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**original article**

The epidemiology of ADHD in college students

**P. MORTIER, K. DEMYTTENAERE, M.K. NOCK, J.G. GREEN, R.C. KESSLER, R. BRUFFAERTS**

BACKGROUNDLittle is known about epidemiological aspects of attention-deficit/hyperactivity disorder (adhd) in university students.

**PURPOSE** Descriptive-epidemiological study of adhd in first-year students at the ku Leuven, Belgium, measuring prevalence, associated psychiatric symptoms, healthcare utilization and academic impact.

**METHOD** Electronic questionnaire survey based on a cross-sectional weighted research design among all first-year students at ku Leuven (n = 4921, response rate 65.4%). adhd was measured using the adhd Self-Report Scale (asrs-6).

RESULTSDepending on the diagnostic threshold used, the prevalence of adhd was estimated between 1.4 and 8.3% of the entire population of first-year students. Even after adjusting for sociodemographic variables, adhd was associated with several emotional problems including suicide attempt(s) (or = 9.10; Cohens d = 0.53), binge eating (or = 5.87; Cohens d = 0.42) or psychotic

symptoms (or 4.44-4.69; Cohens d = 0.36-0.37). adhd was also associated with a higher odds ratio at an end rate below 50% at the end of the academic year (or = 2.46-3.84; Cohens d =

0,22-0,32). Current use and lifetime use of professional assistance were estimated between 7.6-15.5% and 26.5-41.5%, respectively.

CONCLUSIONadhd is moderately prevalent among first-year university students. Despite a significant impact on psychological and academic functioning, few students seek help.

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TERMS **adhd** , comorbidity, impact, prevalence, student, healthcare utilization

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The global prevalence of attention-deficit/hyperactivity disorder (ADHD) in adulthood is estimated at 3.4% of the total population and is associated with significant psychiatric comorbidity and impairments in functioning (Fayyad et al. 2007). The worldwide increase in the number of students starting higher studies (OECD 2012), including the number of stu- dents with ADHD (Dupaul et al. 2009), means that research on ADHD in university students may be important. Studies in university students found prevalences between 2 and 8% and suggest that ADHD is an important

impact on emotional well-being and academi- cal performance (Green & Rabiner 2012). However, studies to date are limited in number, often use small and non-randomized samples, and are primarily from the United States.

Using an electronic questionnaire survey, we investigated in a large sample of university students at KU Leuven the prevalence of ADHD, of ADHD-associated psychiatric symptoms, the impact of ADHD on academic performance and the use of care for ADHD.

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# METHOD

## Sample

The survey data are part of the *Leuven College Surveys*, which, as part of the *International College Surveys* of the wHO *World Mental Health Surveys* (wMH-ICs), consist of a longitudinal psychiatric-epidemiologi- cal study of all first-year students at KU Leuven between 2012 and 2016. The wMH-ICs is a longitudinal multicenter study of emotional well-being, acade- mical and social functioning of university students worldwide. We report from the Belgian part of the first two inclusion years of this study.

The target population consisted of the entire population of first-year students at KU Leuven in the 2012-2013 and 2013-2014 academic years (n = 10,958). Students who were not yet 18 years old, who did not master the Dutch language and students who did not enroll for the first time were excluded from the study (n = 3431). The initial sample thus consisted of 7527 individuals. A total of 4921 individuals participated in the study between September 2012 (the start of the first inclusion academic year) and June 2014 (the end of the two inclusion academic year) (this corresponded to a response rate of 65.4%).

The inclusion of students occurred in three successive stages: 1. the questionnaire was administered as part of a preventive psychomedical consultation to which all first-year students are invited annually (cen- sus). This contact is organized by the Student Health Center of KU Leuven. The center provides both primary medical care and medical-psychiatric and psychotherapeutic counseling to all KU Leuven students in an accessible manner. 2. Non-respondents were then invited with a personalized e-mail to participate via a personalized electronic link to the questionnaire. 3. Next, non-respondents from the 2nd component were again invited by e-mail; this time personalized e-mails were used, combined with raffle incentives (shopping vouchers). The study received a positive opinion from the competent ethics committee of the University Hospital Leuven and from the Committee for the Protection of Personal Life.

## Measuring instruments

The electronic questionnaire was developed specifically for the *World Mental Health* - *International College Surveys* and took an average of 15.2 minutes to complete. The survey instrument is composed of a multitude of specific

scales and subscales from existing questionnaires and instruments.

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These include gender, age, parental financial situation, parental education level, family composition of ear- jump and sexual orientation.

**ADHD**

The *AdHd Self-Report Scale* (AsRs-6) (Kessler et al. 2005) is a screening instrument for ADHD in adulthood. The instrument consists of 6 items that survey DsM-IV symptoms (4 attention deficit and 2 hyperactivity symptoms) over the past 6 months. The

items are scored on a 5-point scale ranging from "never" (0) to "very often" (4) (total score 0-24/24). Validation studies (Kessler et al. 2005; 2007) found a cutoff score of 14/24 for optimal concordance with a clini- cal ADHD diagnosis according to DsM-IV criteria in adulthood. Consistent with the requirements of a clinically useful screening instrument, this cutoff value detects almost all cases of ADHD (negative predic- tive value or NPw = 96.7%) at the expense of a significant number of false-positive findings (PPw = 49.9%). An alternative cutoff score of 18/24 identifies a group with a minimum of false positives at the expense of more false negatives (Kessler et al. 2007). Accordingly, the cutoff score of 14/24 was considered a *possible AdHd diag- nose* and of 18/24 as a *probable AdHd diagnosis*.

**OTHER PSYCHIATRIC SYMPTOMS**

A total of 25 items were surveyed for 12-month prevalence: 14 items from the *Global Appraisal of Individual Needs Short Screener* (Gss) (Dennis et al. 2006) focused on internalizing symptoms, substance-related disorders and criminal and/or violent behavior, 5 items from the *Self-Injurious Thoughts and Behaviors Interview* (Nock et al. 2007) focusing on self-injurious thoughts and behaviors, 4 items from the *Composite International Diagnostic Interview* (Haro et al. 2006) probing for intermittent explosive disorder, (hypo)mania, hallucinations and delusions, and 2 items from the *Mini International Neuropsychiatric Interview Screen* (Sheehan et al. 1998) focusing on binge eating and self-induced vomiting/purgatory behavior. As a measure of co-occurring psychiatric symptoms, the total number of symptoms was calculated and categorized ranging from 0 to 7 or more symptoms.

**SUBSTANCE USE**

Item 2 of the *National Institute on Drug Abuse modified Alcohol, Smoking and Substance Involvement Screening Test* (wHO AssIsT Working Group, 2002) is a question about the 12-month use of 10 substances, including medication. It did not distinguish between medical and non-medically indicated medication use.

**ACADEMIC ACHIEVEMENTS**

The final result (in percent) of all first-year stu- dents was obtained from the KU Leuven Student Administration Department after the end of the academic year.

**CARE**

Current use and lifetime use of professional help and willingness to seek profes- sional help in the event a serious emotional

problem would arise ('very willing' to 'not at all willing') were surveyed (Ursano et al. 2012). Among the subgroup of students who did not indicate they were "very willing" to seek help, 9 barriers to seeking help (dichotomized to "important or very important" vs. "not, little or moderately important") were surveyed (Kessler et al. 2008).

## Statistical processing

All statistical analyses were performed with *Statistical Analysis Software* (SAS version 9.3). Post-stratification weights based on sociodemographic variables (gender, age, nationality, socio-economic situation and family composition) allowed us to determine estimators corresponding to the composition of all first-year students at KU Leuven. Specifically, this means that the results can be considered representative of all first-year students at KU Leuven.

In addition to sociodemographic characteristics of the sample, in this article we present estimated prevalences of ADHD in absolute numbers (N), weighted proportional distributions (%) and standard errors (sE).

For comparing categorical variables, the chi-square test was used and for comparing scale scores, the unpaired t test was used with two-sided significance testing. As association measures between ADHD and independent variables, age- and sex-adjusted odds ratios with 95% confidence intervals (95%-BI) were calculated with logistic regression analyses.

An odds ratio (OR) is defined as the ratio of the probability (*odds*) that an event (e.g., ADHD) will occur to the probability that this event will not occur. ORs were used instead of relative risk to allow adjustment for covariates (age and sex) and because of the advantage of being independent of the prevalence of the outcome measure, in this case ADHD (Simon 2009).

In calculating associations with independent variables, ADHD was defined by a cutoff value on the AsRs-6 of 14/24 (possible diagnosis of ADHD). This provided the analyses with sufficient statistical power and avoided overestimation of association measures.

# RESULTS

## Sample characteristics

A total of 4921 (65.4%) of the 7527 students participated. About half of the students were women

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(55.2%; sE = 0.7). The majority of students came from an intact family (78.4%; sE = 0.6) and reported parents with a comfortable financial situation (83.2%; sE

= 0,6). The level of education was high for 59.3% (sE = 0.8) with both parents and low for 16.0% (sE = 0.6) with both parents. The proportion of students with a non-heterosexual orientation was 5.3% (sE = 0.5).

## Prevalence of ADHD

Using the AsRs-6, we identified 265 students with a *possible* diagnosis of ADHD, 45 of whom had a *probable* diagnosis. This established the preva- lence of *possible* and *probable* ADHD among first-year

students estimated at 8.3% (sE = 0.5) and 1.4% (sE = 0.2), respectively. *Possible AdHd* was more common among students with older age (OR 1.4-2.2), among students with a difficult parental financial situation (OR 1.5), and with a non-heterosexual orientation (OR 2.0) (**TABLE 1**). There was no difference by gender, parental education level and family composition.

## ADHD-associated psychiatric symp- toms and substance use

**TABLE 2** shows that 22 of the 25 psychiatric symptoms showed a statistically significant positive correlation with *possible AdHd*. The highest ORs were found

**TABLE 1Sociodemographic characteristics of first-year students with ADHD, KU Leuven**

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|  |  |  |  |
| --- | --- | --- | --- |
| Percentage of respondents with ADHD  % (SE)\* | | Occurrence in persons with ADHD  % (SE)\*\* | OR (95%-BI). |
| **Gender** |  |  |  |
| man | 9,4 (0,8) | 50,3 (3,1) | 1,28 (0,99-1,64)\*\*\* |
| woman | 7,4 (0,6) | 49,7 (3,1) | 1,00 |
| **Age ( year)** |  |  |  |
| 20 or more | 14,9 (2,8) | 12,8 (2,4) | **2,23 (1,51-3,30)\*\*\*\*** |
| 19 | 10,0 (1,3) | 20,3 (2,5) | **1,41 (1,03-1,94)\*\*\*\*** |
| 18 | 7,3 (0,5) | 66,9 (3,0) | 1,00 |
| **Financial situation of parents** |  |  |  |
| difficult | 10,8 (1,5) | 23,2 (3,0) | **1,45 (1,05-2,01)** |
| easy | 7,3 (0,5) | 76,8 (3,0) | 1,00 |
| **Education level of parents** |  |  |  |
| both low | 5,8 (1,1) | 12,7 (2,3) | 0,68 (0,44-1,05) |
| mixed | 7,9 (1,0) | 26,1 (3,1) | 0,98 (0,70-1,36) |
| both high | 7,9 (0,7) | 61,3 (3,4) | 1,00 |
| **Family of origin** |  |  |  |
| broken | 9,4 (1,2) | 26,1 (3,1) | 1,21 (0,89-1,65) |
| intact | 7,5 (0,5) | 73,9 (3,1) | 1,00 |
| **Sexual orientation** |  |  |  |
| non-heterosexual | 15,8 (3,6) | 9,5 (2,2) | **2,03 (1,18-3,48)** |
| heterosexual | 8,2 (0,6) | 90,5 (2,2) | 1,00 |

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* The percentage of this sociodemographic group (see row) with ADHD

\*\*the percentage of respondents with ADHD who belonged to the sociodemographic group (see row)

\*\*\*only corrected for age

\*\*\*\* adjusted for gender only

**TABLE 2Psychiatric symptoms during previous 12 months in first-year students with possible ADHD, KU Leuven**

|  |  |  |  |
| --- | --- | --- | --- |
| Percentage of respon- dents with ADHD  % (SE)\* | | Occurrence in persons with ADHD  % (SE) \*\* | OR (95%-BI)\*\*\* |
| **Internalizing symptoms** |  |  |  |
| depressive symptoms | 13,2 (1,0) | 66,1 (3,1) | **2,88 (2,18-3,82)** |
| Sleep problems | 12,9 (1,0) | 68,7 (3,0) | **2,89 (2,17-3,86)** |
| Anxiety symptoms | 13,9 (1,2) | 51,6 (3,3) | **2,55 (1,94-3,35)** |
| post-traumatic stress complaints | 17,0 (1,6) | 42,7 (3,3) | **3,02 (2,29-3,99)** |
| **Self-harming thoughts and/or behaviors** |  |  |  |
| Death Wish | 16,4 (5,8) | 3,0 (1,1) | 2,83 (0,97-5,37) |
| Suicide thoughts | 17 (4,4) | 6,0 (1,7) | **2,42 (1,31-4,46)** |
| Suicide Plan | 29,2 (5,5) | 10,4 (2,2) | **4,49 (2,98-8,37)** |
| Suicide attempt | 45,6 (19) | 1,7 (0,9) | **9,10 (2,27-36,47)** |
| non-suicidal self-harming behavior | 19,4 (4,4) | 6,9 (1,7) | **2,91 (1,63-5,19)** |
| **Alcohol and/or drug use** |  |  |  |
| weekly use or more | 11,9 (0,9) | 73,4 (2,9) | **2,60 (1,93-3,50)** |
| spend a lot of time using and/or repairing | 16,7 (1,7) | 36,6 (3,2) | **2,62 (1,97-3,50)** |
| continued use despite negative consequences | 29,6 (7,4) | 5,4 (1,6) | **4,03 (2,07-7,84)** |
| reduced involvement due to use | 24,9 (3,6) | 17,3 (2,6) | **3,59 (2,45-5,26)** |
| withdrawal symptoms | 31,3 (5,4) | 10,8 (2,1) | **4,84 (2,97-7,87)** |
| **Criminal and/or violent behavior** |  |  |  |
| use physical aggression in conflict | 18,0 (2,9) | 14,6 (2,4) | **2,33 (1,57-3,47)** |
| committing shoplifting | 16,6 (4,4) | 5,1 (1,4) | **2,20 (1,17-4,13)** |
| dealing and/or making illegal substances | 36,8 (12,5) | 2,5 (1) | **5,42 (1,95-15,05)** |
| driving under the influence of alcohol and/or substances | 15,6 (4,9) | 3,8 (1,3) | 1,49 (0,72-3,07) |
| destruction of property | 14,2 (6,7) | 1,8 (0,9) | 1,51 (0,54-4,24) |
| **Other severe psychiatric symptoms** |  |  |  |
| Intermittent symptoms of explosive disorder | 21,3 (3,7) | 12,7 (2,3) | **3,01 (1,95-4,65)** |
| (hypo)manic symptoms | 24,5 (3) | 23,5 (2,9) | **3,84 (2,71-5,42)** |
| binge eating | 29,4 (3,2) | 26,3 (2,9) | **5,87 (4,17-8,28)** |
| self-induced vomiting and/or purging behavior | 33,0 (8,8) | 4,5 (1,4) | **5,79 (2,68-12,51)** |
| hallucinations | 30,3 (6,4) | 7,8 (1,9) | **4,69 (2,63-8,35)** |
| delusions | 30,6 (7,8) | 5,8 (1,8) | **4,44 (2,27-8,69)** |
| **Number of psychiatric symptoms** |  |  |  |
| 1 | - | - | 1,00 |
| 2 | - | - | 1,59 (0,90-2,81) |
| 3 | - | - | **2,40 (1,38-4,16)** |
| 4 | - | - | **3,21 (1,85-5,57)** |
| 5 | - | - | **3,99 (2,25-7,09)** |
| 6 | - | - | **4,60 (2,47-8,57)** |
| 7 or more | - | - | **13,70 (8,10-23,16)** |

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* The percentage of this symptomatic group (see row) with ADHD

\*\*the percentage of respondents with ADHD who belonged to the symptomatic group (see row)

\*\*\*the reference group in each case was the group of respondents without the psychiatric symptom in question. OR were weighted for age and gender. For example, the probability of ADHD was about 2.9 times higher among students with depressive symptoms than among those without these symptoms (adjusted for age and gender).

**TABLE 3M Drug use in past 12 months among first-year students with possible ADHD**

|  |  |  |  |
| --- | --- | --- | --- |
| Percentage of respondents with ADHD  % (SE)\* | | Occurrence in persons with ADHD  % (SE) \*\* | OR (95%-BI). |
| **Alcohol and illegal substances** |  |  |  |
| alcohol | 8,0 (0,5) | 93,5 (1,6) | **1,24 (0,72-2,12)** |
| tobacco | 14,5 (1,4) | 44,9 (3,4) | **2,39 (1,81-3,16)** |
| cannabis | 16,8 (1,7) | 40,1 (3,4) | **2,79 (2,09-3,73)** |
| cocaine | 29,0 (12,6) | 2,1 (1,0) | **3,71 (1,24-11,14)** |
| methamphetamines | 50,5 (16,2) | 2,7 (1,2) | **8,59 (2,71-27,27)** |
| inhalants | 22,9 (7,3) | 3,7 (1,3) | **3,17 (1,45-6,94)** |
| hallucinogens | 25,0 (8,5) | 3,4 (1,3) | **3,15 (1,37-7,26)** |
| street opioids | 0,0 (0,0) | 0,0 (0,0) | / |
| **Medication** |  |  |  |
| sedatives and sleep aids | 30,5 (6,5) | 7,5 (1,8) | **5,07 (2,77-9,25)** |
| prescription stimulants | 42,2 (5,4) | 18 (2,7) | **8,33 (5,37-12,91)** |
| prescription opioids | 30,4 (11,6) | 2,2 (1,0) | **5,32 (1,80-15,68)** |

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for suicide attempt(s) (OR = 9.10; Cohens d = 0.53), eating disorders (OR = 5.79-5.87; Cohens d = 0.42), psychotic symptoms (OR = 4.44-4.69; Cohens d = 0.36-0.37), and withdrawal symptoms due to the use of alcohol and/or drugs (OR = 4.84; Cohens d = 0.38).

**TABLE 3** shows that with the exception of alcohol, all drugs were used at increased rates in ADHD, primarily methamphetamines (OR = 8.59; Cohens d = 0.51), prescription stimulu- lants (OR = 8.33; Cohens d = 0.51), prescription opioids (OR = 5.32; Cohens d = 0.40), sedatives and sleep aids (OR = 5.07; Cohens d = 0.39) and cocaine (OR = 3.71; Cohens d = 0.31).

Impact of ADHD on Academic Functioning Students with *possible AdHd* had a statistically signi- ficant loss (t = 6.120; p < 0.0001) in final outcome of 9.6% (sE = 1.6) and were more likely to have a final percentage below 50% (OR 2.46; 95%-BI 1.73-3.49; Cohens d

= 0,22). For students with *probable AdHd*, it was 11.05% (sE = 3.9; t = 2.830; p = 0.005) and 3.84; 95%-BI 1.48-

9.97; Cohens d = 0.32), respectively.

## Care utilization in ADHD

Among students with *possible AdHd,* 7.6% (sE: 1.9) reported being (or having been) currently and 26.5% (sE = 3.0) ever in treatment for an emotional and/or substance-related problem. Among students with *probable AdHd,* this was higher, 15.5% (sE = 6.6) for current and 41.5% (sE =

8.3) for lifetime care use. There was no difference between the groups with and without ADHD in the willingness to seek help in case of a severe emotional pro- blem (t = 0.641; p = 0.52). The three main reported obstacles to seeking help were *preferring to solve the problems themselves* (52.7%), *doubting the effectiveness of treatment* (45.0%) and *being concerned that people would then treat you differently* (42.8%). The perceived obstacles weighed significantly more heavily in 7 out of 9 perceived obstacles in the group with *possible* ADHD than in a group without ADHD or other psychiatric symptoms during the previous 12 months (**FIGURE 1**).

# DISCUSSION

To our knowledge, this is the first study in Europe to describe descriptive-epidemiological characteristics of ADHD in first-year college students. Our findings:

1. a point prevalence of ADHD of 1.4-8.3%, with the occurrence being higher among students with non-heterosexual orientation and with a difficult parental financial situation;
2. ADHD is associated with a wide range of psychi- atric symptoms;
3. ADHD is associated with decreased academic outcomes;
4. a low percentage of students with ADHD are being treated for this problem.

## Point prevalence

The prevalence of ADHD in adulthood among first-year students at KU Leuven was estimated between 1.4 and 8.3%. In 18-24 year olds from the general population it was 7.7% (De Ridder et al. 2008). Given the accurate measurement method of De Ridder et al. (semistructured interview versus self-reporting) and since the AsRs-6 overestimates with a prevalence of 8% (Kessler et al. 2007), this suggests a lower prevalence of ADHD among students compared to peers. However, this statement is speculative and deserves further stu- die. Consistent with previous studies (Blase et al. 2009), we found that ADHD in college continues to be associated with a negative impact on academic performance, i.e., 2 to 4 times higher odds of achieving a failing final grade. Moreover, the higher prevalence of ADHD among older students may point to ADHD-induced study delays in secondary education.

## Comorbidity

Our findings suggest that ADHD, in addition to having a straightforward impact, affects intellectual performance through severe psychiatric comorbidity. In line with existing research (Graziano et al. 2014; Patros et al. 2013; Steadman & Knouse 2014), ADHD was strongly associated with symptoms associated with impulse disorder, such as suicidal

attempts, binge eating or severe substance-related symptoms. The increased use of illicit methamphetamines and cocaine is troubling, and in addition to the expected higher use of prescription stimulants, the use of other prescription medications (opioids and tranquilizers) had up to 5 times higher odds. To what extent these drugs were used as self-medication (Pereira & van de Wetering 2004) remains an open question; however, it is possible that the relationship was explained by intermediate factors such as behavioral disorders or impulsivity (Rooney et al., 2012).

## Low healthcare utilization

A key finding from our study was that despite a negative impact on academic and psychological functi- ons, care use in ADHD for emotional or mid- portion-related problems was particularly low. Even when we considered only students with *probable* ADHD, only 19% were using professional help at the time of the survey; about 44% had ever done so.

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In turn, these low proportions do seem consistent with existing literature regarding care utilization for ADHD in children/adolescents (12-month care utilization 45-74%; Costello et al. 2014; Cuffe et al. 2009) and adults (12-month care utilization 20%; De Ridder et al. 2008; Tuithof et al. 2014).

**FIGURE 1Self-reported obstacles perceived as "important" or "very important" by the students who did not indicate they were "very willing" to seek help for any serious emotional problem (in order of occurrence among the group with possible ADHD)**

47,6

36,1

29,0

30,3

45,0

42,8

42,1

40,9

46,6

36,6

23,8

34,0

18,9

13,8

32,2

29,4

Prefer to solve problems themselves Doubt treatment effectiveness\*

Concerned people would treat people differently\*

Too embarrassed Prefers to call on family and/or friends Don't know where to seek help\*

Transportation problems\*\* Cost too high\*\*

Fear of damage career\*

20,5

Percent Respondents with ADHD

52,7

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\* p < 0,05

\*\* p < 0,0001

Respondents without ADHD or other psychiatric symptoms in the past 12 months

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Consistent with previous research among students (Eisenberg et al. 2011), preferring to solve problems themselves, preferring to rely on family or friends, and questioning the effectiveness of treatment were significant obstacles in seeking help for all students. It was noteworthy that among students with a *possible* diagnosis of ADHD, shame and stigma seemed to weigh significantly heavily, a finding that has been suggested previously (Canu et al. 2008). Structural and practical problems, such as not knowing where to go, cost or problems with transportation, were also more influential among students with ADHD. This is remarkable given that the university has easily accessible and approachable counseling services. It is possible that this finding is related to decreased executive planning ability, inherent in ADHD itself (Barkley et al. 1990).

## Restrictions

This study had several important limitations. First, no clinical diagnoses of psychiatric disorders were made according to official DsM-IV criteria. This was partly met by the use of screening instruments that were well-validated according to DsM-IV criteria, such as the AsRs-6 and the Gss. It should be noted here that according to the AsRs-6 with a PPw of 49.9%, a large proportion of students would receive a possible diagnosis of ADHD, where on further clinical examination alternative diagnoses could be more likely (e.g., depressive disorder). This may provide an alternative explanation for a positive correlation between a possible diagnosis of ADHD and psychiatric symptoms and/or substance use.

Second, only first-year students were included so the findings are not representative of the entire student population of KU Leuven. Moreover, a negative selection effect for ADHD in the transition from secondary to university education cannot be excluded.

Third, the response rate was 65.4%. Although the data were weighted to reflect the target population - the entire

population of first-year students at KU Leuven - to be represented we cannot rule out the possibility that students with mental disorders or other serious emotional problems were less likely to participate in the study (Eaton et al. 1992) despite the fact that more recent research has suggested that this is not so (de Graaf

et al. 2013).

Fourth, in calculating the measures of association with ADHD, only age and gender were corrected for. As a result, the extent to which psychiatric symptoms and academic achievement have a *direct* association with ADHD cannot be determined with certainty.

# CONCLUSION

ADHD is a disorder in 1 to 8% of first-year students and is significantly associated with poorer psychological and academic functioning. The low level of care utilization by students with ADHD is of concern, with an important task to eliminate stigma and shame and organize professional care services perceived as more accessible. The exact causal relationships between ADHD, ADHD-associated psychological comorbidities, academic performance and health care utilization need to be further explored in prospective research, but it is certain that ADHD is already taking a toll on the future of the ever-growing population of college graduates early in life.

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THE EPIDEMIOLOGY OF ADHD IN UNIVERSITY STUDENTS

**SUMMARY**

The epidemiology of ADHD in first-year university students

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BACKGROUNDLittle is known about the epidemiology of attention-deficit/hyperactivity disorder (adhd) in university students.

**AIMTo** investigate the prevalence of adult adhd and comorbid psychiatric symptoms and their effect on the academic performance of first-year university students, and to find out to what extent these students make use of the mental health services of the university.

**METHODAll** first-year students at the University of Leuven in Belgium were asked to complete a computer- assisted survey with a weighted cross-sectional design (n=4,921, response rate= 65.4%). The adhd of these students was measured with the help of the adhd Self-Report Scale (asrs-6).

RESULTSOn the basis of the threshold used, we found that between 1.4 and 8.3% of the entire population of first-year students met the criteria for adhd. Even after controlling for sociodemographic variables, we found that adhd was associated with a wide range of emotional problems including suicide attempts (or=9.10; Cohen's d=0.53), binge eating (or=5.87; Cohen's d=0.42), or psychotic symptoms (ors 4.44-4.69; Cohen's d=0.36-0.37). Students with adhd were 2.46-3.84 times more likely to have a total grading percentage below 50 at the end of the academic year. Current use and lifetime use of the professional mental health services were estimated in the 7.6-15.5% and 26.5-41.5% range, respectively.

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CONCLUSIONAdult adhd is common among first-year university students and is associated with comorbid psychiatric symptoms and poor academic performance. It is therefore surprising that so few students actually receive treatment for their psychiatric and emotional problems.

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**KEY** WORDSadhd, comorbidity, impact, prevalence, service use, student

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