

## Prevalence of ADHD and Mental Health Problems among Preschool Children in the Gaza Strip

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### Abstract

**Aim:** The aim of this study was to investigate the prevalence of ADHD and mental health problems among preschool Palestinian children.

**Method:** The sample consisted of 398 randomly selected preschool children with their mothers and teachers. Children were rated using SDQ and ADHD for parents and teachers.

**Results:** The results showed that 28.4% of the children according to mothers displayed psychiatric morbidity. Among the four categories of mental health problems, 45.8% reported conduct, 14.2% reported emotional problems, 46% reported peer relationships problem, 33.8% reported hyperactivity, and 15.1% reported pro-social problems. Boys were more hyperactive than girls. According to mothers report, 31.3% of children met the DSM-IV criteria for inattentive type, 36.3% of children were hyperactive-impulsive, and 29% met criteria for combined type. The results showed boys had more attention, hyperactivity, and combined ADHD type than girls. According to teachers, 46.7% of the children were displayed psychiatric morbidity by their teachers. Among the four categories of mental health problems, 45.8% reported conduct, 11.6% reported emotional, 55.8% reported peer relationship problems, 15.3% reported hyperactivity, and 31.2% reported prosocially behavior problem. According to teachers report, 28.8% of children met the DSM-IV criteria for inattentive type, 37.3% of children were hyperactive-impulsive, and 28.3% met criteria for combined type of ADHD.

**Clinical implications:** From the above mentioned results, we recommended to conduct more training sessions for parents and teachers specified in one or two specific areas of interest such as behavioural problems and behavioural modification. Involving the fathers in such activities and inviting them to similar training sessions, continuous training inside the kindergarten in specific subjects such as overactivity, using drawing in helping children, play therapy, behavioral modification, and counseling, increase in non curriculum activities in the classes. Increase in number of trips, play sessions, drawing settings, supervision of the kindergarten teachers and regular visits to the kindergartens is required by the project officer and the center directors.

**Keywords:** ADHD; Gaza; Preschool; SDQ

### Introduction

Studies of the epidemiology of childhood disorders have concentrated on school-age children and adolescents. There are emerging studies about the prevalence of DSM disorders among preschool children. Historically, studies of preschool children's problems have concentrated on a limited range of specific problem behaviors. One of the first studies of preschool children was a two-stage design study of 3,860 preschool children in Chicago area [1]. The prevalence of pure internalizing and pure externalizing problems was 3.7% each; the comorbidity rate was 3.3%. With the three scales combined, the overall rate of problems (10.7%) is slightly higher than the rate on the total behavior problems scale (8.3%). The sexes did not differ on internalizing problems, but boys were significantly more likely to exhibit total behavior problems, externalizing behavior problems, and comorbid disorders. In a previous epidemiological study in the Gaza strip, Palestinian children found that in early and middle childhood, the established rates of caseness (10.9% at age 3, 11.1% at age 6, and 16.3% at age 11) compared to findings from Western countries [2]. Thabet et al. [3] in study of 309 preschool children in the Gaza Strip, found in respect to gender, with boys scoring higher on the SDQ hyperactivity subscale. There was only one significant difference in respect to gender, with boys scoring higher on the SDQ hyperactivity subscale. There were no significant differences between boys and girls on total SDQ scores. Children from inner-city areas were rated statistically higher on SDQ emotional problems, prosocial problems, peer problems, and total SDQ scores. The most recently published epidemiologic study with preschoolers included a

sample of 307 children, ages 2 to 5 years, recruited through pediatric practices in semirural North Carolina, drawn from Durham and the surrounding rural area [4]. The study used a structured interview designed for use with preschoolers, the preschool age psychiatric assessment [5]. The sample was predominantly African American (55%) and White=non Hispanic (35%), with few Hispanic families (2%). Egger and Angold reported a prevalence rate of 6.6% for ODD; 3.3% ADHD; 2.1% depression; 2.4% SAD, and 6.5% GAD. Furthermore, Massad et al. [6], in study of children selected from a random sample of kindergartens (3-6 years old, N=350) in Gaza Strip found that 50% of children 3-5 years old had conduct problems, while hyperactivity was mostly reported among the 3 year old children. Lavigne et al. [7] included 796 4-year-old children recruited from schools and pediatric practices in a diverse, urban area. The most common disorders were oppositional defiant disorder (ODD) and attention deficit hyperactivity disorder (ADHD). Generalized anxiety disorder (GAD) and depressive

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disorders were reported in less than 1% of the sample. Race=ethnicity differences were not significant. Gender differences showed ADHD-inattentive type more common among boys, with no gender differences for GAD, major depressive disorder, dysthymia, separation anxiety disorder, or ODD at any level of impairment. Moreover, Wichstrøm et al. [8] in a community sample of Norwegian preschoolers estimated 12.5% of 4-year-olds had at least one psychiatric disorder. Excluding encopresis, the rate of psychiatric disorder was 7.1%. Emotional and behavioral disorders were much more common among children whose parents did not live together or who had low. In study of a sample consisted of 1,738 German children, 840 girls and 898 boys between 3 and 5 years of age [9]. Parents completed the SDQ and gave basic demographical information. They found mean total difficulties score was 7.91, emotional symptoms 1.56, conduct problems was 1.75, hyperactivity/inattention was 3.44, peer problems was 1.16 and prosocial behavior was 7.77. With respect to subtypes of ADHD, the inattentive and combined sub-types were seldom seen (0.2% and 0.3%, respectively), whereas the hyperactive type was more common (1.6%). Thabet et al. [10] in a study aimed to investigate the prevalence of depression and anxiety among preschool children and relationship to mother's mental health. A sample of 380 pre-school children aged 4-6 years with their mothers was selected. The results showed that mean anxiety scores for preschool children was 27.46, generalized anxiety mean was 3.42, social anxiety was 3.94, obsessive compulsive disorder was 4.92, physical injury fear was 10.47 and separation anxiety was 4.94. No sex differences in showing anxiety symptoms, except for physical injury fear which was more in girls than in boys. Bull, in study of a sample consisted of 411 (192 females) children attending preschools in Singapore, aged from 52 to 87 months showed total SDQ was 10.65 for boys and 8.91 for girls. The mean scores generally show less prosocial behaviour and more difficulties on all subscales (particularly for boys), with the exception of Emotion, than in European samples.

ADHD is a diagnostic category in the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders 4<sup>th</sup> edition (DSM-IV-1994) and the more recent DSM-5 (2013). The significant variation in ADHD prevalence worldwide may indicate the debate and the concern for subjectivity in ADHD diagnosis and treatment. The specific pathophysiology of ADHD is unclear, and its etiology seems complex. Multiple genetic and environmental factors act together to induce a spectrum of neurobiological vulnerability [11-13]. Egger et al. [14] reported that the prevalence of ADHD in preschool children ranges from 2% to 7.9%. The estimated prevalence of ADHD in children is 3-4% according to the most recent meta-analysis [15]. The main purpose of this study was to investigate the prevalence of emotional and behavioural problems in preschool Palestinian children.

## Method

### Participants

The study sample consisted of randomly sample of kindergartens in the Gaza included 5 areas of the Gaza Strip. We selected 4 kindergartemns from each area. These represent the different types of kindergartens found in Gaza Strip. This study sample was selected from 392 kindergartens distributed in all areas of Gaza Strip. All preschoolers 4-6 years old were selected from the registration books of ten kindergartens. We randomly selected 20 kindergartens across the Gaza Strip. We randomly selected only one child from each family. If a family had more than one child in the same age group, selection proceeded as follows. The youngest was selected in the first family, the second youngest in the second family, the second oldest child in the third family, and the eldest in the fourth family was approached. This

pattern was repeated in subsequent families. The sample included 398 preschool children and their mothers completed the forms. They were 238 boys (59.8%) and 160 (40.2%) females.

### Measures

**Sociodemographic data:** The children demographic data was collected by questionnaire include sex, age, place of residence and family monthly income.

**The strengths and difficulties questionnaire (SDQ preschool forms for teachers and parents) [16,17] Arabic version [2]:** The Strengths and Difficulties Questionnaire (SDQ) was developed by Goodman and colleagues in the United Kingdom in the late 1990s to screen for psychopathology among children aged 4-16 years [16]. It consists of 25 items and generates 4 "difficulties" subscales (Hyperactivity, Peer Problems, Conduct Problems, and Emotional Symptoms) and one "strengths" scale (Prosocial Behavior). Parents rate each item according to the children's behavior in the last six months on a 3-point Likert scale: not true=0, somewhat true=1, and certainly true=2. The total difficulty score can be computed by adding up the 4 difficulties subscale scores, with higher scores indicating more difficulties. Similarly, higher scores in Prosocial Behavior indicate more strength. The questionnaire was chosen to allow findings from the present study to be directly comparable with larger samples and because the psychometric properties of the questionnaire have been researched extensively with good results regarding both validity and reliability [2,16].

**ADHD-rating scale-IV Arabic version parent and teacher forms:** ADHD-RS-IV is a questionnaire originally based on DSM-IV criteria and frequently used in epidemiological studies. It contains questions that correspond to nine symptoms of inattention and the nine symptoms of hyperactivity/impulsivity in the DSM-IV. The ADHD-RS-IV was designed for parents or teachers to rate the frequency of a child's symptoms on a scale of 0 to 3 with 0=never or rarely, 1=sometimes, 2=often, 3=very often. Children scored six and above in nine items are considered as inattentive; children reported 6 and more in 9 items are considered hyperactive-impulsive. Children were classified as ADHD combined subtype if they met the criteria i.e., six or more in both for inattention and hyperactivity versions. The Arabic version of this scale was before in the same area [18]. In this study, internal consistency for parents form using Cronbach's Alpha was high ( $\alpha=0.84$ ); the split half reliability of the scale was (0.79).

### Study procedure

An approval letter was obtained from authorized body in the Ministry of Health and Education to allow the researcher to carry out the study. For the study, 20 kindergartens were chosen randomly from Gaza Strip. Then we selected randomly number of children from each kindergarten registration book. The researchers trained 6 persons as a team to help in data collection. The team collected data through meeting with the principal of every kindergarten. The data collectors explained to each mother the aim of the study and that the data collected for the study will be kept for scientific research. The mothers were interviewed by researchers and field workers inside the kindergartens and they completed the forms for participation in the study with their children. Every meeting took almost 30 min. The study was conducted on November 2014.

### Statistical analysis

The statistical analyses were accomplished with the SPSS for

Windows (version 20). Percentages, means and standard deviations were used to characterize the sample of mothers and preschool children, children mental health according to ADHD and SDQ. The T-test, one-way analysis of variance and post hoc Tukey's T-test were used to test both the differences in means of ADHD and SDQ. Scores and other sociodemographic variables such as gender, place of residence, and family monthly income. Pearson correlation coefficient test was conducted to find relationships between SDQ scores for parents and teachers.

## Results

### Socio-demographic characteristics of study population

As shown below in Table 1, the sample consisted of 398 preschool children, 238 males (59.8%) and 160 females (40.2%). The age ranged from 4 to 6 years with mean age 5.26 (SD=0.64). According to place of residence, 16.6% were from North Gaza, 42% from Gaza city, 16.3% from Gaza middle area, 9% from Khan Younis, and 16.1% from Rafah area. According to place of residence, 17.9% lived in cities, 1.3% in villages, and 80.9% in refugee camps. Nearly 55.8% of the families subsisted on a monthly income of less than \$300, 31.7% of families subsisted in monthly income from \$301-650 dollars monthly, 11.6% of families subsisted in monthly income from \$651-750 US, 1.1% of families subsisted in monthly income more than \$751 (Table 1).

### Mean and percentage of mental health problems using SDQ ratings by mothers

As shown in Table 2, the results showed that mean total SDQ was 13.09 (SD=5.01), hyperactivity 5.06 (SD=1.57), emotional problems 2.43 (SD=2.06), conduct problems 3.50 (SD=2.12), peer problems was 4.70 (SD=1.73), and prosocial behavior was 7.76 (SD=1.83). Using previous cut-off points of the SDQ, 28.4% of the children rated by their mothers as psychiatric morbidity. Among the four categories of mental health problems, 45.8% reported conduct, 14.2% reported emotional problems, and 46% reported peer relationships problems, 33.8% had

Percent	No.	
		<b>Sex</b>
59.8	238	Boys
40.2	160	Girls
		<b>Age in years</b>
45	11.3	4 y
203	51	5 y
150	37.7	6 y
		<b>Residence</b>
16.6	66	North Gaza
42	167	Gaza
16.3	65	Middle area
9	36	Khan Younis
16.1	64	Rafah
		<b>Type of residence</b>
17.9	71	City
1.3	5	Village
80.9	321	Camp
		<b>Monthly family income</b>
55.8	222	Less than \$300
31.7	126	\$301-625
11.6	46	\$626-750
1	4	More than \$751

**Table 1:** Sociodemographic characteristic of the study sample (N=398).

hyperactivity and 15.1% had pro-social behaviour problems (Table 2).

### Sex differences in strength and difficulties according to mothers

The results showed that the differences toward boys was for hyperactivity (11.59% vs. 3.27%) ( $\chi^2=15.76$ ,  $p=0.001$ ). No differences were found in total SDQ rated by mothers and other subscales. Analysis of variance showed a main effect of age on total SDQ-parent. Post hoc analyses using Tukey's HSD indicated that no age differences in reporting total SDQ by parents,  $F(2,388)=0.04$ ,  $p=0.98$ .

### Mean and percentage of ADHD according to mothers

According to mothers report, inattention mean was 4.74 (SD=2.22), hyperactivity-impulsivity was 5.74 (SD=1.64), combined ADHD was 10.48 (SD=3.29). Using DSM criteria for diagnosis, the results showed 20.9% of preschool children met the DSM-IV criteria for inattentive type, 26.1% of children were impulsive, and 12.8% met criteria for combined ADHD type (Table 3).

### Sex differences in ADHD according to mothers

In order to find differences among sex of children, chi square test was conducted. The results showed that the main differences toward boys was for attention (14.6% vs. 6.3%) ( $\chi^2=4.3$ ,  $p=0.04$ ), hyperactivity (18.3% vs. 7.8%) ( $\chi^2=6.32$ ,  $p=0.01$ ), and combined ADHD type (9.5% vs. 3.3%) ( $\chi^2=7.6$ ,  $p=0.02$ ).

### Mean and percentage of mental health problems using SDQ ratings by teachers

As shown in Table 4 the results showed that mean total SDQ was 14.43 (SD=4.89), hyperactivity 4.72 (SD=1.70), emotional problems 2.44 (SD=2.21), conduct problems 3.78 (SD=2.03), peer problems was 6.83 (SD=2.32), and prosocial behavior was 2.91 (SD=1.73). As shown in Table 4, 46.7% of children were rated by their teachers as psychiatric morbidity. Among the four categories of mental health problems, 45.8% reported conduct, 11.6% reported emotional, 55.8% reported peer relationships, 15.3% reported hyperactivity, and 31.2% reported problem with prosocial behavior (Table 4).

### Sex differences in strength and difficulties according to teachers

In order to find differences among sex of children, chi square test was conducted. The results showed that the differences toward boys was for conduct (32.7% vs. 15.8%) ( $\chi^2=9$ ,  $p=0.01$ ), peer relationships (29.9% vs. 25.9%) ( $\chi^2=11.7$ ,  $p=0.04$ ), and prosocial behaviour (29.9% vs. 14.3%) ( $\chi^2=9$ ,  $p=0.01$ ). No differences in total SDQ by teachers, hyperactivity, and emotional problems. Analysis of variance showed a

Mothers-report	Mean	SD	Abnormal
Total difficulties score	13.09	5.01	28.40
Hyperactivity	5.06	1.57	14.90
Emotional problems	2.43	2.06	14.20
Conduct problems	3.50	2.12	45.80
Peer problems	4.70	1.73	46.00
Prosocial behaviour	7.76	1.83	15.10

**Table 2:** Mean and percentage of mental health problems using SDQ ratings by mothers (N=398).

	Mean	SD	%
Inattention	4.74	2.22	20.9
Hyperactivity-impulsivity	5.74	1.64	26.1
Combined ADHD	10.48	3.29	12.8

**Table 3:** Mean and percentage of ADHD according to mothers.

Teachers-report	Mean	SD	Abnormal
Total difficulties score	14.43	4.89	46.7
Conduct problems	4.72	1.70	48.5
Emotional problems	2.55	2.21	11.6
Hyperactivity	3.78	2.03	15.3
Peer problems	6.83	2.32	55.8
Prosocial behaviour	2.91	1.73	31.2

**Table 4:** Mean and percentage of mental health problems using SDQ ratings by teachers (N=398).

main effect of age on total SDQ-teacher. Post hoc analyses using Tukey's HSD indicated that children at 6 years age had more difficulties than preschool children at age 4 and 5 years  $F(2,388)=3.65, p=0.02$ ).

#### Prevalence of combined ADHD according to teachers

According to mothers report, inattention mean was 3.17 ( $SD=3.11$ ), hyperactivity-impulsivity was 3.49 ( $SD=3.03$ ), combined ADHD was 6.68 ( $SD=5.36$ ). Using DSM criteria for diagnosis, according to teachers report, the results showed 26.9% of children met the DSM-IV criteria for inattentive type 30.3% of children was impulsive, and 15.9% met criteria for combined ADHD type (Table 5).

#### Sex differences in ADHD according to teachers

In order to find differences among sex of children, chi square test was conducted. The results showed that the differences toward boys was for attention (21.1% vs. 5.8%) ( $\chi^2=21.3, p=0.001$ ), hyperactivity (22.5% vs. 7.8%) ( $\chi^2=14.2, p=0.001$ ), and combined ADHD type (12.1% vs. 3.8%) ( $\chi^2=30.32, p=0.001$ ).

#### Relationship between children mental health rated by SDQ-parents and teachers

Pearson correlation test was used to test the correlation between children mental health rated by parents and teachers. The results showed that there was significant association between overall total SDQ- parents and SDQ-teacher ( $r=0.16, p=0.001$ ) (Table 6).

#### Relationship between children ADHD by parents and teachers

Pearson correlation test was used to test the correlation between ADHD scorers rated by parents and teachers. The results showed that there was significant association between combined ADHD-parents and combined ADHD-teacher ( $r=0.80, p=0.001$ ) (Table 7).

### Discussion

Our findings of high rate of mental health problems was inconsistent with studies predominantly from the USA and the UK, Roberts et al. [19] found variation in prevalence rates of child psychopathology, depending on the population and measures. Median rates of psychopathology were: 8% for pre-schoolers, 12% for preadolescents and 15% for adolescents. Few of these studies were from non-Western societies. Also higher than study of Thompson et al. [20] which estimated prevalence rates of 13.2% for mental health problems in UK pre-school children. Fombonne [21] found prevalence of 12.4% among French 8-11 year-olds. In a previous epidemiological study in the Gaza strip, the authors used the Rutter scales in a sample of 6-11 year-old-children and found higher prevalence rates (26.8%), which may reflect differences in the optimal cut-off points of the Rutter Scales and the SDQ [22]. Our study rate of behavioural and emotional problems using SDQ was higher than study of Thabet et al. [2] of Palestinian children found that in early and middle childhood, the established rates of

	Mean.	SD	%
Inattention	3.17	3.11	26.9
Hyperactivity-impulsivity	3.49	3.03	30.3
Combined ADHD	6.68	5.36	15.9

**Table 5:** Mean and percentage of ADHD according to teachers.

caseness (10.9% at age 3, 11.1% at age 6, and 16.3% at age 11) compared with findings from Western countries.

Our findings were inconsistent with study of German children, which showed that 10% of children reported abnormal range in SDQ parents form. Similarly, Davis et al. [23] in study of 4-5-year-old children in the Longitudinal Study of Australian Children (LSAC) showed that for the whole sample, 11.5% of parents reported scores that were above the recommended cutoff (i.e., in the abnormal or of-concern range) for total difficulties. For the subsample with SDQ data from both sources, 10.5% of the parents reported scores were above the recommended cutoff (abnormal or of-concern range) for total difficulties. The teacher reported a lower prevalence of all mental health problems than parents. Approximately 7% of the teacher reported scores above the recommended cutoff (abnormal or of-concern range) for total difficulties. Elberling et al. [24] in a register data from the first year of life was obtained from 99.7% of the children in the cohort of 5,898 eligible children, 3,501 participated in the SDQ assessment (59%). The overall estimated 6 month prevalence of mental health problems was 4.8%. Conduct problems were found in 3.0%, problems of hyperactivity/inattention in 0.7% and emotional problems in 1.5%. Boys showed a higher risk of having mental health problems as compared to girls

Our study showed that teachers said that 26.9% of children met the DSM-IV criteria for inattentive type 30.3% of children was impulsive, and 15.9% met criteria for combined ADHD type. According to mothers report, the results showed 20.9% of preschool children met the DSM-IV criteria for inattentive type, 26.1% of children were impulsive, and 12.8% met criteria for combined ADHD type. Our rate of ADHD is higher than results of Cuff in a NHIS includes 10,367 children ages 4-17 with a response rate of 79.4%. The lifetime prevalence of ADHD was reported by parents to be 7.8%. These high prevalence in consistent with previous study after 6 months of Gaza War in older age children which reported 28% of children had attention deficit disorder by parents and children [9].

### Conclusion

From the above mentioned results, we can record the following recommendations:

More training sessions specified in one or two specific areas of interest such as behavioural problems and behavioural modification. Forming groups of parents who can help other parents in dealing with their children behavioural and emotional problems. Involving the fathers in such activities and inviting them to similar training sessions. Group's sessions for parents need help in understanding their children behaviour and this could be every two weeks in regular base. Distribution of more brochures and pamphlets about children needs, problems, and solutions. Continuous training inside the kindergarten in specific subjects such as overactivity, using drawing in helping children, play therapy, behavioural modification, and counseling. Providing the teachers who show talent and ability to deal with children incentives and promotion.

	1	2	3	4	5	6	7	8	9	10	11
Total difficulties score-parents											
Social-parents	0.59**										
Hyperactivity- parents	0.79**	0.27**									
Emotional-parents	0.76**	0.34**	0.41**								
Conduct-Parents	-0.25 **	0	-0.23 **	-0.26 **							
Peer relationship-parents	-0.01-	-0.03-	0.02	-0.08-	0.02						
Total difficulties score-teachers	0.16**	0.15**	0.09	0.12*	0.01	0.40**					
Social-teachers	0.08	0.14**	0.02	0.09	0.07	0.09	0.69**				
Hyperactivity-teachers	0.16**	0.07	0.16**	0.09	-0.05	0.22**	0.71**	0.20**			
Emotional-teachers	0.15**	0.18**	0.01	0.18**	-0.01	0.05	0.72**	0.54**	0.22**		
Conduct -teachers	-0.17 **	-0.16-**	-0.09-	-.019-**	0.23**	0.23**	-0.09	0.07	-0.23 **	-0.15 **	
Peer relationship-teachers	0.52**	0.13**	0.36**	0.19**	-0.19-**	0.05	0.09	0	0.09	0.06	-0.07

Note: \*\*p<0.01; \*p<0.05

Table 6: Pearson correlation values of SDQ parents and teachers.

	1	2	3	4	5
Hyperactivity impulsivity by parents					
Attention by parents	0.44**				
Combined ADHD-Parents	0.80**	0.89**			
Attention by teachers	0.20**	0.33**	0.32**		
Hyperactivity impulsivity by teachers	0.28**	0.22**	0.29**	0.53**	
Combined ADHD-teachers	0.27**	0.31**	0.35**	0.88**	0.87**

Note: \*\*p<0.01; \*p<0.05

Table 7: Pearson correlation values of ADHD parents and teachers.

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