

## Prevalence of ADHD in Northern Cyprus

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## ABSTRACT

**Objective:** We evaluated the prevalence of attention-deficit/hyperactivity disorder (ADHD) among primary school children in Nicosia, a province of the Turkish Republic of Northern Cyprus (TRNC). **Methods:** ADHD screening scales were filled out by the teachers and parents of primary school children aged 6-11 years. The study was conducted in two stages. In the first stage, the Turgay DSM-IV-Based Disruptive Behavior Disorders Child and Adolescent Rating & Screening Scale (T-DSM-IV-S) was sent to the parents of 1140 students and also given to the teachers of children whose parents filled out the T-DSM-IV-S. For the second stage, children and parents whose children had  $\geq 12$  points from the ADHD scales, either by the parents' or teachers' report, were invited to our clinic for a semi-structured interview (Kiddie Schedule for Affective Disorders and Schizophrenia for School Aged Children-Present and Lifetime; K-SADS-PL). ADHD was diagnosed with use of the K-SADS-PL in both children and their parents as well as in accordance with DSM-IV-TR ADHD criteria. **Results:** The response rate for parents in stage I was 49.9%. A total of 125 children fulfilled the positive screening criteria. Ninety-eight parents were interviewed. The prevalence of ADHD was 12.8%. The major subtype was combined type (61.1%); the inattentive type was present in 33% of the sample, and the hyperactive-impulsive type in 5.6%. **Discussion:** The prevalence of ADHD in primary school-aged children in a province in the TRNC was 12.8%. This is the first study to assess ADHD prevalence and subtype distribution in the TRNC. (*Anatolian Journal of Psychiatry* 2017; 18(5):478-484)

**Keywords:** ADHD, prevalence, subtypes, TRNC, children/young people

## Kuzey Kıbrıs'ta DEHB'nin yaygınlığı

## ÖZET

**Amaç:** Kuzey Kıbrıs Türk Cumhuriyeti'ndeki (KKTC) ilkököl öğrencilerinde dikkat eksikliği/hiperaktivite bozukluğunun (DEHB) yaygınlığını araştırdık. **Yöntem:** DEHB değerlendirme ölçekleri 6-11 yaş arasındaki ilkököl öğrencilerinin anne-babaları ve öğretmenleri tarafından dolduruldu. Çalışma iki basamakta gerçekleştirildi. Birinci basamakta Turgay DSM-IV-Yıkıcı Davranış Bozuklukları Çocuk ve Adolesan Değerlendirme ve Tarama Ölçeği (T-DSM-IV-S) ölçeği 1140 öğrencinin ailesine yollandı. Aynı ölçek, ölçeği doldurulmuş olan çocukların öğretmenlerine de verildi. İkinci basamakta anne-babaları veya öğretmenleri tarafından doldurulan ölçeklerde 12 puandan fazla alan çocukların anne-babaları ve çocukları yarı yapılandırılmış görüşme (Çocuk ve Gençler için Duygulanım Bozuklukları ve Şizofreni ölçeği; K-SADS-PL) için kliniğe çağırıldı. DEHB tanısı çocuklarda ve anne-babalarında hem K-SADS-PL kullanılarak, hem de DSM-IV-TR DEHB ölçütleri kullanılarak konuldu. **Sonuçlar:** Birinci basamakta anne-babaların katılım oranı %49.9 olarak gerçekleşti. Toplam 125 öğrenci ölçeğe göre tanı ölçütlerini karşılamakta idi. Bunlardan 98'inin anne-babası ile görüşülebildi. DEHB'nin yaygınlığı %12.8 olarak bulundu. En sık görülen alt tip kombine alt tip iken, dikkat eksikliği alt tipi %33, hiperkativite-impulsivite alt tipi %5.6 olarak belirlendi. **Tartışma:** KKTC'nin bir bölgesinde ilkököl çağı çocuklarda DEHB yaygınlığı %12.8 olarak belirlendi. Bu çalışma KKTC'de DEHB yaygınlığı

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**Anahtar sözcükler:** DEHB, yaygınlık, alt tipler, KKTC, çocuklar/gençler

## INTRODUCTION

Attention-deficit/hyperactivity disorder (ADHD) is one of the most common psychiatric disorders of childhood.<sup>1</sup> Its prevalence has been reported as 5-10% among school-aged children and tends to persist lifelong, with variable rates.<sup>1,2</sup> ADHD can adversely affect academic performance; cause learning difficulties; result in social rejection; increase the risk of substance abuse, accidents, anxiety, and mood disorders; and cause behavioral problems.<sup>3,4</sup> A significant percentage of children remain undiagnosed or untreated.<sup>5,6</sup> As with other medical conditions epidemiological data may help improve strategies related with early diagnosis and treatment of ADHD, yet a paucity of such data exist, making it crucial to know the actual prevalence of ADHD in diverse populations.<sup>7</sup>

Cyprus is the third largest island in the East Mediterranean area and is divided into North and South Cyprus, with a Turkish population living in the northern part since 1974. The population of the Turkish Republic of Northern Cyprus (TRNC) is about 285,000. The prevalence of ADHD in school-aged children in the TRNC has not been reported.

Previous studies investigating the prevalence of ADHD in children and adolescents worldwide have provided highly variable rates ranging from 0.9% to 20%.<sup>8-17</sup> The prevalence of ADHD is lower in European countries compared with North America.<sup>18</sup> Thus, emphasis has been laid on cultural differences as a potential cause of the variation in ADHD prevalence.<sup>19</sup> Methodological differences in various studies have also been implicated as another cause of the variability of ADHD prevalence.<sup>20</sup> Methodological factors could vary according to information source (parents, teacher, and children), diagnostic procedures used, and use of impairment criteria.<sup>21</sup> Use of a similar methodology in ADHD epidemiological studies could help eliminate these inconsistencies.<sup>22</sup>

It has been reported that ADHD is more common in male children compared with their female counterparts. The male-to-female ratio ranges from 3 to 9.<sup>23</sup>

Three subtypes of ADHD have been defined: the attention deficit subtype, the hyperactive-impulsive subtype, and the combined subtype. The

attention deficit subtype is the most common, although some studies have reported that the combined subtype is the most common.<sup>24</sup>

The aim of the present study was to assess ADHD prevalence and the distribution of its subtypes among primary school children in the Nicosia province of the TRNC.

## METHODS

### Sample group

This study was conducted in the TRNC among primary school children aged 6-11 years. One school for sampling was chosen on the basis of it being a heterogeneous primary school with students enrolled from almost every region of the TRNC. The population of the TRNC was 286,257 according to the Civil Registry Office.<sup>25</sup> The total number of primary school students was 18,511 and the single college had a total of 1140 attending students. A power analysis of this population to select and form the sample of the study was carried out with an alpha error of 5%, a precision of 3%, and an assumption of an ADHD prevalence of 5%; the size of sample was determined to be 200 children. To account for the potential for missing or lost data, 20% was added to the sample size. Consequently, the minimum student number was estimated to be 240 of students.

### Screening procedure

**Stage 1:** The first 18 items of the ADHD-related part of the Turgay DSM-IV-Based Disruptive Behavior Disorders Child and Adolescent Rating & Screening Scale (T-DSM-IV-S) was used. After receiving informed consent from the school teachers the T-DSM-IV-S was mailed together with the informed consent form to the parents of 1140 students. The number of returned forms was 569 (response rate 49.9%).

Teachers of 569 students also filled out the T-DSM-IV-S for the same student after obtaining the parents' informed consent. Hence, a pair of T-DSM-IV-S forms was obtained for each student, one being from the parents and one from the teacher. A positive result for screening for ADHD was defined as having 12 or more points from the ADHD scales, either by the parents' or teachers' report. Among 569 children, 125 met our criteria for positive screening.

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Of these, parents of 98 children accepted interview invitations. Parents of some of the 27 children refused interviews, whereas others could not be reached by telephone (because of invalid phone numbers or unanswered calls).

**Stage II:** Parents accepting the interview and their children have been invited to the Child Psychiatry outpatient clinic. Both parents and the children underwent a detailed interview and evaluation by a child psychiatry expert at the child psychiatry outpatient clinic. At least one parent attended the child's interview. In each interview a detailed psychiatric assessment was carried out with parents and children by using the Kiddie Schedule for Affective Disorders and Schizophrenia for School Aged Children-Present and Lifetime (K-SADS-PL-ADHD) and the DSM IV-TR ADHD diagnostic criteria. At the end of the interview the clinical diagnosis of ADHD has been made by both of K-SADS-PL-ADHD and DSM IV-TR ADHD diagnostic criteria

Exclusion criteria were presence of a diagnosis of a generalized developmental disorder or psychotic disorder; presence of a medical, neurological or genetic disorder; or mental retardation. Suspected cases were assessed with the WISC-R (Wechsler Intelligence Scale for Children). At the end of these procedures two children were diagnosed with mental retardation and thus excluded. Eleven children were considered to have a specific learning disability but were included in the study because ADHD accompanied their clinical status. Neurological examinations were performed for each child attending the interview at the pediatric neurology clinic.

#### Data collection tools

The main tools used were:

**T-DSM-IV-S:** T-DSM-IV-S was developed by Turgay<sup>26</sup> and its validity in Turkish samples was tested by Ercan et al.<sup>27</sup> It is composed of 18 items with two subscales. The symptom scale is a four-point (0-3) scale with a total score is between 0 to 54 points.

**K-SADS-PL:** K-SADS-PL is a widespread diagnostic interview form semi structured to detect current and lifelong psychopathologies in children and adolescents.<sup>28</sup> Validity and reliability studies for a Turkish sample have been reported elsewhere.<sup>29</sup>

#### Statistical analysis

Descriptive statistics were computed for all variables using SPSS version 17 (IBM, USA).

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## RESULTS

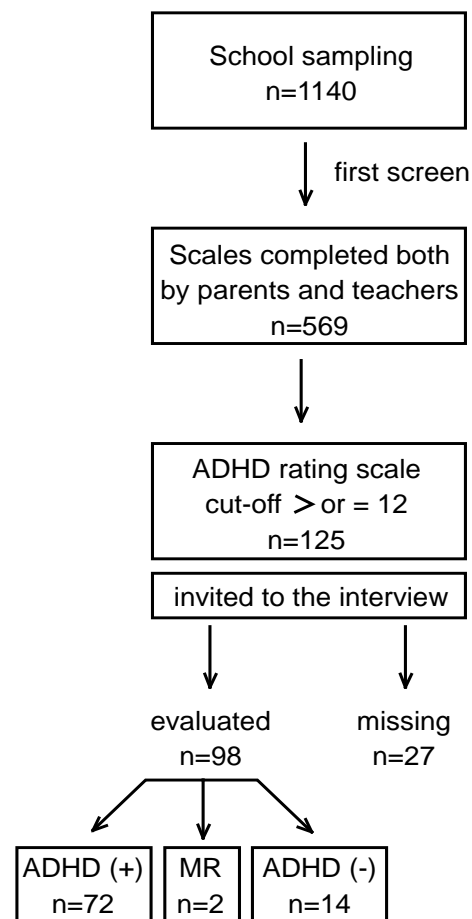
### Stage I

The parents of 569 (49.9%) students out of 1140 students whose parents were sent the T-DSM-IV-S for screening filled out and returned the forms (Figure 1). The gender distribution of the 569 students was 51% (n=290) girls and 49% (n=279) boys. The age range was 6-11 years. The mean age between the genders was similar.

### Stage II

Ninety-eight of 125 families (response rate 78.4%) accepted our invitation for an interview. At the end of the interviews 72 children were diagnosed with ADHD according to DSM-IV-TR criteria, corresponding to an ADHD prevalence of 12.8% (n=72). Of the 72 children diagnosed with ADHD, 29.2% (n=21) were female and

**Figure 1.** Recruitment procedure and participation rates



ADHD: Attention deficit, hyperactivity disorder,  
MR: Mental retardation

**Table 1.** Distribution of ADHD subtypes

Gender	Inattentive		Hyperactive-impulsive		Combined		Total	
	n	%	n	%	n	%	n	%
Males	12	23.5	3	5.9	36	70.6	51	70.8
Females	12	57.1	1	4.8	8	38.1	21	29.2
Total	24	33.3	4	5.6	44	61.1	72	100.0

70.8% (n=51) were male. The male/female ratio was 2.4.

Distribution of the ADHD subtypes (as determined by clinical assessments) were as follows: 61.1% (n=44) for the combined type, 33.3% (n=24) for the inattentive type, and 5.6% (n=4) for the hyperactive-impulsive type (Table 1).

## DISCUSSION

The aim of this study was to assess ADHD prevalence and subtype distribution in primary school children (aged 6-11 years) in the TRNC. We found that the percentage of children meeting ADHD diagnostic criteria was 12.8%. Although this rate is markedly higher than the 5.9% reported by a worldwide meta-analysis of ADHD prevalence,<sup>14</sup> it is within the range that has been reported for ADHD prevalence<sup>9</sup> as well as that of epidemiological studies conducted in Turkey,<sup>21,30</sup> and Chile.<sup>31</sup> Although no similar studies have been reported from the TRNC to date, our methodology and results are in close agreement with studies of Turkish children from Turkey, such as the epidemiological study reported by Ercan et al.<sup>30</sup> from the İzmir province of Turkey, which used a very similar methodology and reported a prevalence of 13.6%. Two other epidemiological studies, one by Ercan et al.<sup>21</sup> another by Rowland et al.<sup>9</sup> reported highly similar results to ours, 12.7% and 12.9% respectively. In Chilean children aged 4-18 years the prevalence of ADHD was found to be 10.4%.<sup>31</sup> A review of the worldwide epidemiological studies on ADHD prevalence revealed a wide range of prevalence's, ranging from 0.9% to 20%.<sup>8-17</sup> Some studies have attributed the wide variation in ADHD prevalence to cultural and geographical factors, while many others have advocated that these discrepancies result from the diagnostic systems and methodology used, sources of information, and whether the diagnostic criteria (impairment and involving at least two domains) are required.<sup>14</sup>

We used strict DSM-IV-TR diagnostic criteria for

ADHD of symptoms being observed in at least two environments, a symptom onset before the age of 7 years, and a minimum symptom duration of 6 months. However, the prevalence we found was higher than that of other prevalence studies carried out in Turkey in different years. A study conducted by Gul et al.,<sup>32</sup> for instance, reported a prevalence of 8.6% and another one, reported by Ersan et al.,<sup>33</sup> found a prevalence of 8.1%. Güler et al.,<sup>34</sup> by contrast, reported a prevalence of 2.7-9.6% based on parent assessment and 2-10.1% based on teacher evaluation. However, those studies and ours differed methodologically as those studies were one-staged studies that achieved diagnoses only through the use of specific scales whereas we first screened children via parent and teacher self-report and then confirmed diagnoses via clinical interviews. This difference may account for the discrepant results between these studies and ours.

There is no gold standard method to definitively diagnose ADHD. The ideal way to make the final diagnosis is the evaluation of cases with positive symptoms obtained via a scale and corroborating the findings with data provided by a thorough psychiatric examination and detailed patient history. To obtain accurate results, we conducted our study in two stages. The first stage had participants fill in forms to screen for ADHD and in the second we conducted interviews based on the K-SADS and DSM-IV-TR, thereby obtaining ADHD diagnoses. The purpose of using both the K-SADS and DSM-IV-TR was to allow for a rigorous diagnostic procedure.

Additionally, we obtained information about ADHD symptomatology from various sources (parents, children, and teachers). This is because previous studies worldwide have shown that ADHD prevalence may show variation depending on the evaluating source.<sup>15</sup> For instance, parental perception (compared with teachers) may reflect more severe impairment and symptoms in children than actual ones,<sup>35</sup> although some studies have reported contrary

results. A prevalence study in 1999,<sup>36</sup> for example, reported an ADHD prevalence of 3.3%, 5%, and 8.9% depending on from what source the information was obtained (child, parent, teacher, respectively). These differences in ADHD prevalence do not necessarily imply that one source is superior or better than the other. Rather, it may be regarded as a reflection of behavioral vicissitudes in different contexts and the various interactions between the child and the source. Despite inconsistencies between the sources of information, each perspective is valid for evaluating a child.<sup>15,35,37</sup>

### Subtype distribution

The most common ADHD subtype was the combined type 61.1% (n=44). The second most common type was the inattentive type with a rate of 33.3% (n=24), and the least common type was the hyperactive type (5.6%, n=4). A recent meta-analysis<sup>25</sup> pointed out that the most commonly seen subtype of ADHD is the combined type, as was also found in studies from North Carolina,<sup>9</sup> Colombia,<sup>12</sup> Brazil,<sup>38,39</sup> Italy,<sup>8</sup> Majorca,<sup>11</sup> Venezuela,<sup>15</sup> Texas,<sup>13</sup> Saudi Arabia,<sup>10</sup> Lebanon,<sup>40</sup> and Turkey.<sup>21</sup> Conversely, ADHD prevalence studies from Nigeria<sup>41,42</sup> and a prevalence study from Brazil<sup>43</sup> reported that the inattentive type was the most common subtype. The global subtype studies reported that the combined and the inattentive types were the most common,<sup>24,25</sup> while two epidemiological studies from Turkey found that the hyperactive type was the most common.<sup>32,33</sup> These differences in the rates of various subtypes may stem from methodological variations as well as cultural discrepancies. More society-based studies are needed to interpret our results with respect to subtype distribution.

One of the most consistent findings in the literature about the gender distribution in ADHD is the higher proportion of males to females.<sup>11,23</sup> While that proportion is 6/1 to 9/1 in the clinical population, it has been reported by epidemiological studies to be as low as 2/1 to 3/1.<sup>44</sup> We found an ADHD male/female ratio of 2.4/1 in the TRNC, which is consistent with the literature.

The study has some limitations. Although the school sampled represents children from the larger population (because it accepts students from the entire country), only one school was sampled. The first stage of screening was made by self-report and half of the questions were not responded to and thus could not be analyzed. Because there were no scales to define clinical impairment in both the TRNC and Turkey, we could not apply the impairment criteria. Strengths of the study are that the sample selection was conducted with the power analysis method and in stage II all students were interviewed clinically. Lack of accuracy in responses to questions is always possible therefore the 'response error' is another limitation of the study.

In conclusion, this is the first study to assess ADHD prevalence and ADHD subtype distribution in school-aged children in the TRNC. Results may help guide future epidemiological studies related to ADHD prevalence in the TRNC and related areas and contribute to the existing literature. Results may also assist planning ADHD management strategies to be implemented in the TRNC. Further studies are needed to better characterize the epidemiology of ADHD in a wider population in the TRNC.

**Authors's contributions:** Ö.H.B.: Recruiting the subjects, literature review, planning the procedures, performing the study, performing psychiatric examination, writing the manuscript; E.D.: Performing the study, performing neurological examination; Ö.Ş.Ü.: Statistical analysis, writing the manuscript.

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