and 46% agreed that their adolescent generally behaved well and followed adult instructions.

Negative emotional and behavioral patterns were also noted, where 47.6% of caregivers reported that their adolescent often lost their temper and 42.9% indicated that the adolescent had many worries or often seemed worried. Similarly, 47.6% of caregivers observed nervousness in new situations and loss of confidence. Furthermore, 37.3% noted that their adolescent was often unhappy, depressed, or tearful, and 40.5% indicated that the adolescent was picked on or bullied by others.

Regarding hyperactivity and attention issues, 65.1% of caregivers reported that their adolescent was easily distracted and lost concentration. Other hyperactive tendencies, such as constant movement or fidgeting, were observed in 33.3%, while 32.5% noted that the adolescent was restless and could not sit still for long. Task completion and attention to responsibilities were identified as challenges, with only 15.9% of caregivers reporting that their adolescent had good attention and consistently finished tasks or homework. Conversely, 45.2% noted difficulty in task completion.

Behaviors related to discipline and conduct problems were variable, where 69.8% of caregivers stated that their adolescent did not steal, 42.1% reported that their adolescent often lied or cheated, and 19.8% noted frequent fights or bullying behavior toward peers. The mean total SDQ difficulties score was 26.7 ± 6.1 (range: 10–40), which is within the clinical range based on established cut-offs (>17 for total difficulties), indicating significant impairment in this sample.

Distribution of support services

Figure 2 illustrates the distribution of support services received by adolescents with ADHD. The majority (57.9%) of the cohort did not access any formalized therapeutic or educational interventions. Among those receiving support, private lessons or academic support (10.3%) and special education services (6.3%) were the most frequently utilized modalities. Conversely, counseling or psychotherapeutic interventions (4.0%), behavioral modification programs (4.8%), speech and language therapy (4.0%), and ancillary support services (4.8%) were markedly underutilized, suggesting potential barriers to accessing multidisciplinary care.

Correlation analysis: parenting practices and adolescent functioning

Table 5 presents the Pearson correlation coefficients calculated between the APQ subscales and SDQ subscales. Positive parenting practices (involvement, positive reinforcement) had significant negative correlations with SDQ total difficulties ($r = -0.28$, $p < 0.01$; and $r = -0.24$, $p < 0.05$, respectively), indicating that greater positive parenting was associated with fewer behavioral and emotional difficulties. In particular, positive involvement was negatively correlated with conduct problems ($r = -0.31$, $p < 0.001$) and hyperactivity–inattention ($r = -0.22$, $p < 0.05$). Inconsistent discipline had significant positive correlations with SDQ total difficulties ($r = 0.35$, $p < 0.001$), conduct problems ($r = 0.42$, $p < 0.001$), and emotional symptoms ($r = 0.27$, $p < 0.01$). Poor supervision was positively correlated with peer problems ($r = 0.29$, $p < 0.01$) and conduct problems ($r = 0.33$, $p < 0.001$). Harsh discipline (yelling and physical punishment) had significant positive correlations with emotional symptoms ($r = 0.30$, $p < 0.001$) and peer problems ($r = 0.25$, $p < 0.01$). These bivariate associations provide preliminary evidence that parenting practices were systematically related to adolescent functioning, justifying their inclusion in the multivariate regression models.

Table 3: Parent–Adolescent Interaction Patterns (APQ) Over the Past Month (N = 126).

	Never	Very rarely	Sometimes	Often	Always
You have a friendly conversation with your son/daughter.	1 (0.8%)	6 (4.8%)	36 (28.6%)	59 (46.8%)	24 (19%)
You tell your son/daughter when they do something well.	1 (0.8%)	2 (1.6%)	18 (14.3%)	60 (47.6%)	45 (35.7%)
You threaten to punish your son/daughter and then do not actually punish them.	9 (7.1%)	30 (23.8%)	47 (37.3%)	26 (20.6%)	14 (11.1%)
You volunteer to help with special activities in which your son/daughter participates (e.g., sports, scouts).	38 (30.2%)	19 (15.1%)	37 (29.4%)	26 (20.6%)	6 (4.8%)
You reward or give something extra to your son/daughter when they obey or behave well.	5 (4%)	13 (10.3%)	33 (26.2%)	44 (34.9%)	31 (24.6%)
Your son/daughter does not leave a note or does not tell you where they are going.	46 (36.5%)	31 (24.6%)	23 (18.3%)	16 (12.7%)	10 (7.9%)
You play games or do other fun activities with your son/daughter.	15 (11.9%)	35 (27.8%)	52 (41.3%)	21 (16.7%)	3 (2.4%)
Your son/daughter convinces you not to punish them after they do something wrong.	18 (14.3%)	21 (16.7%)	40 (31.7%)	33 (26.2%)	14 (11.1%)
You ask your son/daughter about their day at school.	2 (1.6%)	6 (4.8%)	23 (18.3%)	46 (36.5%)	49 (38.9%)
Your son/daughter stays out in the evening past the time they are supposed to be home.	82 (65.1%)	25 (19.8%)	11 (8.7%)	6 (4.8%)	2 (1.6%)
You help your son/daughter with their school homework.	18 (14.3%)	24 (19%)	35 (27.8%)	24 (19%)	25 (19.8%)
You feel that getting your son/daughter's obedience has become more of a struggle than it is worth.	11 (8.7%)	13 (10.3%)	43 (34.1%)	32 (25.4%)	27 (21.4%)
You praise your son/daughter when they do something good.	2 (1.6%)	6 (4.8%)	9 (7.1%)	56 (44.4%)	53 (42.1%)
You ask your son/daughter about their plans for the next day.	12 (9.5%)	22 (17.5%)	48 (38.1%)	26 (20.6%)	18 (14.3%)
You take your son/daughter to a special activity.	32 (25.4%)	21 (16.7%)	39 (31%)	21 (16.7%)	13 (10.3%)
You praise your son/daughter if they behave well.	2 (1.6%)	4 (3.2%)	21 (16.7%)	53 (42.1%)	46 (36.5%)
Your son/daughter goes out with friends you do not know.	86 (68.3%)	17 (13.5%)	13 (10.3%)	6 (4.8%)	4 (3.2%)
You hug or kiss your son/daughter when they do something good.	6 (4.8%)	13 (10.3%)	30 (23.8%)	43 (34.1%)	34 (27%)
Your son/daughter goes out without telling you when they will be back.	77 (61.1%)	17 (13.5%)	17 (13.5%)	11 (8.7%)	4 (3.2%)
You talk with your son/daughter about their friends.	4 (3.2%)	8 (6.3%)	37 (29.4%)	47 (37.3%)	30 (23.8%)
Your son/daughter is out at night without an adult supervisor.	96 (76.2%)	9 (7.1%)	10 (7.9%)	7 (5.6%)	4 (3.2%)
You let your son/daughter off punishment early (e.g., lifting restrictions before the time is up).	33 (26.2%)	16 (12.7%)	44 (34.9%)	22 (17.5%)	11 (8.7%)
Your son/daughter helps plan family activities.	15 (11.9%)	10 (7.9%)	49 (38.9%)	40 (31.7%)	12 (9.5%)
You get so busy that you forget where your son/daughter is or what they are doing.	60 (47.6%)	28 (22.2%)	25 (19.8%)	9 (7.1%)	4 (3.2%)
Your son/daughter is not punished when they do something wrong.	29 (23%)	36 (28.6%)	44 (34.9%)	13 (10.3%)	4 (3.2%)
You attend your son/daughter's school meetings, teacher conferences, or other school events.	18 (14.3%)	11 (8.7%)	28 (22.2%)	38 (30.2%)	31 (24.6%)
You tell your son/daughter that you like it when they help with household chores.	2 (1.6%)	7 (5.6%)	10 (7.9%)	49 (38.9%)	58 (46%)

Table 3 (*continued*)

	Never	Very rarely	Sometimes	Often	Always
You do not check if your son/daughter has returned home from school when they should be home.	89 (70.6%)	10 (7.9%)	11 (8.7%)	5 (4%)	11 (8.7%)
You do not tell your son/daughter where you are going.	47 (37.3%)	21 (16.7%)	36 (28.6%)	17 (13.5%)	5 (4%)
Your son/daughter returns home from school more than an hour later than you expect.	93 (73.8%)	16 (12.7%)	8 (6.3%)	7 (5.6%)	2 (1.6%)
The punishment you give to your son/daughter depends on your mood.	45 (35.7%)	28 (22.2%)	36 (28.6%)	9 (7.1%)	8 (6.3%)
Your son/daughter is at home without adult supervision.	56 (44.4%)	17 (13.5%)	31 (24.6%)	13 (10.3%)	9 (7.1%)
You slap your son/daughter with your hand when they do something wrong.	78 (61.9%)	28 (22.2%)	12 (9.5%)	5 (4%)	3 (2.4%)
You ignore your son/daughter when they make a mistake.	29 (23%)	22 (17.5%)	60 (47.6%)	12 (9.5%)	3 (2.4%)
You take privileges or money from your son/daughter as punishment.	36 (28.6%)	15 (11.9%)	41 (32.5%)	30 (23.8%)	4 (3.2%)
You send your son/daughter to their room as punishment.	47 (37.3%)	24 (19%)	29 (23%)	18 (14.3%)	8 (6.3%)
You hit your son/daughter with a belt, stick, or another object when they do something wrong.	87 (69%)	21 (16.7%)	8 (6.3%)	10 (7.9%)	0 (0%)
You yell or scream at your son/daughter when they do something wrong.	9 (7.1%)	29 (23%)	49 (38.9%)	27 (21.4%)	12 (9.5%)
You calmly explain to your son/daughter why their behavior was wrong when they misbehave.	4 (3.2%)	7 (5.6%)	37 (29.4%)	42 (33.3%)	36 (28.6%)
You use time-out (make them sit or stand in the corner) as punishment.	91 (72.2%)	16 (12.7%)	9 (7.1%)	9 (7.1%)	1 (0.8%)
You assign extra homework to your son/daughter as punishment.	79 (62.7%)	18 (14.3%)	18 (14.3%)	8 (6.3%)	3 (2.4%)
Total score (mean ± SD)	112.4 ± 15.5 (Min = 41, Max = 168)				

Regression analyses

Factors associated with parenting practices (APQ scores)

Table 6 presents the regression analysis results for factors associated with APQ scores. Marital status had a significant association, where single caregivers reported higher APQ scores compared with widowed caregivers (β = 27.992, 95% CI: 4.252−51.733, $p = 0.021$; Cohen's $f^2 = 0.14$, small-to-medium effect). In addition, individuals with no siblings had significantly lower APQ scores than those with more than two siblings (β = −20.164, 95% CI: −36.099 to −4.23, $p = 0.014$; Cohen's $f^2 = 0.12$, small effect**).** Other variables, including age, gender, parental education, employment, and school performance, were not statistically significant ($p > 0.05$). The full model explained 22% of the variance in APQ scores (adjusted $R^2 = 0.18$), corresponding to a medium effect (Cohen's $f^2 = 0.28$).

Factors associated with adolescent functioning (SDQ scores)

Maternal guardianship was significantly associated with higher SDQ scores (β = 12.097, 95% CI: 2.03−22.164, $p = 0.019$; Cohen's $f^2 = 0.15$, medium effect). However, given the cross-sectional design and the very small sibling−guardian comparison group, this finding should be interpreted with caution and does not imply a causal relationship. Parental education had a significant association, where adolescents of more educated caregivers scored lower on the SDQ (β = −3.017, 95% CI: −5.564 to −0.47, $p = 0.021$; Cohen's $f^2 = 0.09$, small effect). Better school performance (β = −3.257, 95% CI: −5.669 to −0.845, $p = 0.009$; Cohen's $f^2 = 0.11$, small effect) and access to support services (β = −3.157, 95% CI: −5.367 to −0.946, $p = 0.006$; Cohen's $f^2 = 0.12$, small effect) were associated with lower SDQ scores. Other variables were not statistically significant ($p > 0.05$). The full model explained 28% of the variance in SDQ scores (adjusted $R^2 = 0.24$), corresponding to a medium-to-large effect (Cohen's $f^2 = 0.39$).

Figure 3 illustrates the significant predictors of adolescent SDQ scores, with their effect sizes and 95% CIs. Maternal guardianship (β = 12.097, 95% CI: 2.03−22.164, $p = 0.019$, $f^2 = 0.15$) was associated with higher SDQ scores, suggesting an association between maternal guardianship and higher reported emotional and behavioral difficulties in this sample. Parental education (β = −3.017, $f^2 = 0.09$), school performance (β = −3.257, $f^2 = 0.11$), and access to support services (β = −3.157, $f^2 = 0.12$) were associated with lower SDQ scores, suggesting that these factors were associated with lower reported emotional and behavioral difficulties in this sample. Maternal guardianship had the largest standardized effect, but this interpretation should be treated with caution because the sibling−guardian comparison group was very small (n = 2), which may have reduced the stability of the estimate.

Table 4: Adolescent Behavioral and Emotional Characteristics (SDQ) (N = 126).

Item	Certainly True	Somewhat True	Not True
Cares about others' feelings	70 (55.6%)	48 (38.1%)	8 (6.3%)
Restless, overactive, cannot sit still for long	41 (32.5%)	45 (35.7%)	40 (31.7%)
Often complains of headaches, abdominal pain, or nausea	28 (22.2%)	39 (31%)	59 (46.8%)
Shares with other young people, for example, games or food	53 (42.1%)	52 (41.3%)	21 (16.7%)
Often loses their temper	60 (47.6%)	51 (40.5%)	15 (11.9%)
Prefers to be alone	31 (24.6%)	45 (35.7%)	50 (39.7%)
Generally behaves well and usually does what adults ask	58 (46%)	55 (43.7%)	13 (10.3%)
Has a lot of worries or often seems worried	54 (42.9%)	55 (43.7%)	17 (13.5%)
Helpful if someone is hurt, upset, or feeling uncomfortable	48 (38.1%)	53 (42.1%)	25 (19.8%)
Constantly moves or fidgets	42 (33.3%)	43 (34.1%)	41 (32.5%)
Has at least one good friend	73 (57.9%)	33 (26.2%)	20 (15.9%)
Frequently fights with other young people or bullies them	25 (19.8%)	45 (35.7%)	56 (44.4%)
Often unhappy, depressed, or tearful	33 (26.2%)	46 (36.5%)	47 (37.3%)
Is generally liked by others	51 (40.5%)	61 (48.4%)	14 (11.1%)
Easily distracted and loses concentration	82 (65.1%)	30 (23.8%)	14 (11.1%)
Nervous in new situations and easily loses confidence	60 (47.6%)	46 (36.5%)	20 (15.9%)
Kind to younger children	72 (57.1%)	39 (31%)	15 (11.9%)
Often lies or cheats	30 (23.8%)	43 (34.1%)	53 (42.1%)
Is picked on or bullied by others	47 (37.3%)	51 (40.5%)	28 (22.2%)
Often offers to help others (parents, teachers, or children)	60 (47.6%)	54 (42.9%)	12 (9.5%)
Thinks things through before acting	22 (17.5%)	51 (40.5%)	53 (42.1%)
Steals from home, school, or elsewhere	18 (14.3%)	20 (15.9%)	88 (69.8%)
Gets along better with adults	45 (35.7%)	58 (46%)	23 (18.3%)
Has many fears or is easily scared	47 (37.3%)	53 (42.1%)	26 (20.6%)
Has good attention, finishes tasks or homework to the end	20 (15.9%)	49 (38.9%)	57 (45.2%)
Total difficulties score (mean ± SD)	**26.7±6.1**		
Range	**10–40**		

Note: Total difficulties score >17 indicates clinical range. Higher scores indicate greater impairment.

Summary of key findings

In summary, the bivariate correlations indicated significant associations between parenting practices and adolescent functioning, where positive parenting was associated with fewer difficulties and inconsistent/harsh parenting associated with greater impairment. Multivariate regression identified maternal guardianship as a risk factor for higher SDQ scores (medium effect), while higher parental education, better school performance, and access to support services emerged

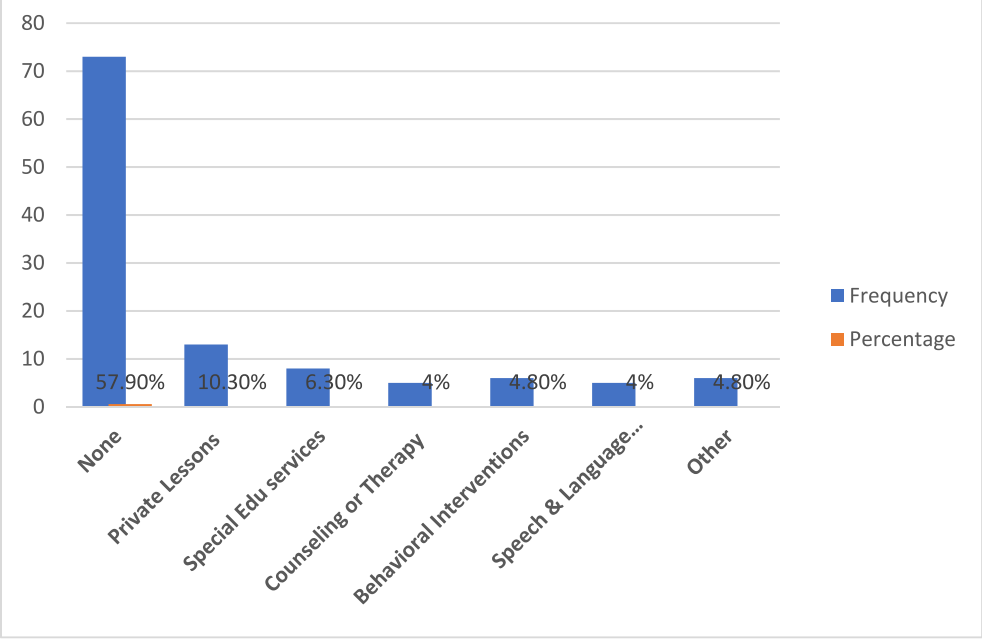


Figure 2: Distribution of Educational and Support Services Received by Adolescents with ADHD (N = 126).

Table 5: Factors Associated with Parenting Practices (APQ Scores): Regression Analysis Results.

	Estimate	95% Confidence Interval		*p*-value	Cohen's f^2	Effect Size
		Low	High			
(Intercept)	111.77	65.248	158.294	0		
Age	−0.355	−2.358	1.648	0.726		
Gender, Male/Female	1.703	−4.717	8.122	0.6		
Parent, Other/Sibling	−12.056	−40.973	16.86	0.41		
Parent, Father/Sibling	2.834	−23.325	28.993	0.83		
Parent, Mother/Sibling	−0.729	−26.172	24.714	0.955		
Age of parent, more than 45 years/less than 45 years	−1.618	−8.735	5.499	0.653		
Marital status, single/widow	27.992	4.252	51.733	0.021	0.14	Small-medium
Marital status, married/widow	11.031	−8.785	30.847	0.272	0.12	Small
Marital status, divorced/widow	21.034	−0.913	42.981	0.06		
Education of parent, diploma or more/ baccalaureate or less	−1.914	−8.352	4.523	0.557		
Employment of parent, not employed/ employed	−0.892	−6.927	5.142	0.77		
Salary, more than 10,000 SAR/less than 10,000 SAR	1.541	−4.394	7.476	0.608		
Number of siblings, less than 2/more than 2	1.945	−4.312	8.202	0.539		
Number of siblings, none/more than 2	−20.164	−36.099	−4.23	0.014		
Education, secondary/elementary	−1.807	−10.344	6.731	0.676		
Birth order	−1.802	−3.909	0.306	0.093		
School performance, more than average/less than average	−4.026	−10.122	2.069	0.193		
Support services, Yes/No	3.404	−2.183	8.991	0.23		
Model summary						
R^2					0.22	$\mathbf{R^2}$
Adjusted R^2					0.18	Adjusted R^2
F (df)					4.23 (18, 107)	F (df)
p-value					<0.001	*p*-value
Cohen's f^2 (model)					0.28	Medium

Table 6: Factors Associated with Adolescent Emotional and Behavioral Functioning (SDQ Scores): Regression Analysis Results.

	Estimate	95% Confidence Interval		*p*-value
		low	high	
(Intercept)	23.468	5.06	41.876	0.013
Age	−0.114	−0.907	0.679	0.776
Gender, male/female	0.68	−1.86	3.22	0.597
Parent, other/sibling	8.717	−2.725	20.158	0.134
Parent, father/sibling	9.516	−0.834	19.866	0.071
Parent, mother/sibling	12.097	2.03	22.164	0.019
Age of parent, more than 45/less than 45 years	0.567	−2.249	3.383	0.69
Marital status, single/widow	0.822	−8.571	10.216	0.863
Marital status, married/widow	−4.699	−12.539	3.142	0.237
Marital status, divorced/widow	−1.557	−10.241	7.127	0.723
Education of parent, diploma or more/baccalaureate or less	−3.017	−5.564	−0.47	0.021
Employment of parent, not employed/employed	0.341	−2.047	2.728	0.778
Salary, more than 10,000 SAR/less than 10,000 SAR	1.342	−1.006	3.69	0.26
Number of siblings, less than 2/more than 2	1.44	−1.036	3.915	0.252
Number of siblings, none/more than 2	−1.104	−7.408	5.201	0.729
Education, secondary/elementary	−0.591	−3.969	2.787	0.73
Birth order	−0.028	−0.862	0.806	0.947
School performance, more than average/less than average	−3.257	−5.669	−0.845	0.009
Support services, Yes/No	−3.157	−5.367	−0.946	0.006

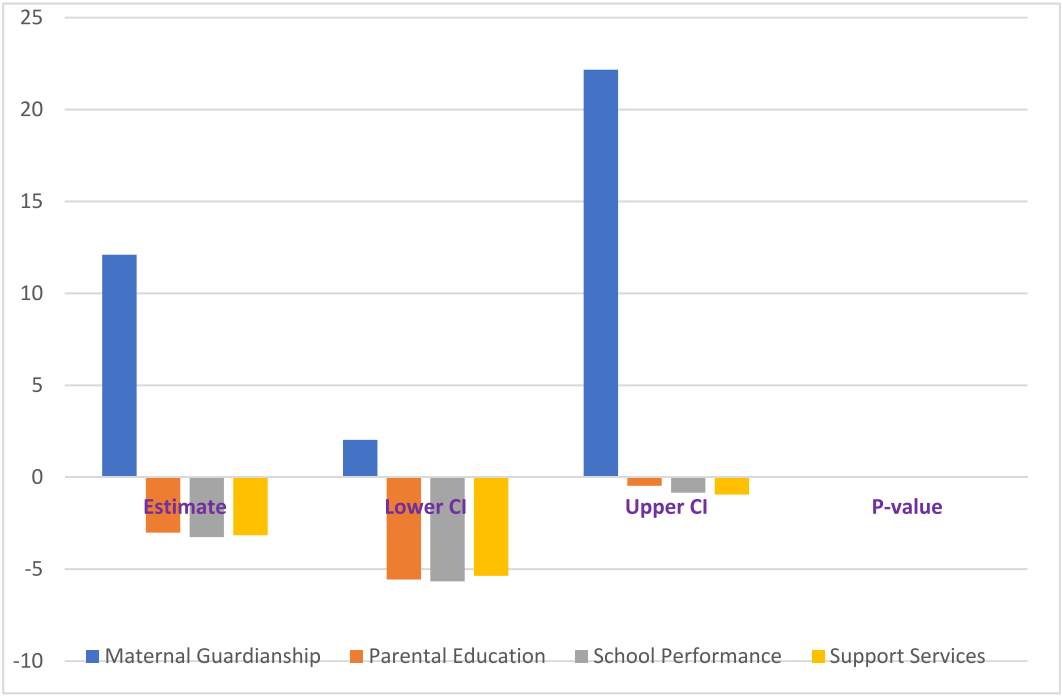


Figure 3: Regression Coefficients and Effect Sizes for Variables Associated with Adolescent SDQ Scores.

as protective factors (small-to-medium effects). The full multivariate model explained 28% of the variance in adolescent functioning, representing a medium-to-large collective effect.

Discussion

The present study explored the intricate relationships between parent–child interaction patterns and adolescent functioning in Saudi Arabian families managing ADHD, utilizing a cross-sectional design.

The demographic profile of the adolescent participants showed that the sample was predominantly male in mid-adolescence, aligning with epidemiological trends suggesting a higher prevalence of ADHD in males. However, this overrepresentation of males may also reflect referral bias as males with ADHD may exhibit more externalizing behaviors that prompt clinical referral compared with females, who may present with predominantly inattentive symptoms that are under-recognized.[14] The distribution of children across different grade levels highlights the pervasive impact of ADHD on academic trajectories. The relatively high proportion of children with average academic performance together with the substantial minority with below average performance emphasizes the need for targeted educational interventions and individualized support to mitigate the academic challenges often faced by adolescents with ADHD.[15] A particularly concerning finding was the limited access to formal support services reported by a significant majority of families, which may reflect multiple factors, including limited availability of specialized services in certain regions, financial barriers, lack of awareness about available resources, or cultural stigma associated with seeking formal mental health support. This highlights a potential gap in service provision and the need for increased awareness and accessibility to resources for families managing ADHD in KSA.[16]

The caregiver demographics reflected a typical pattern with mothers as the primary caregivers, and most were within the usual age range of parents of adolescents. The diverse range of parental education levels within the sample allowed the influence on parenting practices and child outcomes to be explored. Similarly, the variability in family income provided an opportunity to investigate the potential impacts of socioeconomic factors on the dynamics within these families. In their population-based cohort study, Choi et al. found that children who lived in decreasing-income or consistently low-income households had a higher risk for ADHD, suggesting that promotion of targeted policies and priority support may help reduce the impact of ADHD in this vulnerable group.[17]

Examination of parent–child interaction patterns assessed by using the APQ indicated the complex interplay of positive and less adaptive parenting behaviors. The high prevalence of positive interactions, such as frequent friendly conversations, consistent praise, and active engagement with the adolescent's school life, aligns with the broader literature emphasizing the importance of positive parenting in fostering healthy development, especially in the context of ADHD. These findings suggest that despite the challenges of managing ADHD, many Saudi families maintain warm and supportive relationships, reflecting cultural values of family cohesion and respect for authority.[18]

However, our study also identified areas of concern. Parental supervision regarding curfews and night–time activities appeared generally adequate, but a substantial proportion of caregivers acknowledged difficulties in consistently monitoring their adolescent's activities. This inconsistent supervision could potentially create

vulnerabilities, particularly for adolescents with ADHD who may exhibit impulsivity and impaired judgment. This finding resonates with research highlighting the importance of consistent monitoring and supervision in mitigating risk-taking behaviors in adolescents with ADHD.[19]

The disciplinary practices reported by caregivers provided a mixed picture. Severe physical punishment was infrequent, but reliance on verbal reprimands, such as yelling and screaming, was common. Furthermore, a substantial proportion of caregivers reported inconsistent discipline, such as threatening punishment without follow-through. These findings are consistent with previous research indicating that families managing ADHD often experience increased stress and may resort to less effective disciplinary strategies.[20] Inconsistent and aversive parenting practices have been linked to increased behavioral problems and emotional dysregulation in children with ADHD.[21] However, the reliance on verbal reprimands and inconsistent discipline highlights the need for parenting interventions that focus on positive discipline strategies, effective communication, and consistent limit setting.[22]

Parental involvement in school and extracurricular activities emerged as an area requiring attention. The relatively low levels of participation in school events and extracurricular activities suggest a potential disconnect between parents and their adolescents' academic and social lives. Engaging in these activities provides opportunities for parents to connect with their adolescents, support their development, and foster their interests. These findings contrast with previous studies that emphasized the importance of parental involvement in promoting positive outcomes for children with ADHD.[23]

The results obtained by regression analysis provided further insights into the factors associated with parent–child interactions and adolescent functioning. The significant association between marital status and APQ scores, with single parents reporting higher scores, may reflect the increased stress and challenges faced by single parents in managing the demands of raising a child with ADHD. Alternatively, single parents may be more vigilant in their parenting efforts to compensate for the absence of a partner, which could have manifested as higher reported engagement on the APQ. This finding warrants further investigation, possibly through qualitative studies, to explore the lived experiences of single parents raising adolescents with ADHD in KSA. The association between the number of siblings and APQ scores, where children without siblings had lower scores, is also an interesting finding that requires further exploration.[24]

The results obtained by correlation analysis provide empirical support for the hypothesized relationships between parenting practices and adolescent functioning, which are consistent with both social learning theory and the transactional model. Positive parenting practices were associated with fewer difficulties, and inconsistent and harsh discipline was associated with greater impairment. These associations were modest in magnitude but they align with the effect sizes typically observed in parenting research and suggest that parenting practices account for meaningful variance in adolescent outcomes.[25]

Moreover, our findings regarding parenting practices and adolescent functioning in Saudi Arabian families managing ADHD both align with and diverge from studies conducted in Western countries and other Middle Eastern contexts. For instance, the association between inconsistent discipline and increased behavioral problems is consistent with the findings obtained in Western studies.[24,25] However, the magnitude of these associations in our sample suggests that the cultural context may amplify or attenuate certain relationships. The cultural context of KSA introduces unique factors, such as the emphasis on hierarchical family structures and the limited involvement of fathers in caregiving, which may amplify the challenges faced by mothers.[26]

In contrast to studies in Western countries, where shared parenting responsibilities are more common, the reliance on maternal guardianship in KSA may exacerbate the emotional and behavioral difficulties of adolescents with ADHD. This finding is supported by research highlighting the high levels of stress and reduced quality of life among Saudi mothers of children with ADHD.[27,28] However, an alternative interpretation is that mothers, as the primary caregivers, may simply be more aware of and thus more likely to report their adolescents' difficulties compared with siblings or other guardians, who may have less direct observation of daily functioning.[28] In addition, the limited access to formal support services further compounds these challenges because parents may lack the resources and strategies needed to effectively manage ADHD symptoms.[29]

Importantly, alternative explanations should also be considered. The observed association between maternal guardianship and higher SDQ scores may reflect reporting differences rather than actual differences in adolescent functioning because mothers are more likely to serve as primary caregivers, and thus may have greater awareness of behavioral and emotional symptoms. Moreover, the very small sibling–guardian comparison group may have reduced the stability of the estimate. Therefore, these findings should be interpreted with caution until replicated in larger and more diverse samples.

The cultural norms in KSA, such as the emphasis on family honor and the stigma associated with mental health disorders, may also influence parenting practices and adolescent outcomes.[30] For example, parents may be reluctant to seek external support due to fear of social judgment, leading to increased reliance on punitive disciplinary strategies.[28,29] This is consistent with our finding that 60.3% of caregivers reported yelling or screaming at their children, and 44.4% acknowledged threatening punishment without follow-through. These practices are common in many cultures but may be particularly pronounced in KSA due to the lack of accessible and culturally sensitive interventions.[30]

Our findings regarding the negative impact of inconsistent discipline and the benefits of positive parenting practices are consistent with Western research,[24,25] but the cultural context of KSA introduces additional complexities.[31] For example, high levels of maternal stress and the limited involvement of fathers in caregiving are less commonly reported in Western studies but are consistent with findings from other Middle Eastern countries. These cultural differences highlight the importance of developing interventions that are sensitive to the unique needs of Saudi Arabian families as well as recognizing that within-culture variability exists and not all families will respond identically to culturally adapted approaches.[31–33]

The present study contributes to the theoretical literature on ADHD and parenting in several ways. First, it extends the applicability of social learning theory and the transactional model to a non-Western cultural context, demonstrating that the core principles of these frameworks, particularly the bidirectional influences between child behavior and parenting, operate in a similar manner in Saudi Arabian families.[5,6] Second, the findings obtained suggest that cultural factors may moderate the strength of certain relationships, where maternal guardianship emerged as a culturally specific risk factor that amplified the association between parenting stress and adolescent difficulties.[26,27] Third, the modest effect sizes observed suggest that parenting practices are important but only among multiple factors that influence adolescent functioning, consistent with ecological models of development that emphasize multiple interacting systems.[7]

Study limitations

Several methodological limitations should be considered. The cross-sectional design precludes causal inferences and longitudinal studies are needed to establish temporal precedence. Reliance on parent-report measures may have introduced social desirability bias and future research should include multiple informants. Cultural interpretations discussed in this study were theoretical and not directly measured using culturally specific instruments or qualitative methods. Therefore, conclusions regarding the influence of Saudi cultural norms should be interpreted cautiously. Convenience sampling from specialized clinics limits the generalizability to families not seeking formal care or in rural areas, and the actual sample size (126 vs. target 384) may have limited the detection of smaller effects. The comparison between maternal and sibling guardianship requires cautious interpretation due to the very small subgroup size ($n = 2$). Unmeasured variables (parental mental health, marital conflict, family stress, and ADHD severity) may have confounded the observed relationships. Finally, recruitment from a single geographic region limits the representativeness relative to rural areas where cultural norms and service access may differ. Despite these limitations, this study provided valuable insights into family dynamics in Saudi families managing ADHD and identified targets for culturally sensitive interventions. Future research should include longitudinal designs, diverse samples, multiple informants, and randomized controlled trials of culturally adapted interventions.

Conclusion

According to the present study, parenting practices were significantly associated with adolescent functioning in Saudi families managing ADHD, consistent with social learning theory and the transactional model. Positive parenting practices (praise and friendly conversations) were found to be prevalent but significant challenges remain, including inconsistent supervision, verbal reprimands, and limited support service access. Maternal guardianship was associated with higher adolescent difficulties, likely reflecting cultural dynamics where mothers bear the primary caregiving burden. Cultural norms regarding mental health stigma and gender roles further complicate parenting and help-seeking. Given the cross-sectional design, these findings are associations rather than causal relationships. Culturally sensitive interventions are needed to promote shared caregiving, reduce maternal stress, and enhance service access. Future longitudinal research with diverse samples and multiple informants should evaluate the effectiveness of interventions. Despite its limitations, this study provides an empirical foundation for understanding family processes and developing targeted interventions for Saudi adolescents with ADHD and their families.

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Ethical considerations

Ethical approval for this study was obtained from the Institutional Review Board (IRB) at King Fahad Medical City (IRB #23–550C). This study adhered to the ethical principles outlined in the Declaration of Helsinki, ensuring the protection of participants' rights, confidentiality, and informed consent. Written informed consent was obtained from all participating caregivers, and assent from adolescent participants.

Clinical trial number

Not applicable.

Peer review

This article was peer-reviewed by two independent and anonymous reviewers.

Data availability statement

The data sets generated and/or analyzed during the current study are available from the corresponding author on reasonable request.

Conflicts of interest

There are no conflicts of interest to declare.

Authors contributions

Fatimah AlAhmari: Conceptualization, Methodology, Investigation, Data curation, Formal analysis, Validation, Writing – original draft, Writing – review & editing, Visualization, Project administration, Supervision, Corresponding author .Arwa Almubaydh: Methodology, Investigation, Data collection, Writing – review & editing. Maha Aldosari: Methodology, Investigation, Writing – review & editing. Marwah Aloufi: Methodology, Investigation, Writing – review & editing. All authors critically reviewed the

manuscript, approved the final version for publication, and agree to be accountable for all aspects of the work.

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