

# The Israel Survey of Mental Health among Adolescents: Prevalence of Attention-Deficit/Hyperactivity Disorder, Comorbidity, Methylphenidate Use, and Help-Seeking Patterns

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**ABSTRACT:** **Background:** The prevalence of ADHD is controversial, with many feeling that this disorder is over- or under-diagnosed. **Objectives:** To study the prevalence of attention-deficit/hyperactivity disorder (ADHD) and its association with socio-demographic characteristics, comorbid mental disorders, medical services, and methylphenidate use in the Israeli adolescent population.

**Methods:** The Israel Survey of Mental Health among Adolescents was conducted in a representative national sample of 14–17 year olds and their mothers. The Development and Well-Being Assessment was administered to identify DSM-IV diagnoses of ADHD and comorbid mental and learning disorders, and the results were verified by senior child psychiatrists. Respondents were also asked about their use of medical services and psychotropic drug intake in the past 12 months.

**Results:** Three percent of the adolescents met the DSM-IV criteria for ADHD. ADHD was significantly associated with gender (higher prevalence in boys than girls), ethnicity (higher prevalence in Jews than Arabs/Druze), referral to a medical professional, and maternal help-seeking for the emotional or behavioral problems of the adolescent. Medication was prescribed to 2.9% of adolescents: 34.6% with a diagnosis of ADHD had not been prescribed methylphenidate in the past year, and 34.6% of the medicated subjects did not have a diagnosis of ADHD. None of the Arab/Druze adolescents was receiving stimulants compared to 3.7% of the Jewish adolescents.

**Conclusions:** Despite advances in public awareness of mental disorders in youth, a substantial proportion of older Israeli adolescents, especially from minority groups, are under-diagnosed or untreated. At the same time, many, especially from the Jewish majority, are over-diagnosed and potentially over-treated. Ethnic disparities in rates of mental health care highlight the urgent need to identify and overcome barriers to the recognition and treatment of these conditions.

**KEY WORDS:** adolescents, attention deficit/hyperactivity disorder (ADHD), comorbidity, methylphenidate use, help-seeking

**A**ttention-deficit/hyperactivity disorder [1] is a neurobiological condition characterized by developmentally inappropriate levels of inattention, impulsivity and hyperactivity. It is one of the most common psychiatric conditions in children [1]. Originally considered primarily a disorder of early and middle childhood, ADHD is now believed to continue through adolescence and into adulthood [2]. It is also known to be associated with a range of mental health and neurodevelopmental comorbidities [3]. Although ADHD is considered a well-validated diagnosis, concerns have been raised about possible over-diagnosis, over-medication with methylphenidate, medicalization of educational and behavioral problems [4], and especially, stigmatization in minority populations and misapplication of the diagnosis in non-western settings [5].

Israel is a multiethnic country with a substantial minority of Arab/Druze citizens and a large immigrant population, making it an ideal setting for epidemiological studies of ADHD. The array of cultures and ethnicities can also lead to disparities in the availability of medical and mental health services and the reasons for their use. To date, the prevalence and patterns of ADHD comorbidities and their relationship to accessible health care have not been investigated in Israel.

The present study takes advantage of a recent community-based epidemiological survey of adolescents in Israel that specifically addressed health services use and barriers to treatment. The aims of the present study were as follows: to investigate the

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ADHD = attention-deficit/hyperactivity disorder

prevalence of ADHD in a non-referred adolescent population; determine the association of ADHD with socio-demographic variables, other psychiatric disorders, and methylphenidate use; compare the use of methylphenidate between the Jewish majority and the Arab minority and immigrants; and assess the help-seeking behaviors of parents of adolescents with ADHD.

## SUBJECTS AND METHODS

The data for the study were derived from the Israel Survey of Mental Health among Adolescents (ISMEHA). A detailed description of the methodology has been published elsewhere [6]; a brief summary is presented here.

### SURVEY POPULATION

The ISMEHA collected data from a nationwide, cross-sectional representative sample of 14–17 year olds living in urban settings of more than 2000 inhabitants who met the status of legal residents according to the National Population Register. Adolescents residing in small rural settings, such as kibbutzim or other collective communities (accounting for 7.3% of this age group in the national population), were excluded. These adolescents do not differ from those living in urban settings in their socio-demographic characteristics, educational opportunities and accessibility to health services. Other adolescents not included in the sample were those living in unrecognized Bedouin villages (1.7%), Palestinian residents of East Jerusalem (2.8%), and Jewish ultra-Orthodox (*Haredi*) adolescents (17.8%) because of their low response rate in the pilot stage (4%).

### SAMPLE WEIGHTS AND INFLATION FACTORS

The sample was weighted back to the total population to compensate for unequal selection probabilities resulting from clustering effects and non-response. The weights were adjusted to make the weighted sample totals conform to known population totals taken from the Central Bureau of Statistics, a proven reliable source, after Jewish ultra-Orthodox adolescents were excluded. The inflation method for each group of individuals was determined according to the known characteristics of the respondents and non-respondents in the given group.

### PROCEDURE

The survey was performed at the respondents' homes between January 2004 and March 2005. Parents provided written informed consent for their own and their child's participation in the study. All participants (mothers and adolescents) received a detailed explanation of the objectives and methods of the survey and were assured confidentiality. The interview was conducted face-to-face by two trained lay interviewers, with the adolescent and the mother, separately and simultaneously.

The data for the present study were based on the mothers' interviews. The study protocol was approved by the Human Subjects Committee of Schneider Children's Medical Center of Israel.

## INSTRUMENTS

### • PSYCHIATRIC DIAGNOSES

The Development and Well-Being Assessment Inventory includes a battery of questionnaires, interviews, and rating techniques used to generate ICD-10 and DSM-IV psychiatric diagnoses for children aged 5 to 17 years [7]. It is a multi-informant interview focused on psychiatric symptoms and their impact on the life of the adolescent and his/her family. When definite symptoms are identified by the structured questions, interviewers use open-ended questions and supplementary prompts to get participants to describe the problem in their own words [7]. These descriptions are recorded verbatim. The responses to the structured items are used to generate one or more computerized diagnoses according to the criteria of the DSM-IV [1]. Thereafter, a team of psychiatrists reviews the recorded comments and, on the basis of the computerized and recorded data, confirms or rejects the preliminary computerized diagnoses.

The diagnosed disorders are categorized into two types: externalizing (including ADHD, oppositional defiant disorder, and conduct disorder) and internalizing (including separation anxiety, specific phobia, social phobia, panic disorder, post-traumatic stress disorder, obsessive-compulsive disorder, generalized anxiety disorder, and major depressive disorder). The screening question for ADHD is as follows: "Considering his/her age, do you think your child has a problem of hyperactivity or low ability to concentrate?" The clinical utility of the DAWBA for ADHD detection has been confirmed in clinical practice [8].

The DAWBA was translated into Hebrew especially for this study and then back-translated. The Hebrew translation was culturally sensitive, and the back translation was compared to the original English version by the developer (Robert Goodman). The Arabic and Russian versions were taken from the DAWBA website ([www.dawba.com](http://www.dawba.com)). The interviews took place in Hebrew, Arabic, or Russian, according to the preference of the interviewees.

### • USE OF STIMULANTS

Mothers were asked whether their adolescent child had ever been prescribed medication by a physician for emotional, behavioral or hyperactivity problems, and if the adolescent child had ever taken stimulants (two separate items).

### • USE OF MENTAL HEALTH SERVICES

Mothers were asked three questions about health services use: a) "Has a teacher, school counselor or any other adult ever

ISMEHA = Israel Survey of Mental Health among Adolescents

DAWBA = Development and Well-Being Assessment Inventory

suggested that you seek help from a professional for emotional, mood or behavioral problems in your child?" b) "Has your child visited a primary health care practitioner in the past 12 months?" c) "Have you consulted with a professional or informal mental health care provider for the emotional or behavioral problems of your child in the past 12 months?"

#### • SOCIO-DEMOGRAPHIC AND DISABILITIES PROFILE

Socio-demographic (age, gender, ethnicity, country of birth) were obtained from the National Population Register. Additional information, such as number of siblings, maternal education, marital status of the parents, paternal employment, and receipt of welfare were obtained directly from the respondents. Mothers were also asked whether the adolescent had a diagnosed learning disability or a hearing or speech impairment

#### DATA ANALYSIS

Data analyses were performed with the SPSS version 17 (SPSS Inc., Chicago, IL, USA) using the complex-sample analysis module to adjust for sampling weight. The prevalence of ADHD and the use of methylphenidate were analyzed by selected demographic variables; raw numbers and weighted proportions are presented. Owing to the small number of subjects who had ADHD or used methylphenidate, between-group differences in proportions were analyzed by chi-square or Mann-Whitney *U* test for two independent samples. *Z* values and significance are shown.

## RESULTS

#### CHARACTERISTICS OF THE STUDY POPULATION

The overall response rate was 68.2%; 14.8% of the adolescents were not located and 17.0% refused to participate. Among the located subjects, the response rate approached 80%.

Table 1 (column 1) shows the characteristics of the study population. Of the 957 participants, 77% were Jewish and 23% were Muslim or Christian Arabs or Druze, 82% were born in Israel, more than 77% belonged to families with three or more children, 40% of the mothers had more than a high school education, 14% were divorced, 23% of the fathers were unemployed, and 14% belonged to families on welfare.

#### PREVALENCE OF ADHD

Figure 1 shows the manner in which the diagnosis of ADHD was established. A total of 921 mothers answered the screening question of the DAWBA: 103 responded affirmatively. Among their respective children, 22 (21%) were given a final diagnosis of ADHD by the consulting clinicians after assessing the verbatim answers of the mothers. The remaining 818 mothers responded negatively to the initial screening question. Among their respective children, 4 (0.5%) were clinically diagnosed

**Table 1.** Prevalence of ADHD by demographic variables and selected use-of-services indicators (raw numbers and weighted proportions)

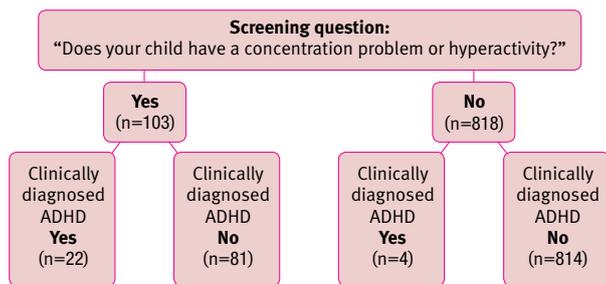
Demographic variables and service-use indicators	ADHD						
	Total sample		Prevalence			Mann-Whitney U	
	N	%	N	%	(SE)	Z	P
<b>Gender</b>							
Male	497	51.2	19	3.9	(1.0)		
Female	460	48.8	7	2.0	(0.8)	2.181	0.029
<b>Ethnic group</b>							
Jewish	658	77.1	23	3.6	(0.8)		
Arab/Druze	299	22.9	3	1.0	(0.8)	2.216	0.027
<b>Immigrant status</b>							
Israeli born	826	81.5	22	3.0	(0.7)		
Immigrants	131	18.5	4	2.8	(1.7)	0.265	0.791
<b>No. of siblings</b>							
0,1	174	22.7	10	5.9	(1.9)		
2 or more	763	77.3	16	2.2	(0.7)	2.693	0.007
<b>Maternal years of school</b>							
0–11	299	27.3	9	3.3	(1.4)		
12	277	32.8	6	3.0	(1.3)		
13+	325	39.9	10	2.9	(1.0)	0.090	0.929
<b>Marital status</b>							
Married	813	85.6	20	2.5	(0.6)		
Single/divorced	122	14.4	6	6.6	(2.7)	1.552	0.121
<b>Paternal employment</b>							
Employed	661	77.0	19	3.0	(0.8)		
Unemployed	214	23.0	3	1.5	(1.1)	1.192	0.233
<b>Receiving welfare</b>							
Yes	136	14.1	4	3.9	(2.2)		
No	793	85.9	22	3.0	(0.7)	0.118	0.906
<b>Advisor/teacher suggested specialist consultation</b>							
Yes	75	8.1	14	18.2	(5.1)		
No	832	91.9	12	1.8	(0.6)	8.539	0.000
<b>Visited primary care practitioner in the past year</b>							
Yes	600	69.0	21	3.9	(0.9)		
No	307	31.0	5	1.5	(0.8)	1.605	0.109
<b>Consulted mental health professional</b>							
Yes	97	11.1	15	15.6	(4.2)		
No	815	88.9	11	1.6	(0.6)	7.881	0.000

with ADHD. In all, 3% of the adolescents (n=26) met the DSM-IV criteria for ADHD.

#### PREVALENCE OF ADHD BY SOCIO-DEMOGRAPHIC AND SERVICE-USE VARIABLES

Table 1 (column 2) shows the association of ADHD with selected socio-demographic characteristics and health-services use. Significantly higher prevalence rates of ADHD were found in boys than in girls (3.9% vs. 2.0%), in Jews than in Arabs/Druze (3.6% vs. 1.0%), and in adolescents with no or only one sibling than in those with two or more siblings (5.9% vs. 2.2%). ADHD was not associated with immigrant status, maternal education, marital status of the parents, paternal employment, or need for welfare.

**Figure 1.** Flow chart of respondents in ADHD diagnostic process



Of the 75 adolescents referred to a specialist by a teacher, school counselor or another adult, 93.3% (n=70) were Jewish and 6.7% were Arab/Druze (data not shown).

**ADHD AND COMORBIDITY**

In the analysis of selected mental disorders, learning disability, and hearing or speech impairments in the adolescents with ADHD, only trend levels were considered because of the small numbers. A trend of higher rates relative to the general population was noted for obsessive-compulsive disorder (20.4% vs. 1.2% in the general population), oppositional defiant disorder (22.8% vs. 1.8%), conduct disorder (47.1% vs. 0.9%), and hearing/speech impairment (22.4% vs. 6.8%).

**USE OF METHYLPHENIDATE**

Methylphenidate use was reported by 26 mothers; 17 children (65.4%) had ADHD and 9 did not. These nine adolescents who did not have ADHD but did receive methylphenidate constituted 1.1% of the whole study population. A total of 880 mothers declared that their child had not used methylphenidate. Of their children, 9 (34.6%) were diagnosed with ADHD and 871 were not. For 15 of the mothers participating in the study, information regarding methylphenidate use was incomplete and therefore the denominator here is not 921 but 906.

Table 2 shows the rates of methylphenidate use by selected socio-demographic characteristics. Stimulants were used significantly more by boys than girls (4.7% vs. 1.0%), Jews than Arabs/Druze (3.7% vs. 0), immigrants than Israeli-born adolescents (4.9% vs. 2.4%), and adolescents with no or only one sibling than those with 2 or more (7.2% vs. 1.6%). Stimulant use was not related to maternal years of education, marital status of the parents, paternal employment, or receipt of welfare.

**DISCUSSION**

**PREVALENCE OF ADHD**

Our study shows that 3% of Israeli adolescents, 3.9% of boys and 2.0% of girls, meet the DSM-IV criteria for ADHD. These figures need to be understood in the context of the high heterogeneity of subjects with ADHD worldwide, owing to the

**Table 2.** Prevalence of methylphenidate use by demographic variables (raw numbers and weighted proportions)

Demographic variables	N	Methylphenidate use			
		Prevalence %	(SE)	Z	P
<b>Gender</b>					
Male	21/472	4.7	(1.1)		
Female	5/435	1.0	(0.5)	2.974	0.003
<b>Population group</b>					
Jewish	26/626	3.7	(0.9)		
Arab/Druze	0/281			3.464	0.001
<b>Immigrant status</b>					
Israeli born	19/782	2.4	(0.7)		
Immigrant	7/125	4.9	(2.1)	1.971	0.049
<b>No. of siblings</b>					
0,1	13/166	7.2	(2.3)		
2 or more	13/740	1.6	(0.5)	4.234	0.000
<b>Maternal years of school</b>					
0-11	8/288	3.5	(1.5)		
12	4/268	1.3	(0.7)		
13+	14/315	4.1	(1.1)	1.265	0.206
<b>Marital status</b>					
Married	20/786	2.6	(0.7)		
Single/divorced	6/118	4.9	(2.2)	1.539	0.124
<b>Paternal employment*</b>					
Employed	21/640	3.4	(0.8)		
Unemployed	2/205	1.1	(0.8)	1.765	0.078
<b>Welfare</b>					
Yes	5/129	4.7	(2.3)		
No	21/769	2.6	(0.7)	0.717	0.473

\*Incomplete data for paternal employment

wide range of contributing factors: age (higher prevalence in younger children), identity of informants (parents, teachers, subjects, or combinations), diagnostic criteria (higher prevalence using the DSM-IV than the DSM-III [9] and higher prevalence using DSM classification than the ICD [10]), the instrument(s) used to gather relevant information, and application (or not) of criteria for impairment [11]. Although we used the DSM-IV, our prevalence rate of ADHD was lower than in other reports [12]. A meta-regression analysis of worldwide studies of ADHD among subjects 18 years and younger revealed a pooled prevalence of 5.29% [13]. A survey in North Carolina using parents as informants found that 10% of the children had been diagnosed with ADHD and 7% were on medication [14]. An epidemiological study of nearly 6000 children in Rochester, Minnesota, reported a cumulative incidence of 7.5% for ADHD in the elementary and secondary school population [15]. This value was close to the 6.7% reported by the U.S. National Health Interview Survey for 1997 through 2000 [16]. The National Survey of Children's Health conducted in the United States during 2003-2011 [17] asked parents of more than 100,000 children aged 4 to 17 years whether their child had ever been diagnosed with ADHD or ever received pharmacological treatment (as opposed to currently). The rate of lifetime childhood diagnosis of ADHD was 11%; however,

only 6.1% (or 69% of those with ADHD) had ever been treated with medication for the disorder.

A lower prevalence of ADHD is usually found in older children. Furthermore, although the American Academy of Child and Adolescent Psychiatry (2007) stated that “it is clearly established” that ADHD does not remit with the onset of puberty [18], diagnostic issues remain. The DSM-IV criteria were designed for school-age children in terms of number of symptoms required to meet the diagnostic threshold (i.e., 6 of the 9 symptoms of inattention and/or hyperactivity/impulsivity) and therefore may be developmentally inappropriate for older adolescents. Thus, our low prevalence rates may also be due to the natural history of the disease or the use of inappropriate criteria.

#### **ADHD AND GENDER**

We found a higher prevalence of ADHD among boys than girls, as reported in many earlier studies [19,20].

#### **ADHD AND MINORITY STATUS**

One of the most striking findings of this study was the low prevalence of ADHD and lack of use of methylphenidate in the Arab/Druze minority group. The overall rate of ADHD in the whole study was 3%. However, comparison by ethnic group yielded a 1.0% rate for Arabs/Druze compared to 3.6% for Jews. This may be a true discrepancy due to genetic or environmental factors. Alternatively, it may be at least partly attributable to possible cultural insensitivity of the instrument used, which could have led us to miss some cases. It may also be due to under-diagnosis by the medical establishment, given the higher availability of mental health services – and the fewer unmet health needs – in Jewish than in Arab localities in Israel [21]. An earlier study of ADHD treatment in Israel yielded similar findings to ours [22]. Interestingly, a community psychiatric survey from the United Arab Emirates using a similar methodology reported a 0.9% prevalence of ADHD in a mixed sample of children and adolescents [23]. Accordingly, a previous study from the USA noted relatively lower rates of diagnosed disorders and use of health services among the African-American minority population [24]. The authors argued that unlike Caucasian parents, parents in the African-American community may regard ADHD symptoms as bad behavior rather than a medical condition and consequently have a higher threshold for problem recognition and treatment seeking. In addition, African-American professionals are less likely to diagnose ADHD or prescribe stimulant medication owing to the socially constructed view of the disorder, involving distrust of the educational system, perceived lack of awareness on the part of Caucasian educators, social stigma of the diagnostic label, concern about addiction to drug treatments, and political pressure. In a nationally representative adolescent sample from the United States, the severity of mental disorders was found to be significantly associated with an increased likelihood of receiving treatment, but half the ado-

lescents with severely impairing disorders had never received professional help. Hispanic and non-Hispanic black adolescents, even those with severe impairment, were less likely than their white counterparts to receive mental health services [25].

Additionally, the association of low rates of ADHD in the Arab/Druze community with minority status and poor access to services, reported in the previous study from Israel [22], is also compatible with our finding that of the 14 adolescents with ADHD referred by an authority figure to seek medical attention only 2 were of Arab/Druze origin. However, it is also possible that there is less tolerance for excessive activity in the classroom at the Arab/Druze schools than at the Jewish schools, and thus teachers at the Arab/Druze schools might not refer their students for ADHD diagnosis as they mistakenly interpret symptoms as bad behavior.

It is noteworthy that prevalence rates of ADHD were higher in adolescents with no or only one sibling than in those from larger families. This again may be explained by the lower rates of ADHD reported among minority adolescents, as almost all the Arab/Druze adolescents (96.6%) had two or more siblings compared to 71.5% of the Jewish adolescents.

#### **OVERUSE OF STIMULANTS**

We found, coincidentally, that 34.6% of the adolescents diagnosed with ADHD did not take methylphenidate, whereas 34.6% of those who did take methylphenidate were not diagnosed with ADHD. We assume that most of the latter group comprised those who probably were over-using the medication, although it is also possible that many of them were symptom-free precisely because they were taking medication. Thus, use of methylphenidate might reduce the true prevalence of ADHD in adolescents.

Our finding that immigrant adolescents had higher rates of methylphenidate use than adolescents born in Israel must be further qualified. Since all the adolescent immigrants in the survey were Jewish, we conducted another comparison of Israel-born Jewish adolescents with immigrant Jewish adolescents. The results yielded a higher rate of stimulant use in the immigrants (5.0% vs. 3.3%), but the difference was not statistically significant.

#### **LIMITATIONS AND STRENGTHS**

The main strength of this study lies in its methodological rigor [6]. However, we must confront potential limitations. One of them is the response rate: 14.8% could not be located and 17% refused to participate. Thus, the response rate was 80% in the located sample and 68.2% in the total sample. Although a 68% response rate is relatively high for an epidemiological community study, the possibility must be considered that those who were not found or refused to answer have higher rates of mental disorders than those who responded, and that the prevalence of ADHD in this age group might be underestimated. However, in order to reduce this risk, the

sample was weighted back to the total population to compensate for clustering effects in the sampling and non-responses.

Another limitation is that although the study was carried out in a representative sample of 14–17 year old Israeli adolescents, the low prevalence of ADHD (3%) did not allow for intragroup comparisons as statistical power was relatively low. In order to overcome this concern, data were analyzed with non-parametric statistical measures.

Another potential limitation is the assumption of universality regarding expression of psychiatric symptoms across cultures [12]. Although our diagnostic instruments were appropriately translated to Hebrew, Arabic and Russian and parents were interviewed in their preferred language, cross-cultural variability of certain diagnostic concepts and their measurement could be responsible for the lower rates of ADHD found among the Arab/Druze adolescents.

### CONCLUSIONS AND CLINICAL IMPLICATIONS

Israel has a relatively strong mental health delivery system and well-developed child and psychiatric and neurological services. Nevertheless, there is much room for improvement in the diagnosis and treatment of ADHD. Many adolescents, especially from minority groups, are under-diagnosed and under-treated whereas many, especially from the Jewish majority, may be over-diagnosed and potentially over-treated. These disparities highlight the urgent need to identify and combat barriers to the recognition and treatment of ADHD. We believe they are not restricted to Israel and may have implications for worldwide clinical practice.

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