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ISLAMIC UNIVERSITY OF MADINAH

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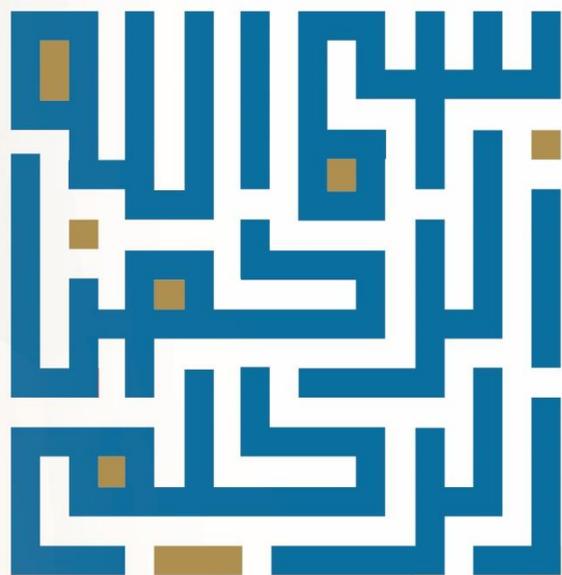




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البحوث المنشورة في المجلة
تعبر عن آراء الباحثين ولا تعبر
بالضرورة عن رأي المجلة

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قواعد وضوابط النشر في المجلة

- أن يتسم البحث بالأمانة والجدية والإبتكار والإضافة المعرفية في التخصص.
- لم يسبق للباحث نشر بحثه.
- أن لا يكون مستلاً من بحوث سبق نشرها للباحث.
- أن يلتزم الباحث بالأمانة العلمية.
- أن تراعى فيه منهجية البحث العلمي وقواعده.
- أن لا تتجاوز نسبة الاقتباس في البحث المقدم (25%) .
- أن لا يتجاوز مجموع كلمات البحث (12000) كلمة بما في ذلك الملخصين العربي والإنجليزي وقائمة المراجع.
- لا يحق للباحث إعادة نشر بحثه المقبول للنشر في المجلة إلا بعد إذن كتابي من رئيس هيئة تحرير المجلة.
- أسلوب التوثيق المعتمد في المجلة هو نظام جمعية علم النفس الأمريكية (APA) الإصدار السادس، وفي الدراسات التاريخية نظام شيكاغو.
- أن يشتمل البحث على : صفحة عنوان البحث ، ومستخلص باللغتين العربية والإنجليزية، ومقدمة ، و صلب البحث ، وخاتمة تتضمن النتائج والتوصيات ، وثبت المصادر والمراجع ، والملاحق اللازمة (إن وجدت).
- يلتزم الباحث بترجمة المصادر العربية إلى اللغة الإنجليزية.
- يرسل الباحث بحثه إلى المجلة إلكترونياً ، بصيغة (WORD) وبصيغة (PDF) ويرفق تعهداً خطياً بأن البحث لم يسبق نشره ، وأنه غير مقدم للنشر. ولن يقدم للنشر في جهة أخرى حتى تنتهي إجراءات تحكيمه في المجلة



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**Emotional and Behavioral Difficulties in Children
and Adolescents with Autism in Saudi Arabia
From Their Parents' Perspective**

إعداد

د. مجده السيد الكشكي

أستاذ علم النفس الاكلينيكي بكلية الآداب والعلوم
الانسانية جامعة الملك عبد العزيز بجده

د. شذا جميل خصيفان

أستاذ علم النفس المشارك بكلية الآداب
والعلوم الانسانية - جامعة الملك عبد العزيز



Abstract

Background: Extensive global research has profiled the behavioral strengths and difficulties among people with autism spectrum disorder (ASD) to ascertain the most effective rehabilitation approaches. The present study aims to clarify behavioral strengths and difficulties in Saudi children and adolescents with ASD using the Strengths and Difficulties Questionnaire (SDQ).

Methods: Parents of autistic children and adolescents aged 2–18 years in Saudi Arabia reported their children's behavioral strengths and difficulties by completing the SDQ instrument. Results were analyzed statistically for associations between strengths or difficulties and various demographic variables of the children and their parents.

Results: SDQ provides measures of five subscales: emotional symptoms, conduct problems, hyperactivity/inattention, peer relationships, and prosocial behavior. Associations between parental sociodemographic factors and characteristics of ASD subjects were found in a number of SDQ subscales. As to the ASD subjects, the hyperactivity mean value was the highest. There were higher statistically significant emotional problems in female ASD subjects than in males. However, other difficulty-related subscales did not differ between male and female ASD subjects. The prosocial (a strength) subscale was significantly lower in female participants than in males. No specific pattern in SDQ subscales was revealed according to age.

Conclusion: The differential aspects of SDQ in Saudi children and adolescents with ASD, based on their behavioral strengths and difficulties in the context of gender, age-stratification, parental sociodemographic impact, and biological factors suggest that preventive, therapeutic, and rehabilitation strategies need to be tailored for Saudi ASD children in order to be effective.

Keywords: autism spectrum disorder (ASD), Emotional and behavioural difficulties, Strengths and Difficulties Questionnaire, parental sociodemographic impact on autistic children, gender differences in children with ASD.

الصعوبات الانفعالية والسلوكية لدى الأطفال والمراهقين المصابين بالتوحد في المملكة العربية السعودية من وجهة نظر والديهم

مستخلص الدراسة

تركز الدراسات العالمية في مجال التوحد حالياً على استكشاف الجوانب المختلفة لاضطراب طيف التوحد (ASD)، ومنها تحديد مواطن القوة والصعوبات بهدف إعداد برامج إعادة تأهيل أكثر فعالية، في ضوء ذلك تهدف الدراسة الحالية إلى التعرف على نقاط القوة والصعوبات السلوكية لدى عينة من الأطفال المصابين بالتوحد في المملكة العربية السعودية باستخدام استبيان نقاط القوة والصعوبات (SDQ).

تكونت عينة الدراسة من (٩٣) من آباء وأمهات أطفال سعوديين تم تشخيصهم مسبقاً بالتوحد، طُبّق عليهم استبيان مواطن القوة والصعوبة لتقييم طفلهم المصاب بالتوحد، وكان متوسط عمر هؤلاء الأطفال ١١٥ شهراً.

توصلت الدراسة إلى عدة نتائج منها أن فرط النشاط كان أكثر المشكلات السلوكية انتشاراً لدى العينة، ووجدت فروق ذات دلالة إحصائية لصالح الاناث في المشكلات العاطفية فقط أما باقي الصعوبات فلم توجد فروق دالة فيها وفقاً للنوع، أما فيما يتعلق بالفروق في مواطن القوة (السلوك الاجتماعي الايجابي) وجدت فروق دالة إحصائية لصالح الذكور، لم توجد فروق دالة إحصائية وفقاً للعمر، وُجدت علاقة ارتباطية دالة بين بعض الخصائص الاجتماعية والديموغرافية للوالدين والمشكلات السلوكية والعاطفية لأبنائهم.

في ضوء هذه النتائج تم التوصية بأن الاستراتيجيات العلاجية والوقائية وإعادة التأهيل للأطفال ذوي التوحد لكي تكون فعالة يجب أن تكون مصممة بناء على تشخيص نقاط القوة والصعوبة لديهم.

الكلمات المفتاحية: اضطراب طيف التوحد، الصعوبات العاطفية والسلوكية، SDQ، المملكة العربية السعودية، المتغيرات الديموغرافية.

Introduction

The global prevalence of autism spectrum disorder (ASD) has been increasing rapidly, warranting early diagnosis that can be useful for rehabilitation interventions (Salayev & Sanne, 2017; Nevison, 2014; Elsabbagh et al., 2012). According to the latest information available from the World Health Organization, one in 160 children is diagnosed with autism spectrum disorder, which begins in childhood and tends to persist into adolescence and adulthood (WHO, 2019). The impact of ASD on individuals' lives differs among those with the disorder. Some people with ASD can lead independent lives while others encounter severe disabilities and difficulties, requiring life-long assistance and supportive care.

In the Gulf countries, a systematic review conducted on the epidemiology of autism revealed a prevalence ranging from 1.4 to 29 per 10,000 people (Salhia et al., 2014). Specifically, a study in Taif, Saudi Arabia, showed the estimated prevalence of autism in primary school children aged 7–12 years old to be 0.035% (Al-Zahrani, 2013). On the other hand, another review of the available literature failed to uncover reliable recent statistics of the prevalence of children with autism/ASD in Saudi Arabia (Zeina et al., 2014). However, The Saudi Ministry of Health has reported that one in every 160 Saudi children has ASD (Ministry Of Health Saudi Arabia, 2020).

Diagnosing ASD is difficult as there is no specific medical test, such as a blood test, to diagnose the disorder. Evaluation of the child's behavior and development is crucial to diagnosing an ASD case. The initial starting point for diagnosing ASD varies. Sometimes, it can be detected even at 18 months or younger (Lord et al., 2006). To date, several screening tools have been used for ASD, primarily the child behavior checklist, the Strengths and Difficulties Questionnaire (SDQ) (Goodman, 1997), and the Rutter Scale (Salayev & Sanne, 2017).

It has been observed that children with emotional and behavioral difficulties who are provided delayed services and inadequate help often tend to struggle in various aspects of their lives, resulting in catastrophic consequences. Children with ASD should be given proper support and educational services that can help them deal with their emotions in an appropriate fashion. Therefore, SDQ can play a very significant role in preparing them for an improved quality of life. In Saudi Arabia, the population generally considers any kind of emotional and behavioral difficulties in a particular manner, usually with a negative perspective. It is considered that children display these inadequacies due to poor parenting or dysfunctional families. However, this perception is mainly due to lack of knowledge and awareness about ASD and how it can be diagnosed with screening tools and addressed if given timely attention and care (Kauffman & Landrum, 2013).

The Strengths and Difficulties Questionnaire (SDQ), widely used in clinical practice as well as in research investigations, is a validated brief dimensional measure of psychopathology, particularly in children aged 4–16 years (Goodman, 1997).

School psychologists often use it as a screening and assessment tool for assessing mental health status (Levitt et al., 2007). The use of SDQ has been globally adopted in assessing children's behavior; this scale is extensively used in research activities in the USA (Dickey, & Blumberg, 2001), Europe (Obel et al., 2004), Asia (Leung & Wong, 2003), and parts of Africa (Kashala et al., 2005). There is an enormous amount of research that has used SDQ for the measurement of child behavior to date (Russell et al., 2013).

SDQ is a scale consisting of 25 items inquiring about the behavioral attributes of the child, with five subscales (emotional symptoms, conduct problems, hyperactivity/inattention, peer relationships, and prosocial behavior), each consisting of five items respectively. The SDQ has demonstrated effectiveness in discriminating children with and without psychiatric disorders (Goodman, 1997; Goodman et al., 2000; Salayev et al., 2014). The unique character of SDQ is that it has parallel versions that collect the same data from parents, teachers, and young people aged 11 or older (Russell et al., 2013). Further, a supplemental "impact" subscale also exists that actively measures chronicity, distress, social difficulties, and burden to others, offering additional supportive and useful information to healthcare professionals, including clinicians and researchers (Goodman, 1997). SDQ has already been proven beneficial in diagnosing ASD in a clinical setting (Leung & Wong, 2003). Several studies have also evaluated changes in different subscales in SDQ. They showed the predictive power of ASD in that the alteration in prosocial and peer relationship problems subscales can have a predictive impact on ASD (Russell et al., 2013). The autism screening score was calculated from the peer problems subscale score minus the prosocial subscale (Goodman et al., 2000).

The cultural sensitivity of the SDQ scale was critically considered when it was applied to psychological testing (Birbili, 2000), mainly when it was used in a different population than the original place where it was validated (Balaban, 2006). The factor structures, reliability, validity, sensitivity, specificity, and comparability with other tools and instruments were investigated and profiled in Great Britain, Germany, Bangladesh, India, and Sri Lanka, and also among different cultures (Kumar, & Fonagy, 2013; Thabet et al., 2000). SDQ has also been validated in two Arab countries, namely Saudi Arabia and Oman, with a considerable sample size (El-Keshky & Emam, 2014) using the teacher informant version. In this study, multigroup confirmatory factor analysis (CFA) based on structural equation modeling showed the cultural invariance for the SDQ applied in Oman and Saudi Arabia. This study also showed gender invariance for the SDQ five-factor models in subjects with ASD in both nations.

There have been quite a few studies that have published recent data regarding treatment and interventions in ASD children specifically involving Arab countries (Alnemary et al., 2017; Alkhateeb et al., 2015; Hussein & Taha, 2013; Sahlia et al., 2014). The majority of these studies highlighted the areas of research that need to be

paid attention to in the future. They presented the problems and challenges faced by ASD children; however, they have not summarized the different aspects of behavioral and emotional challenges in ASD-affected children in Arab countries as a whole. Therefore, we used the Strengths and Difficulties Questionnaire (SDQ) in order to demonstrate a clear and broader understanding of the characteristics of these children and assess their characteristics at a level where the impact on the behavioral and emotional aspects of the ASD children can be evaluated.

Research Questions

This study aims to address the following questions:

1. What, if any, are the gender-based differences in SDQ subscales among children and adolescents with autism in Saudi Arabia?
2. What, if any, are the age-based differences in SDQ subscales among children and adolescents with autism in Saudi Arabia?
3. What parental sociodemographic variables have impacted the emotional and behavioural strengths and difficulties of their children and adolescents with autism?

Aims of the Research

This research aims to fulfill the following objectives:

1. Identifying differences among children and adolescents with autism in Saudi Arabia with regard to emotional and behavioral strengths and difficulties according to gender and age.
2. Determining the parental sociodemographic variables that impact the emotional and behavioural strengths and difficulties of their children and adolescents with autism.

Method

Participants

A total of 93 parents of autistic children and adolescents (aged 2–18 years) in Saudi Arabia were recruited for the study. They self-reported measures of their children's behavioral strengths and difficulties via SDQ. Children and adolescents included in the study were selected across different geographical locations of Saudi Arabia and the majority were from families of the middle to low segments of the socioeconomic spectrum. The sampling type was convenience sampling, but all the children included as subjects were previously diagnosed cases of ASD.

Ethical considerations

Ethical approval was obtained to conduct the investigation prior to data collection. Sampling and ethical research approval were obtained from both the Ethics

Committee of the Deanship of the Scientific Research (DSR), King Abdul Aziz University, Jeddah, as well as from the families of the autistic children.

Informed consent was obtained from the parents of children and adolescents with ASD. The aim of the study was explained in detail to the parents. The researchers assured parents of data privacy and preservation of confidentiality.

Inclusion criteria

All subjects were diagnosed cases of ASD; however, time to diagnosis varied. The study included participants currently residing in Saudi Arabia. We mainly recruited children and early adolescents (2-18 years old) of both genders.

Measures

The SDQ version used in the present study comprises 25 items related to the child's behavioral attributes, which are combined to generate five subscales, each containing five items. The subscale designed for emotional symptoms includes questions on fears, worries, misery, nervousness, and somatic symptoms. The conduct problems subscale includes queries on tantrums, obedience, fighting, lying, and stealing. The hyperactivity/inattention subscale inquires about restlessness, fidgeting, concentration, distractibility, and impulsivity. The peer relationships subscale addresses issues concerning popularity, victimization, isolation, friendship, and ability to relate to children as compared to adults. The prosocial subscale clarifies and explores consideration of others, ability to share, kindness to younger children, helpfulness when other children are distressed, and willingness to volunteer to comfort.

For all subscales, excluding the prosocial subscale, a higher score represents greater difficulty. In contrast, the prosocial items inquire about the presence of prosocial behavior, so this subscale measures the child's prosocial strengths as opposed to difficulties. A higher prosocial score represents increased prosocial behavior. In all items, the answer options are: Not true, Somewhat true, or Certainly true, which are scored as 0, 1 or 2, giving each subscale a total possible score of 10. Details on SDQ are available at the SDQ website (www.sdqinfo.org). This scale has been validated in Saudi Arabia and exhibits good internal consistency reliability (El-Keshky & Emam, 2014). In the present study, Cronbach's α values for the Emotional problems, Conduct problems, Hyper-activity, Peer problems, Total difficulty, and Prosocial behavior (Strengths) were 0.73, 0.78, 0.76, 0.82, 0.85, and 0.72, respectively.

Data collection

The data were collected between October and December, 2019. The first step of this research involved receiving written permission and consent from the parents. Detailed information from the research investigators on the study's objectives, protocols, data privacy, and the purpose of the research was shared with the parents. Once authorized consent was obtained, Arabic versions of the SDQ were distributed to the parents of subjects with ASD for their parent-report.

Statistical analysis

All incomplete questionnaires were not considered for data analysis. Data entry was done in Excel, and SPSS version 20 was used for the statistical analysis. The ASD data analysis was performed for gender and age stratification, and was used either in determining percentages or means, whichever was applicable. Based on the sociodemographic variables, univariate regression analysis was performed. Each child's T-test was used for conducting statistical analysis. Further, we conducted both univariate and multivariable regression analyses. Any p-value less than 0.05 is considered as statistically significant.

Results

Sociodemographics of subjects and parents

Table 1 describes the sociodemographics of the study participants, both parents and children. 76.3% of the children were male. The mean age was 115 months. On average, it took 2.91 years to obtain an ASD diagnosis for the participants. For 83.9% of the child subjects, the attending parent was a biological mother. In terms of parents' education, more than 63% had university or master's degrees. More than 96% of the parents of the ASD children were married. More than 46% of the parents faced difficulties in obtaining services for their ASD child.

Table 1. Sociodemographics of children and their parents

Variable	Participants
Child age in months, mean (SE)	115.0 (4.2)
Gender of child	
Male (%)	76.3
Female (%)	23.7
How long did it take to obtain diagnosis, mean (SE)	2.91(0.12)
Parent access to services	
Much easier (%)	7.5
Somewhat easier (%)	28.0
No difference (%)	18.3
Somewhat harder (%)	33.3
Much harder (%)	12.9
Relationship to the child - biological mother, (%)	83.9
Gender of parent	
Male (%)	16.1
Female (%)	83.9
Parental educational qualifications	
No qualification (%)	17.2
Left school before acquiring any degree (%)	19.4
University degree (%)	51.6
Master's degree (%)	11.8
Parent Employment	
In a job (%)	25.8
Parent weekly income – 200 SR or less, (%)	18.3
Marital status	
Married (%)	96.8
Divorced/widowed (%)	3.2

Values expressed as mean \pm SE and percentage (%).

Descriptive statistics of SDQ items and subscales

Table 2 shows the mean, standard error, skewness, and kurtosis for each item of the SDQ scale. The skewness varies between the data sets for the participants and large skewness was observed for S12, S18, and S22, which was around 2.00. For the data sets, there was a balance between the mean value and standard error for each item.

Table 2. Mean, Standard Error, Skewness, and Kurtosis for the items of the SDQ scale

Item	Mean	Standard Error	Skewness	Kurtosis
S1	0.95	0.06	-0.02	0.28
S2	1.27	0.08	-0.48	-1.03
S3	0.51	0.07	1.01	-0.20
S4	0.69	0.07	0.44	-0.72
S5	1.31	0.07	-3.39	-6.36
S6	1.09	0.08	-0.15	-1.25
S7	1.14	0.07	-0.19	-0.84
S8	1.02	0.06	-0.009	-0.87
S9	0.65	0.07	0.56	-0.69
S10	1.17	0.07	-0.25	-0.93
S11	0.59	0.07	0.72	-0.59
S12	0.61	0.08	0.78	-0.81
S13	1.02	0.07	-0.03	-0.87
S14	0.96	0.07	0.05	-0.76
S15	1.47	0.07	-0.86	-0.33
S16	1.20	0.07	-0.08	-0.85
S17	1.13	0.08	-0.21	-1.14
S18	0.29	0.06	1.89	2.52
S19	0.88	0.08	0.21	-1.31
S20	0.70	0.07	0.50	-0.86
S21	0.62	0.07	0.62	-0.66
S22	0.28	0.06	2.02	2.86
S23	0.90	0.07	0.14	-0.97
S24	1.06	0.07	-0.08	-0.85
S25	0.58	0.07	0.76	-0.55

Gender-based differences in SDQ subscales among the participants

As demonstrated in Table 3 and Figure 1, among the participants there was a higher statistically significant emotional problem in female subjects with ASD than in male subjects. However, other difficulty-related subscales did not differ between male and female ASD subjects. In contrast, the prosocial subscale (strength) was significantly lower in female participants than in male ASD subjects.

Table 3. Comparison of mean scores of strengths, difficulties, and total difficulty subscales according to gender by the subject's *t*-test

Strengths and Difficulties subscales	Participants			
	Total	Male	Female	P-value
Emotional problems	4.82(0.24)	4.54 (0.26)	5.73 (0.50)	0.031

Strengths and Difficulties subscales	Participants			
	Total	Male	Female	P-value
Conduct problems	3.63(0.18)	3.72 (0.21)	3.36 (0.34)	0.406
Hyperactivity	5.12(0.18)	5.10 (0.20)	5.18 (0.40)	0.843
Peer problem	4.42(0.20)	4.61 (0.22)	3.82 (0.44)	0.090
Total difficulty	17.99(0.54)	17.96 (0.60)	18.09 (1.20)	0.916
Prosocial behavior (Strengths)	4.11(0.24)	4.56 (0.26)	2.64 (0.48)	<0.001

Values are expressed as means \pm standard error.

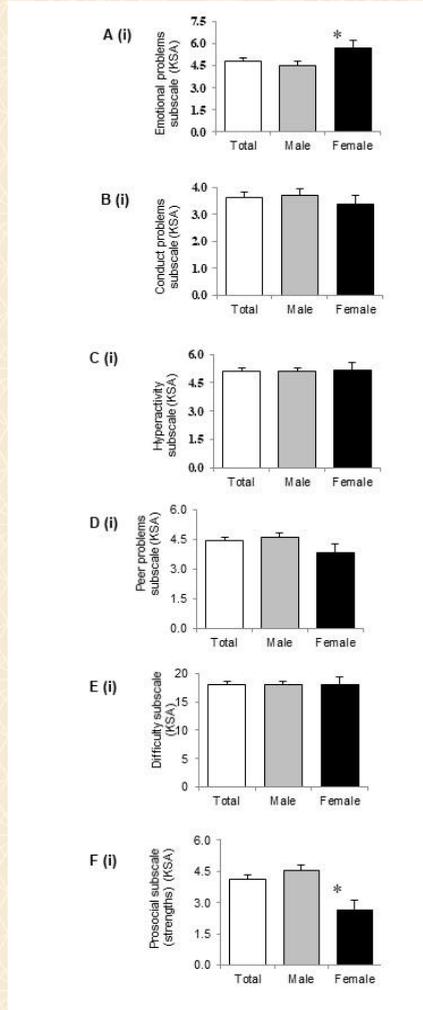


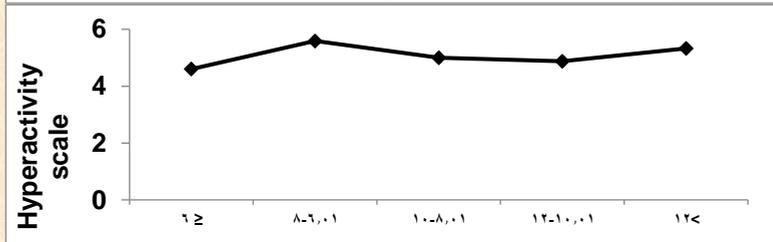
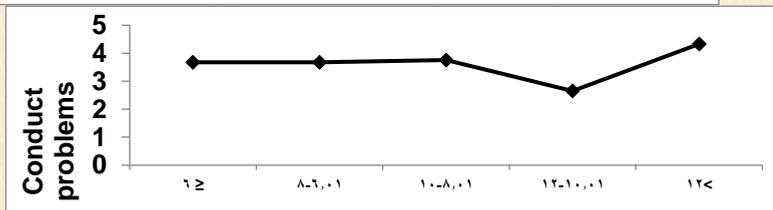
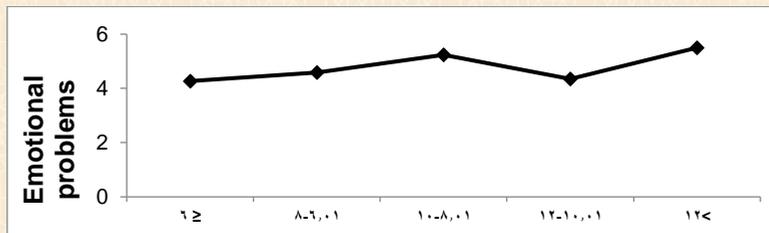
Fig 1. Graphical representation of strengths and difficulty subscales according to gender, clearly showing their differential patterns.

Age-stratification differences

In the current study, we did not measure the **SDQ** subscales in subjects with **ASD** in a timely manner; just one-time data was obtained. When we did an age-stratified analysis, no specific pattern in **SDQ** subscales was revealed, and total difficulty and strengths were observed in **ASD** subjects. This can be seen in Table 4 and Figure 2.

Table 4. Mean and standard error of SDQ subscales in age-stratified measurements among ASD subjects

Participants					
Variable (SDQ Subscale)	(age≤6 years)	(age 6.01-8.00 years)	(age 8.01-10.00 years)	(age 10.01-12.00 years)	(age>12 years)
Emotional problems	4.27 ± 0.43	4.59 ± 0.57	5.24 ± 0.61	4.35 ± 0.44	5.50 ± 0.45
Conduct problems	3.67 ± 0.58	3.68 ± 0.37	3.76 ± 0.39	2.65 ± 0.21	4.33 ± 0.37
Hyperactivity	4.60 ± 0.39	5.59 ± 0.33	5.00 ± 0.39	4.88 ± 0.36	5.33 ± 0.50
Peer problems	4.47 ± 0.38	4.27 ± 0.34	3.90 ± 0.40	4.41 ± 0.46	5.17 ± 0.60
Total difficulty	17.0 ± 1.36	18.1 ± 1.15	17.9 ± 1.09	16.3 ± 0.77	20.3 ± 1.43
Prosocial (strengths)	3.33 ± 0.42	4.18 ± 0.53	3.71 ± 0.42	4.65 ± 0.60	4.61 ± 0.68



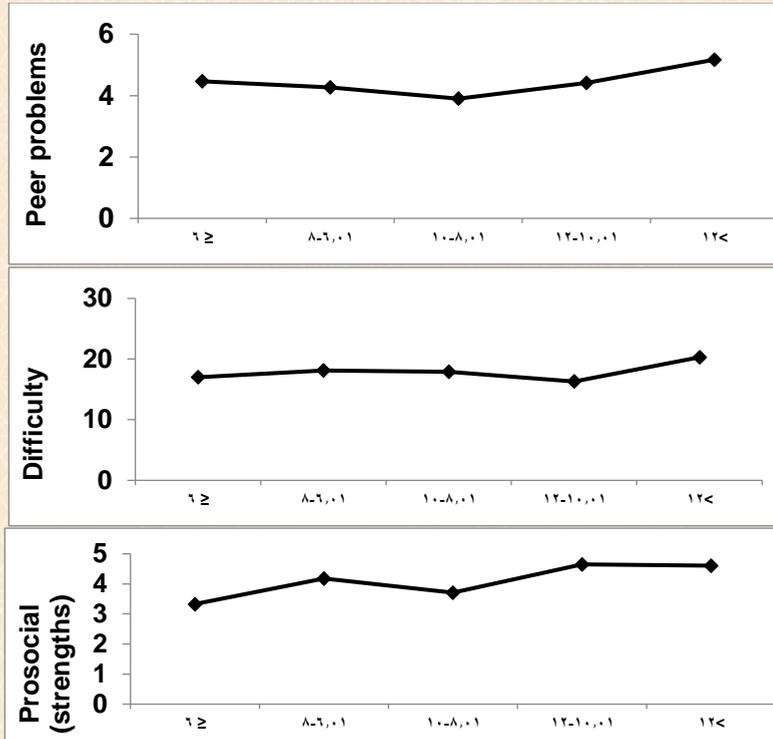


Fig 2. SDQ subscales with age-stratified measurements for ASD subjects. Age on the horizontal scale is measured: ≤ 6 , 6.01-8.00, 8.01-10.00, 10.01-12.00 and ≥ 12 years.

Regression Analysis

The regression analysis revealed a number of notable associations or lack thereof. These results incorporate characteristics of the parents other than the sociodemographics previously mentioned, specifically the parents' health status, financial status, relationship status, and income. The results are portrayed in Table 5.

Parental age: Parental age was significantly associated with the hyperactivity subscale, peer problem subscale, total difficulty subscale, and the prosocial subscale.

Parental education: Among the ASD subjects, no SDQ subscales were significantly associated with parental education level.

Service accessibility: Service accessibility showed no significant association with the peer problems subscale, total difficulty subscale, and the prosocial subscale (strengths) in subjects with ASD.

Parental health status: Parental health status had a significant association with the emotional problems subscale, conduct problems subscale, total difficulty subscale, and prosocial subscale (strengths) in subjects with ASD.

Parental financial status: Parental financial status was significantly associated with the peer problems subscale and prosocial (strengths) subscale in subjects with ASD.

Parental happiness: Parental happiness with their relationships was significantly associated with the conduct problems subscale, total difficulty subscale, and prosocial (strengths) subscale in subjects with ASD.

Parental weekly income: Among the ASD subjects, no SDQ subscales were significantly associated with parental employment status.

Table 5. Univariate regression analysis of the parental categories and other parameters.

Variable (SDQ subscale)	Participants		
	Unstandardized Coefficients (B)	SE	P value
Parental age (<=24 vs. >24 years) and other parameters			
Emotional problems	0.005	0.009	0.613
Conduct problems	-0.012	0.012	0.311
Hyperactivity	-0.024	0.012	0.050
Peer problems	-0.046	0.010	<0.001
Total difficulty	-0.009	0.004	0.021
Prosocial (strengths)	0.025	0.009	0.005

Parental education (no qualification vs. educated) and other parameters

Emotional problems	-0.008	0.017	0.638
Conduct problems	-0.007	0.023	0.772
Hyperactivity	-0.019	0.023	0.414
Peer problems	0.020	0.021	0.335
Total difficulty	-0.002	0.008	0.825
Prosocial (strengths)	0.001	0.017	0.933

Service accessibility (harder vs. easier) and other parameters

Emotional symptoms	0.019	0.023	0.406
Conduct problems	-0.057	0.030	0.059
Hyperactivity	0.004	0.031	0.896
Peer problems	0.003	0.028	0.911
Total difficulty	-0.002	0.010	0.858
Prosocial (strengths)	-0.039	0.022	0.082

Parental health (bad vs. good) and other parameters

Emotional symptoms	0.042	0.015	0.006
Conduct problems	0.045	0.020	0.024
Hyperactivity	0.031	0.020	0.128
Peer problems	0.015	0.019	0.416
Total difficulty	0.019	0.007	0.005
Prosocial (strengths)	-0.001	0.015	0.925

Parental weekly income (<500 vs. ≥ 500) and other parameters

Emotional symptoms	-0.011	0.023	0.641
Conduct problems	-0.019	0.030	0.530
Hyperactivity	-0.023	0.031	0.461
Peer problems	-0.060	0.027	0.028
Total Difficulty	-0.015	0.010	0.141
Prosocial (strengths)	-0.054	0.022	0.016

Parental relationship (very happy vs. others) and other parameters

Emotional symptoms	0.025	0.022	0.261
Conduct problems	0.077	0.027	0.006
Hyperactivity	0.020	0.029	0.495
Peer problems	0.030	0.026	0.249
Total difficulty	0.020	0.009	0.038
Prosocial (strengths)	0.050	0.021	0.018

Parental employment (job vs. without a job) and other parameters

Emotional symptoms	-0.001	0.020	0.949
Conduct problems	-0.051	0.026	0.052
Hyperactivity	0.008	0.027	0.766
Peer problems	-0.021	0.024	0.382
Total difficulty	-0.008	0.009	0.367
Prosocial (strengths)	-0.005	0.020	0.794

SE: standard error

Multivariate regression analysis

Multivariate regression analysis results are shown in Table 6. As can be seen, in the sample population only conduct problems were significantly associated with weekly income and service accessibility.

Table 6. Multivariate regression analysis of SDQ parameters with parental sociodemographics

Variable (SDQ subscale)	Participants		
	Exp(B)	95% CI (Lower-Upper)	P value
Parental age			
Emotional problems	3.19	0.37-27.38	0.289
Conduct problems	1.82	0.21-15.99	0.591
Hyperactivity	0.09	0.001-7.80	0.291
Peer problems	0.18	0.014-2.27	0.184
Prosocial (strengths)	0.34	0.04-2.87	0.318
Educational qualification			
Emotional problems	0.98	0.73-1.30	0.869
Conduct problems	0.98	0.67-1.43	0.915
Hyperactivity	0.89	0.61-1.31	0.550
Peer problems	1.21	0.85-1.72	0.287
Prosocial (strengths)	0.96	0.72-1.26	0.745
Service accessibility			
Emotional problems	1.16	0.92-1.46	0.214
Conduct problems	0.69	0.51-0.95	0.022
Hyperactivity	1.11	0.83-1.49	0.474
Peer problems	1.19	0.92-1.56	0.193
Prosocial (strengths)	0.85	0.68-1.06	0.138

Variable (SDQ subscale)	Participants		
	Exp(B)	95% CI (Lower-Upper)	P value
Health in general			
Emotional problems	1.41	0.99-2.01	0.061
Conduct problems	1.62	0.89-2.92	0.112
Hyperactivity	1.11	0.70-1.75	0.672
Peer problems	1.21	0.76-1.93	0.425
Prosocial (strengths)	0.85	0.60-1.20	0.359
Income			
Emotional problems	1.08	0.84-1.39	0.565
Conduct problems	0.64	0.43-0.96	0.029
Hyperactivity	1.19	0.85-1.68	0.310
Peer problems	0.92	0.68-1.24	0.578
Prosocial (strengths)	1.07	0.84-1.37	0.574
Relationship with spouse			
Emotional problems	0.93	0.75-1.17	0.544
Conduct problems	1.09	0.81-1.46	0.577
Hyperactivity	0.95	0.71-1.27	0.742
Peer problems	0.84	0.64-1.09	0.187
Prosocial (strengths)	0.83	0.66-1.03	0.92
Employment status			
Emotional problems	1.09	0.85-1.40	0.502
Conduct problems	1.35	0.99-1.86	0.061
Hyperactivity	0.89	0.65-1.22	0.456
Peer problems	0.96	0.72-1.26	0.754
Prosocial (strengths)	1.25	0.99-1.58	0.062

CI=confidence interval

Gender of subjects with ASD and SDQ subscales – univariate and multivariate analysis:

In ASD subjects, gender was significantly associated with the prosocial (strengths) subscale (Table 7).

In the ASD subjects, there was no significant association between any SDQ subscale and age when the subjects were divided on the basis of being greater than or less than ten years old (Table 7). There was no significant association of any SDQ subscale with age when dividing the subjects by gender and age (Table 7).

Table 7. Univariate and multivariate regression analysis based on the child's gender, age, and other parameters.

Variable (SDQ subscale)	KSA		
	β	SE	P value
Child's gender (male vs. female) – univariate			
Emotional problems	0.04	0.02	0.03
Conduct problems	-0.02	0.03	0.41
Hyperactivity	0.01	0.03	0.84
Peer problems	-0.04	0.02	0.09
Total difficulty	0.001	0.01	0.92
Prosocial (strengths)	-0.06	0.02	<0.001

Child's age (<=10 vs. >10 years) – univariate

Emotional problems	0.01	0.02	0.68
Conduct problems	-0.02	0.03	0.61
Hyperactivity	-0.001	0.03	0.99

Peer problems	0.04	0.03	0.14
Total difficulty	0.01	0.01	0.58
Prosocial (strengths)	0.04	0.02	0.09
Child's gender category – multivariate			
Emotional problems	1.32	0.99-1.75	0.06
Conduct problems	0.84	0.57-1.24	0.39
Hyperactivity	1.01	0.70-1.47	0.95
Peer problems	0.95	0.69-1.32	0.77
Prosocial (strengths)	0.68	0.50-0.93	0.02
Child's age category (<=10 vs. >10 years) – multivariate			
Emotional problems	1.15	0.91-1.45	0.25
Conduct problems	0.80	0.58-1.09	0.16
Hyperactivity	0.97	0.73-1.31	0.85
Peer problems	1.14	0.88-1.48	0.32
Prosocial (strengths)	1.19	0.95-1.49	0.12

SE: standard error

β : Unstandardized coefficients

KSA: Kingdom of Saudi Arabia

Discussion

The present study represents the first attempt to characterize the emotional and behavioral strengths and difficulties of Saudi children and adolescents with ASD based on parent-reported SDQ questionnaires. We found differential patterns of behavioral strengths and abnormalities in Saudi ASD subjects. A distinct variation on SDQ subscales was observed in subjects with ASD in terms of gender. Parental sociodemographics also impacted the subjects with ASD in a number of ways. The present study should have tremendous impact in considering and taking future steps to socialize children with ASD with the particular aspects of the SDQ subscale patterns observed.

The global burden of mental, neurological, and substance disorders is increasing at a fast rate, currently accounting for 10%–14% of the entire Global Burden of Disease, and this uptrend has been distinctly manifested in low- and middle-income countries (Huang et al., 2019; Murray et al., 2012; Jamison, 2006). There are several factors that need to be taken into consideration to account for this rapid rise, including poverty, less access to interventional resources, services, and developed health care systems, as well as violence and other factors (Huang et al., 2019; Murray et al., 2012; Jamison, 2006). There are established statistics showing that 171 million young children in low-income countries are “off track” in terms of behavioral- and social-emotional development, warranting the innovation of early prevention and intervention strategies aimed at providing health-promotion agendas (Huang et al., 2019).

In recent years, there has been growing interest regarding the social, educational, and psychological characteristics of ASD-affected children residing in Arab countries. Major areas of research have included regions such as Jordan, Saudi Arabia, and

Lebanon. The most critical aspect of data collection is by conducting questionnaires. The implementation of a cross-sectional design helps in estimating the change in the behavior and situation of a specific population (Sedgwick, 2014), as highlighted in the present study.

In line with such a global trend and effort, the present study included subjects with ASD from many regions of Saudi Arabia. This study addressed a particular group of children and adolescents having ASD and evaluated them via the SDQ scale. Indeed, the validity of the SDQ scale has been assessed even in exploring the behavioral abnormalities in children with High-Functioning Autism Spectrum Disorder (HFASD) (Iizuka et al., 2010). Several studies used SDQ as a screening tool for childhood behavioral disorders (Mullick et al., 1997; Russell et al., 2013). One study investigated learning disabilities among Arab children in Saudi Arabia and found SDQ to be an excellent screening tool for learning disabilities in Arab children (El-Keshky & Emam, 2014).

It is very important to not only assess the difficulties faced by ASD-affected children but also plan interventional programs that help them to gain independence. In one study (Rayan & Ahmad, 2016), it was shown that an intervention program helped in improving the quality of life of ASD children as well as improving the coping mechanisms of their parents. These researchers showed that an approach in which parents systematically execute a mindfulness-based intervention will help improve the children's behavior. Better psychological health, social acceptance, and a positive mindset will be attained if the problems associated with ASD are assessed and treated in a timely fashion. Other studies have also been conducted (Dardas & Ahmad 2015a, 2015b) which demonstrated that the relationship between the parents and their stress-coping mechanisms impacted the overall quality of life of their ASD-affected children.

In the present study, assessments were performed for both genders, with a higher participation of male ASD subjects. This study setting was similar to a previous study conducted in Iran (Mohammadi & Zarafshan, 2014). The present study also performed a gender stratification analysis among ASD subjects. It demonstrated that emotional problems were higher in female ASD subjects with a low level of prosocial strength in comparison to male ASD subjects, and these differences were statistically significant ($p < 0.05$). These data imply that female subjects with ASD have more emotional problems accompanied by less behavioral strength (Table 3). By exploiting the SDQ scale to characterize behavioral difficulties in subjects with ASD, another study has also shown gender-specific differences (Wang et al., 2016). Female gender, higher hyperactivity, and worse prosocial behavior as measured by the SDQ scale in Chinese subjects with ASD were strongly associated with increased overall sleep disturbances (Wang et al., 2016; Adams et al., 2014). In our multivariate analysis using the ASD subjects' gender, prosocial strength had a significant association with gender (Table 7). Thus, the gender of subjects with ASD had an impact on the SDQ measures.

This study also conducted an age-stratified analysis. Although its measurement was obtained at a single point in time, the study design was not cohort-observational. We did not find any age-stratified consistent trend in SDQ subscale measurements for strengths and difficulties in ASD subjects. A recent study using SDQ as a screening tool in the context of neurodevelopmental disorders showed that a higher value of the total difficulty score, conduct problems, hyperactivity, and low prosocial behavior are characteristic features of ASD and ADHD as a comorbidity in boys aged 6-12 years old (Yamawaki et al., 2020).

Parental sociodemographics influence the diagnosis and clinical outcome of those with ASD (Frazier et al., 2013; Bailey et al., 2019; Malek et al., 2015; Russell et al., 2011; Alenazi et al., 2019). Children with intellectual disabilities are remarkably different from children who have typical development in terms of difficulties associated with initial levels of exhibiting higher externalizing and internalizing behaviors, accompanied by lower prosocial behaviors (Bailey et al., 2019). And with age, some changes take place with comparatively lower decreases in both externalizing and internalizing behaviors, with concomitant smaller increases in prosocial behaviors (Bailey et al., 2019). This same study further demonstrated that there was a significant role of maternal mental health problems in the expressions and determination of childhood behavior problems (Bailey et al., 2019).

In the present study, we conducted both univariate and multivariate analyses of parental sociodemographics with SDQ measurement values for subjects with ASD. We showed the important sociodemographic factors of parents along with SDQ measurements of ASD subjects through univariate analysis in Table 6. Parental age was significantly associated with the hyperactivity subscale, peer problem subscale, total difficulty score, and prosocial subscale. Further profiling was performed in terms of parental health status, which had significant associations with the emotional problems subscale, conduct problems subscale, total difficulty score, and prosocial (strengths) subscale in ASD subjects. In our ASD subjects, the parental financial situation had a significant association with the peer problems subscale and the prosocial (strengths) subscale. Furthermore, parental happiness played a considerable role associated with the conduct problems subscale, total difficulty score, and prosocial (strengths) subscale. Thus, it is evident that parental sociodemographic factors ranging from health status to income confer differential contributions to the behavioral strengths and difficulties of Saudi children residing in different locations.

However, when we conducted a multivariable analysis of various parental sociodemographic factors with SDQ scale measurements, fewer elements determined the extent of the SDQ scale parameters. Table 7 revealed that only conduct problems had a significant association with family income and service accessibility.

In order to provide a holistic picture of ASD and an approach to be followed, we need to work on three important areas so that the ASD-affected children in the Arab countries can live life effectively. Large scale randomized controlled trials should be conducted that evaluate the prevalence of ASD and its diagnostic patterns.

Secondly, the experiences and outcome assessments of the parents and other caregivers should be measured in order to better understand the challenges faced by the children as well as the parents. Thirdly, the inclination of the Arab nations for improving the emotional, behavioral, and communication abilities of the children should be focused. These three areas will provide clarity to the Arab nations and direction in terms of what guidelines need to be followed. The present paper has presented an assessment tool that will definitely help in bringing a better view of the present situation of ASD children.

Limitations and Future directions

The present study has several limitations. We used the data generated only from parent-reports and there was no information regarding whether the ASD subjects have other comorbid diseases or disorders such as ADHD or cerebral palsy. No normal control group assessment was included in the present study. The SDQ is very promising as a screening measure or rating scale in different cultural populations; however, future research should identify and establish indigenously meaningful constructs for the studied population and culture and subsequently review standards of child mental health problems by fashioning personalized medical and health practices. Future studies should include more female subjects with ASD to overcome any existing gender-related bias from the current study (Mahendiran et al., 2019). More extensive studies with adequate numbers of female participants are essential further to dissect the sex differences in these studied domains (Mahendiran et al., 2019). Future studies should also apply a comprehensive multidisciplinary assessment in exploring behavioral strengths and difficulties to profile the impact on ASD children of various geographical settings. Future studies should also be conducted with a cohort design to explore how geography poses an impact on the SDQ subscale in subjects with ASD at an increased age.

Implications

The present study demonstrated several unique characteristics of SDQ parameters of Saudi children and adolescents with ASD: firstly, the SDQ subscales differed based on gender and age-stratification; secondly, there were differences in the associations between parental sociodemographic factors and characteristics of ASD subjects in various SDQ subscales; finally, we verified each item of the SDQ subscale with their skewness. These findings will aid in innovating the therapeutic, preventive, and rehabilitation strategies appropriate for each context-specific ASD case in a vast Arab continent and elsewhere.

Even though ASD has affected populations all over the world, the majority of the research has been conducted in Western countries. In the Arab countries, there is lack of knowledge and understanding of the various aspects of ASD, therefore, the approach that is used is far behind that of Western nations. They have more expertise, knowledge, and professional support services (Hussein et al., 2011; Sharpe & Baker, 2011) than that present in Arab nations. In the Arab world, research has included only limited areas and lacks a clear overall picture (Al-Salehi & Ghaziuddin, 2009).

In this paper, we have made a strong attempt to demonstrate the key diagnostic challenges of ASD-affected children. The present study is the first offering detailed and comprehensive profiling of behavioral strengths and difficulties in ASD child and adolescent. These findings will help in building context-specific public health policy for tackling ASD. Further larger scale research is required so that we can evaluate the most efficient way and strategy for improving interventions and service delivery for ASD children. Cultural, social, and educational impacts should also be taken into consideration so that a targeted approach can be implemented in Saudi Arabia.

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