Mental disorders in Spanish university students: Prevalence, age-of-onset, severe role impairment and mental health treatment.

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Background: The university period carries risk for onset of common mental disorders. Epidemiological knowledge on mental disorders among Spanish university students is limited.

Aims: To estimate lifetime and 12-month prevalence, persistence and age-of-onset of mental disorders among Spanish first-year university students, as well as associated role impairment and mental health treatment use.

Methods: First-year university students (N=2,118; 55.4% female; mean age=18.8 years) from five Spanish universities completed a web-based survey, screening possible DSM–IV mental disorders (major depressive episode (MDE), mania/hypomania, generalized anxiety disorder (GAD), panic disorder (PD), alcohol abuse/dependence (AUD), drug abuse/dependence (DUD), and adult attention-deficit/hyperactivity disorder (ADHD)).

Results: Lifetime and 12-month prevalence of any possible mental disorder was 41.3% (SE=1.08) and 33.0% (SE=0.97), respectively. Lifetime prevalence of AUD was 7.1% (SE=0.51), of DUD was 3.8% (SE=0.32), and of ADHD was 3.0% (SE=0.22). Severe role impairment was reported by 14.3% (SE=0.98) of students with any mental disorder, and 11.8% (SE=0.80) of students with a DSM–IV mental disorder.

Conclusions: The prevalence of mental disorders among Spanish university students is high, and severe role impairment is common among students with mental disorders. Mental health treatment use is low, and interventions targeting mental health among university students are needed.

Abbreviations: AOR, adjusted Odd Ratio; ASRS, Adult ADHD Self-Report Scales; AIC, Akaike’s information criterion; AUD, Alcohol use disorder; AUDIT, Alcohol Use Disorders Identification Test; AUC, Area Under the curve; ADHD, Attention-deficit/hyperactivity disorder; UIB, Balearic Islands University; UPV-EHU, Basque Country University; UCA, Cádiz University; CIDI, Composite International Diagnostic Interview; CI, Confidence interval; DUD, Drug use disorder; GAD, Generalized anxiety disorder; ITC, International Test Commission; MDE, Major depressive episode; UMH, Miguel Hernández University; MI, Multiple Imputation; OR, Odd Ratio; OECD, Organization for economic co-operation and development; PD, Panic disorder; UPF, Pompeu Fabra University; SDS, Sheehan Disability Scale; SE, Standard Error; SD, Standard Deviation; WMH-ICS, World Mental Health International College Student initiative.

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1. Introduction

In the last decades, there has been an increase of young people entering tertiary education across developed countries (OECD, 2018). Entering university is a critical period (Auerbach et al., 2016; Pedrelli et al., 2015) as students face a series of important challenges, such as leaving one's parental home or assuming more responsibilities (Arias-de la Torre et al., 2019). In addition, students enter a new developmental phase, i.e. emerging adulthood, characterized by greater autonomy, changes in social roles, and instability of relationships (Sussman and Arnett, 2014). Emerging adulthood has been described as a peak period for onset of many common mental disorders such as mood, anxiety and substance use disorders (Auerbach et al., 2018b). Prevalence and treatment of mental disorders among university students is therefore an increasing subject of attention (Blanco et al., 2008; Bruffaerts et al., 2018; Eisenberg et al., 2007; Mclaflerty et al., 2017). A recent cross-national study reported that approximately one third of the number of students in public universities of Spain in the year 2014-15, and their distribution in terms of gender, nationality and academic field was similar to that of the overall population of students in public universities of Spain (see Supplementary table 1). Inclusion criteria for eligible students at baseline were: (i) age range from 18 to 24 years old; and (ii) first year students enrolled in a university degree for the first time. The only exclusion criterion was non-acceptance of the informed consent for the study. A total of 16,332 students fulfilled inclusion criteria. Eligibility of registered individuals was validated by the corresponding universities.

The sample was recruited in two stages. In the first stage, all eligible students (i.e., census sampling) were invited to participate. In a second stage, a random subsample of non-respondents to the first stage was contacted offering an economic incentive to complete the survey. In UPV-EHU University, only the first stage was carried out. The recruitment method consisted of personal e-mail invitation letters sent by the university authorities to each of the eligible students, and accompanied by advertising campaigns.

Students were invited to complete the study registration form via the UNIVERSAL website (http://encuesta.estudio-UNIVERSAL.net/), and written informed consent was obtained from all subjects. Students received a personalized link and password to complete the survey via a secure Web platform designed for the study. The data collection platform followed the international recommendations and guidelines for computerized assessment (International Test Commission -ITC-, 2005) (International Test Comission, 2019). At the end of the web-based survey, all respondents received information on how to access local health services. Individuals with positive responses on suicide items received a specific alert with indications to consult a health professional.

The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008. Ethical approval was provided by the Parc de Salut Mar-Clinical Research Ethics Committee (Reference: 2013/5252/I).

2. Methods

2.1. Study design

Data come from the UNIVERSAL project, a multi-center observational cohort study of all students starting their first course in five Spanish universities. UNIVERSAL is part of the World Mental Health International College Student (WMH-ICS) initiative (https://www.hcp.med.harvard.edu/wmh/college_student_survey.php). Information on the rationale and methods of the UNIVERSAL project has been published elsewhere (Blasco et al., 2016).

2.2. Setting and participants

Web-based surveys were administered between October 2014 and October 2015 in a convenience sample of five public universities from different Autonomous Regions of Spain: Balearic Islands (UIB), Basque Country (UPV-EHU), Andalusia (UCA), Valencia (UMH), and Catalonia (UPF). These universities represented around 8% of the total number of students in public universities of Spain in the year 2014-15, and their distribution in terms of gender, nationality and academic field was similar to that of the overall population of students in public universities of Spain (see Supplementary table 1). Inclusion criteria for eligible students at baseline were: (i) age range from 18 to 24 years old; and (ii) first year students enrolled in a university degree for the first time. The only exclusion criterion was non-acceptance of the informed consent for the study. A total of 16,332 students fulfilled inclusion criteria. Eligibility of registered individuals was validated by the corresponding universities.

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2.3. Measures

Sociodemographic and university-related variables

Sociodemographic variables included gender, age, country of birth,
parental education, parental marital status, urbanity, religious background and sexual orientation.

A set of university-related variables was also assessed, i.e. academic field and first-term living location during the university period (parents’ home vs other type of residence). Academic field was classified according to the official Spanish Government of university degrees, in accordance with the International Standard Classification of Education (UNESCO Institute for Statistics, 2011).

Mental disorders

Mental disorders assessed included: mood disorders (i.e., major depressive episode [MDE] and mania/hypomania [Broad mania]), anxiety disorders (i.e., generalized anxiety disorder [GAD] and panic disorder [PD]), substance use disorders (i.e., alcohol abuse or dependence [Alcohol use disorder-AUD] and drug abuse or dependence [Drug use disorder-DUD]), and attention-deficit/hyperactivity disorder [Adult ADHD]. Note that DUD involves either cannabis, cocaine, any other street drug, or a prescription drug either used without a prescription or used more than prescribed to get high, buzzed, or numbed out.

Items for assessing possible mood disorders, anxiety disorders and DUD were based on the Composite International Diagnostic Interview Composite International Diagnostic Interview Screening Scales (CIDI-SC) (Kessler et al., 2013a; Kessler and Üstün, 2004), chosen for their good psychometric properties (Kessler et al., 2013b), which also showed overall good concordance with blinded clinical diagnoses in the area under the curve (AUC) range of 0.6-0.9 (Ballester et al., 2019). Possible alcohol abuse or dependence was screened using the Alcohol Use Disorders Identification Test (AUDIT) showing concordance with clinical diagnosis in the range AUC = 0.78-0.91 (Saunders et al., 1993). Adult ADHD was assessed using the Adult ADHD Self-Report Scales (ASRS) with items referring to the previous 6 months, which version was found to have strong concordance with clinical diagnoses (AUC 0.90) (Kessler et al., 2005). Additional items assessed age-of-onset of each disorder as well as the number of lifetime years with symptoms.

Impairment

To assess 12-month role impairment, an adapted version of the Sheehan Disability Scale (SDS) was used (Leon et al., 1997). This scale is composed of four role domains: home management (cleaning, shopping and working around the house), college-related and other work (ability to work as well as most of other people), close personal relationships (ability to initiate and maintain close personal relationships), and social life (without further specification). A visual analogue scale (0-10) was used to rate the degree of impairment for each domains, labeled as no interference (0), mild (1–3), moderate (4–6), severe (7–9), and very severe (10) interference. Severe self-reported role impairment was defined as having a 7-10 rating. Validation studies on the Spanish version showed good internal reliability with Cronbach’s

![Flow diagram of the study sample. The UNIVERSAL (University and Mental Health) project.](image-url)
alpha ranging from 0.72 to 0.89 and supported the discriminatory va-

liability between healthy participants and patients (Bobes et al., 1999; 
Luciano et al., 2010).

Mental health treatment

Items adapted from the CIDI services section assessed mental health
treatment receipt. Students were asked whether they ever received
psychological counselling or medication for an emotional or substance
problem as well as the age of the first time and the last time they re-
tained treatment (Kessler and Üstün, 2004). Twelve-month treatment
was defined as being currently in treatment or by having a difference of
≤ 1 between current age and age at the last time receiving treatment.

2.4. Analyses

The proportion of missing values on each of the variables ranged
from 0.09% to 4.96%. Item-level missing data among respondents were
imputed using multiple imputation (MI) by chained equations
(van Buuren, 2012) with m = 43 imputed datasets, equivalent to the
percentage of incomplete subjects (White et al., 2011), and with 10
iterations per imputation. Pooled MI-based parameter estimates, stan-
dard errors (SE) and statistical inference were obtained from the
weighted analysis of these MI datasets. Inverse-probability weighting
was applied to hard-to-reach respondents that were randomly selected
and offered a monetary incentive to participate (endgame strategy
weights). Post stratification weighting was applied to restore the dis-
tribution of the population regarding sex, age, country of birth, and
academic field within each university, as well as population distribu-
tions across universities (results available upon request). Analyses were
performed using SAS v9.4 (SAS Institute Inc., 2014) and RStudio

Lifetime and 12-month prevalence of possible mental disorders and
comorbidity were estimated. F-tests for independence based on MI ex-
amed gender differences in prevalence rates. Persistence was esti-
ated as 12-month prevalence among lifetime cases. Estimates of age-
of-onset were reported as median values with associated interquartile
ranges.

Bivariate analyses were performed to examine the associations be-
tween sociodemographic/university characteristics and 12-month pos-
sible mental disorders and to explore the relationships between 12-
month possible mental disorders and severe role impairment and
mental health treatment. Crude odds ratios (ORs) were estimated and
MI-based confidence intervals (CIs) were calculated at the 95% level.
Statistical significance level α was set at the 5% level, after adjustment
for multiple comparisons using the Benjamini–Hochberg procedure
(Benjamini et al., 2001) with a false discovery rate of 5%.

Finally, multiple logistic regression models were performed. Regression
coefficients and their MI-based standard errors were ex-
ponentiated to generate adjusted ORs and associated 95% CIs. To assess the
association of 12-month possible mental disorders and severe role
impairment and mental health treatment, a series of five models were
developed to evaluate the joint effect of multiple mental disorders.
Model 1 was composed for separate dummy variables for each of the
seven types of mental disorders in the assumption that the joint effect of
the multiple disorders is the product of the corresponding disorders’
odds ratios. Model 2 (included of one continuous variable indicating
number of disorders) and Model 3 (included a series of dummy vari-
ables indicating categorical number of disorders) implicitly assume that
the specific disorder is unimportant once number of disorders is known.
In addition, Model 3 allowed for interactions in the sense that the
coefficients associated with having exactly n disorders can be sig-
nificantly different form the product associated with having one dis-
order. Model 4 (included the type of mental disorders and continuous
number -different than 1- of mental disorders) and Model 5 (included
the type of mental disorders and categorical number –different than 1-
of mental disorders) allowed for both differences for the effects of dif-
ferent disorders and their interactions. Models were adjusted by

sociodemographic and university variables: age, sex, university, aca-
demic field, country, parent’s studies, and current living situation.
Models that explored the association between 12-month possible mental
disorders and mental health treatment were also adjusted for
impairment. Statistical significance was evaluated with two-sided F
tests based on multiple imputations and a level of significance of 0.05.
The area under the curve (AUC) and the Akaike’s information criter-
ion (AIC) were calculated to select the best model.

3. Results

3.1. Participants

Of the total of 16,332 students that fulfilled inclusion criteria, 2,862
students registered in the study. Among them, 2,674 were validated
participants (the eligibility of the registered students was validated by
the corresponding universities). A total of 2,395 students initiated the
survey, of which 2,118 completed the survey and were included in this
study (see flow diagram in Figure 1). The overall weighted response
rate was 19%, ranging from 9% (Basque Country University) to 44% (Pompeu Fabra University). We found somewhat unbalanced distribu-
tions of the sample with respect to available census information, with
higher proportions in the UNIVERSAL sample of females (72.5% vs.
55.2%), foreign students (5.3% vs. 3.2%), and health sciences students
(25.6% vs. 15.8%). Post-stratification weights restored population dis-
tributions on all these variables and have been accounted different re-
ponse rates at each university weights proportionally to its population
of eligible students.

Table 1 summarizes the weighted characteristics of the UNIVERSAL
study, overall and by gender. Mean age was 18.8 years (SD = 1.4) and
55.4% were female. More than half (57.3%) had parents without uni-

versity studies, 13.8% had separated or divorced parents and 66.1% were raised in a city. Over half of students reported no religious af-

iliation (58.0%) and 89.3% self-identified as heterosexual. Basque Country University represented 43.9% of the students and almost 48% of
the students from the participating universities were in the Social and
Legal Sciences academic field. More than half of the students were
living at parents’ home (56.2%).

3.2. Prevalence and age-of-onset of mental disorders

Lifetime prevalence of possible mental disorders is presented in
Table 2. The highest prevalence rates were found for MDE (23.1%) and
GAD (19.3%). Females were significantly more likely to experience
mood and anxiety disorders than males, while the latter had sig-
nificantly higher rates of any substance use disorders. Twelve-month
prevalence estimates were also highest for MDE (18.9%) and GAD
(16.0%). Persistence of possible mental disorders was in the range
80.5–95.2%, except for DUD (41.0%). Overall, 11.0% of students ex-
perienced two disorders and 5.6%, three or more disorders, in the 12-
months previous to the assessment.

Supplementary table 2 shows the median age-of-onset of each
possible mental disorder. Median age-of-onset was 14 for Adult ADHD;
15 for MDE, broad mania and AUD; and 16 for GAD, PD and DUD.

3.3. Severe role impairment

A total of 29.2% of the sample with any 12-month mental disorder
reported any severe role impairment versus 10.2% for those without
mental disorder. As shown in Table 3, severe role impairment was
common among students who screened positive for 12-month mental
disorders, particularly for PD (61.7%) and 12-month broad mania
(45.8%), and increased substantially with increasing comorbidity of
disorders, up to 52.8% when students reported three or more disorders.
All disorders except DUD were significantly associated with severe
role impairment in bivariate models, with odds ratios ranging from 1.6

607
to 8.4 (Detailed results are shown in the Supplementary Table 3).

Table 3 also shows the results of the logistic regression models predicting any severe impairment, adjusting for all sociodemographic and university predictors. In Model 1, MDE, GAD, PD, and AUD were significantly associated with severe role impairment (median OR = 1.8), especially PD (OR = 4.0; 95% CI = 1.9-8.5). Model 2 included only the number of disorders (as a continuous variable), showing an increase in odds for severe role impairment with a factor of 2.0 (95% CI = 1.8-2.2) for each additional mental disorder. Model 3 included number of disorders as a categorical variable with ORs ranging from 2.1 (for exactly one disorder) to 9.0 (for three or more disorders), following approximately a linear pattern in the logit.

Models 4 and 5 show the association of possible mental disorders with severe role impairment taking into account the number of disorders (as a continuous count in Model 4 and as a categorical variable in Model 5). In both models, the ORs for individual disorders are only slightly higher than the first model. This is in line with the ORs for the number of mental disorders in model 5 being smaller than one (0.8), suggesting a slight subadditive effect of the individual disorders on impairment, although this effect was not statistically significant.

Although AUCs were similar, ranging from 0.735 to 0.736, according to Akaike’s information, the best-fitting regression model for 12-month impairment was Model 1 (including type of mental disorder).

3.4. Mental health treatment

In this study, 12.6% of students with possible mental disorder and 2.3% of those without mental disorder reported receiving treatment in the past year, respectively. As shown in Table 4, the receipt of mental health treatment was highest among participants with 12-month anxiety disorders (35.3% for PD and 20.1% for GAD) and increased with increasing comorbidity up to 18.0-19.0% when students reported two or more disorders.

In bivariate models (Supplementary Table 4), all past year mental disorders were associated with receiving treatment, except AUD. Specifically, PD (OR = 9.6; 95% CI = 4.8-18.9) and GAD (OR = 7.4; 95% CI = 5.0-10.7) yielded the highest odds for treatment. Also, bivariate models show a gradient between the number of possible mental disorders and receiving treatment.

The multiple model, including both type and number of mental disorders, was selected as the best-fitting regression model to estimate factors associated with 12-month treatment (AIC = 798.0; AUC = 0.805) (Table 4). The ORs for individual disorders are higher than the first model when number of disorders is included in the model, in line with the OR for number of mental disorders being significantly smaller than 1. This model shows that possible mental disorders are associated with an increase to receive mental health treatment. Also, the model shows a gradient suggesting a subadditive effect in the logit between number of disorders and receiving mental health treatment. The series of multiple logistic regression models are shown in Supplementary Table 5.

Analyses of the association of 12-month mental disorders and sociodemographic and university variables are presented in Supplementary Table 6 and Supplementary Table 7. Female gender and having parents with low educational attainment emerged as significant positive correlates of 12-month mood, anxiety and substance disorders. Living at first term in other house than parent’s home showed a positive correlation with any substance disorders. Reporting non-heterosexual orientation showed a positive correlation with two or more mental disorders. AUCs of the models ranged from 0.597 to 0.636.

4. Discussion

4.1. Main findings

The current study is the first in Spain that provides an overview of mental disorders, their associations with impairment, and the use of mental health treatment among Spanish university students. The study confirms and extends evidence on the high prevalence and persistence of both lifetime and 12-month mental disorders in this population. Nearly 20% of students reported two or more diagnoses. The median age-of-onset ranged from 15.5 to 17.5. Notably, results indicated that possible mental disorders are associated with severe role impairment (29.2%), while only under a fifth of university students with a mental disorder received treatment in the last 12 months.

Almost 42% of university students screened positive for at least one lifetime possible mental disorder, with MDE and GAD disorders being the most prevalent. These findings were slightly lower to previous study in Spain which found high levels of depression and anxiety (55.6% and 47.1%, respectively) in university students (Balanza et al., 2009). On the other hand, prevalence estimates were slightly higher to the results found in a cross-national study (overall prevalence: 35.3% lifetime, 31.4% 12-months) (Blanco et al., 2008). Gender differences in prevalence of mental disorders were found in our study. In concordance
Table 2
Lifetime and 12-month prevalence, and persistence of mental disorders by gender in the UNIVERSAL study (n = 2,118)

<table>
<thead>
<tr>
<th>Mental disorders</th>
<th>Lifetime prevalence</th>
<th>12-month prevalence</th>
<th>Persistence&lt;sup&gt;f&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total (SE)</td>
<td>Male (SE)</td>
<td>Female (SE)</td>
</tr>
<tr>
<td>Major depressive episode</td>
<td>23.1 (0.92)</td>
<td>17.2 (1.23)</td>
<td>27.9 (1.31)</td>
</tr>
<tr>
<td>Broad mania</td>
<td>3.4 (0.42)</td>
<td>2.5 (0.51)</td>
<td>4.2 (0.63)</td>
</tr>
<tr>
<td>Any mood disorder&lt;sup&gt;a&lt;/sup&gt;</td>
<td>24.5 (0.94)</td>
<td>18.2 (1.26)</td>
<td>29.6 (1.34)</td>
</tr>
<tr>
<td>Generalized anxiety disorder</td>
<td>19.3 (0.86)</td>
<td>11.7 (1.05)</td>
<td>25.3 (1.27)</td>
</tr>
<tr>
<td>Panic Disorder</td>
<td>2.5 (0.35)</td>
<td>1.7 (0.43)</td>
<td>3.1 (0.52)</td>
</tr>
<tr>
<td>Any anxiety disorder&lt;sup&gt;b&lt;/sup&gt;</td>
<td>20.1 (0.88)</td>
<td>12.9 (1.10)</td>
<td>26.0 (1.29)</td>
</tr>
<tr>
<td>Alcohol abuse or dependence</td>
<td>7.0 (0.56)</td>
<td>9.7 (0.97)</td>
<td>4.8 (0.63)</td>
</tr>
<tr>
<td>Drug abuse or dependence</td>
<td>5.3 (0.3)</td>
<td>7.1 (0.86)</td>
<td>3.8 (0.57)</td>
</tr>
<tr>
<td>Any substance use disorder&lt;sup&gt;c&lt;/sup&gt;</td>
<td>11.1 (0.69)</td>
<td>15.1 (1.18)</td>
<td>7.8 (0.79)</td>
</tr>
<tr>
<td>Attention deficit hyperactivity disorder&lt;sup&gt;d&lt;/sup&gt;</td>
<td>11.2 (0.68)</td>
<td>9.6 (0.96)</td>
<td>12.5 (0.97)</td>
</tr>
<tr>
<td>Any mental disorder&lt;sup&gt;e&lt;/sup&gt;</td>
<td>41.3 (1.08)</td>
<td>35.1 (1.57)</td>
<td>46.3 (1.47)</td>
</tr>
</tbody>
</table>

| Number of disorders                  |                     |                     |                       |                     |                     |                     |                       |                     |                     |                     |                     |
| One disorder                         | 21.3 (0.9)          | 19.6 (1.31)         | 22.7 (1.24)            | 11.0 (3,176409)<sup>**</sup> | 19.1 (0.87)         | 16.3 (1.23)         | 21.3 (1.21)            | 11.5 (3,98476)<sup>**</sup> | 46.2 (2.28)         | 46.6 (3.97)         | 46.0 (2.78)            | 2.7 (3,11019)      |
| Two disorders                        | 11.7 (0.71)         | 8.3 (0.91)          | 14.6 (1.04)            |                       | 11.0 (0.69)         | 8.0 (0.89)          | 13.4 (1.01)            |                       | 26.6 (2.01)         | 22.7 (3.31)         | 28.9 (2.53)            |                       |
| Three or more disorders              | 8.2 (0.6)           | 7.2 (0.85)          | 9.0 (0.84)             |                       | 5.6 (0.51)          | 4.7 (0.69)          | 4.6 (0.73)             |                       | 13.6 (1.56)         | 13.3 (2.68)         | 13.8 (1.93)            |                       |

<sup>a</sup>-Any mood disorder: Major depressive episode or Broad mania; <sup>b</sup>-Any anxiety disorder: Generalized anxiety disorder or Panic Disorder; <sup>c</sup>- Any substance use disorder: Alcohol abuse or dependence or Drug abuse or dependence; <sup>d</sup>-Attention deficit hyperactivity disorder (ADHD) only surveyed at last 6 months prevalence; <sup>e</sup>- Any mental disorder: Any mental disorder for the lifetime prevalence and 12-month prevalence, with the exception of ADHD with a prevalence of 6-month; <sup>f</sup>- Persistence defined as 12-month prevalence among lifetime cases; <sup>g</sup>-F-test to evaluate significant difference in estimates based on multiple imputations. ndf = numerator degrees of freedom; ddf = denominator degrees of freedom. Raw p-value statistically significant after adjustment for multiple comparisons using Benjamini-Hochberg procedure with false discovery rate 0.05. *p-value < .05; **p-value < .01.

%: weighted proportions; SE: Standard error.
Table 3
12-month mental disorders as predictors for 12-month of any severe role impairment (Sheehan Disability Scale) in the UNIVERSAL study (n=2,118)

<table>
<thead>
<tr>
<th>Mental disorders</th>
<th>Any severe role impairment</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>SE</td>
<td>aOR (95% CI) F (ndf, ddf)</td>
<td>aOR (95% CI) F (ndf, ddf)</td>
<td>aOR (95% CI) F (ndf, ddf)</td>
<td>aOR (95% CI) F (ndf, ddf)</td>
</tr>
<tr>
<td>Major depressive episode</td>
<td>38.0</td>
<td>2.44</td>
<td>2.4 (1.8-3.3) 325.5 (1,397744)**</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Broad mania</td>
<td>45.8</td>
<td>6.5</td>
<td>1.8 (1.0-3.4) 3.8 (1,6130)</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Generalized anxiety disorder</td>
<td>38.2</td>
<td>2.65</td>
<td>2.3 (1.6-3.2) 247.1 (1,101327)**</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Panic Disorder</td>
<td>61.7</td>
<td>7.9</td>
<td>4.0 (1.9-8.5) 12.6 (1,3077)**</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Alcohol abuse or dependence</td>
<td>25.4</td>
<td>3.67</td>
<td>1.8 (1.1-2.8) 5.6 (1,271176)**</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Drug abuse or dependence</td>
<td>26.9</td>
<td>6.67</td>
<td>0.8 (0.3-1.8) 0.4 (1,11830)</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Attention deficit hyperactivity disorder</td>
<td>31.2</td>
<td>3.02</td>
<td>1.3 (0-9-1.9) 2.1 (1,260028)</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Number of disorders (continuous)</td>
<td>–</td>
<td>–</td>
<td>2.0 (1-8-2.2) 134.2 (1, 152112)**</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Number of disorders (categorical)</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>One disorder</td>
<td>19.7</td>
<td>2.01</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Two disorders</td>
<td>33.6</td>
<td>3.13</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Three or more disorders</td>
<td>52.8</td>
<td>4.63</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>AUC</td>
<td>0.735</td>
<td>1729.4</td>
<td>0.736</td>
<td>1737.1</td>
<td>0.736</td>
<td>1748.0</td>
</tr>
<tr>
<td>AIC</td>
<td>604.6</td>
<td>613</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a.-F-test to evaluate significant difference in estimates based on multiple imputations. ndf = numerator degrees of freedom; ddf = denominator degrees of freedom.
*p-value < .05; **p-value < .01.
All models are adjusted for the predictors shown in the rows, socio-demographic (gender, age, parental educational level, parental marital status, religion, place raised, and sexual orientation) and university predictors (university, academic field and first-term living location during the university period).
%: weighted proportions; SE: Standard error; aOR: odds ratio adjusted; CI: confidence interval; AUC: Area under the curve; AIC: Akaike information criterion.
Hunt and Eisenberg, 2010; Verger et al., 2010). According to a recent sample (Barrera and Norton, 2009; Lochner et al., 2003). Another interesting finding is that 31.2% of Adult ADHD cases reported impair-

### Table 4
12-month mental disorders as predictors for 12-month treatment in the UNIVERSAL study (n=2,118)

<table>
<thead>
<tr>
<th>Mental disorders</th>
<th>Any treatment</th>
<th>Multiple model</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>SE</td>
</tr>
<tr>
<td>Major depressive episode</td>
<td>16</td>
<td>1.83</td>
</tr>
<tr>
<td>Broad mania</td>
<td>16.1</td>
<td>4.69</td>
</tr>
<tr>
<td>Generalized anxiety disorder</td>
<td>20.1</td>
<td>2.2</td>
</tr>
<tr>
<td>Panic Disorder</td>
<td>35.3</td>
<td>7.6</td>
</tr>
<tr>
<td>Alcohol abuse or dependence</td>
<td>7.6</td>
<td>2.35</td>
</tr>
<tr>
<td>Drug abuse or dependence</td>
<td>10.7</td>
<td>4.62</td>
</tr>
<tr>
<td>Attention deficit hyperactivity disorder</td>
<td>10.3</td>
<td>1.97</td>
</tr>
</tbody>
</table>

Number of disorders (continuous)

<table>
<thead>
<tr>
<th>Number of disorders</th>
<th>Any treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>One disorder</td>
<td>7.6</td>
</tr>
<tr>
<td>Two disorders</td>
<td>19.0</td>
</tr>
<tr>
<td>Three or more disorders</td>
<td>18.0</td>
</tr>
</tbody>
</table>

Number of disorders (categorical)

<table>
<thead>
<tr>
<th>Number of disorders</th>
<th>AUC</th>
<th>AIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>One disorder</td>
<td>0.805</td>
<td></td>
</tr>
<tr>
<td>Two disorders</td>
<td>798.0</td>
<td></td>
</tr>
</tbody>
</table>

a.- F-test to evaluate significant difference in estimates based on multiple imputations. ndf = numerator degrees of freedom; ddf = denominator degrees of freedom.

*p-value < .05; **p-value < .01. All models are adjusted for the predictors shown in the rows, socio-demographic (gender, age, parental educational level, parental marital status, religion, place raised, and sexual orientation), university predictors (university, academic field and first-term living location during the university period) and impairment.

%: weighted proportions; SE: Standard error; aOR: odds ratio adjusted; CI: confidence interval; AUC: Area under the curve; AIC: Akaike information criterion

with previously studies (Auerbach et al., 2018b; McLafferty et al., 2017; Vázquez et al., 2011), females had higher prevalence of mood and anxiety disorders and males had higher prevalence of substance use disorders. Persistence was roughly 80% for almost all possible mental disorders, which was higher than persistence found in a previous Spanish study among university students (42.2%) (Vázquez et al., 2011). The age-of-onset found in our study was between 14 and 19 ages, a younger age to those reported for the general population (anxiety disorders:25–53, mood disorders: 25–45, and substance disorders:18–29) (Kessler et al., 2007). Such differences should be interpreted cautiously as they could be influenced by the restricted age range of our sample (18-24 years) (de Girolamo et al., 2012).

Findings show that about 20% of students with one possible mental disorder report severe role impairment, which is lower than the rates of 25-30% described in previous studies (Alonso et al., 2018; Klemm-Ketis et al., 2011; Verger et al., 2010). The disorder most strongly associated with severe role impairment in our study was PD, although PD showed low prevalence estimates both lifetime and 12-month. This high prevalence of PD is associated with severe role impairment in our study, showing statistically significant association in the bivariate analyses (OR=2.5; CI95%=1.9-3.4). It is likely that these results are associated with receiving treatment. It might be possible that university students were receiving treatment for another emotional problem, as reported in previous studies (Bruffaerts et al., 2019; Hunt and Eisenberg, 2010). Finally, we observed subadditive effects of multiple disorders associated with mental health treatment, suggesting that the comorbidity of possible mental disorders does not imply a greater perceived need for treatment than it could expect for each disorder (Bruffaerts et al., 2019).

This study identified a number of sociodemographic and university-related variables that are associated with 12-month mental disorders, which have been reported in previous studies (Auerbach et al., 2018b; Balanza et al., 2009; Wicki et al., 2010). Having parents with low educational level was a significant correlate of 12-month mental disorders. These results would be in agreement with previous findings of more prevalent among students from low-income families (Eisenberg et al., 2013; Said et al., 2013; Vázquez et al., 2011). In our study, living outside the parents’ house was found to be associated with substance disorder, which could be partially explained by lower parental control (Caamaño-Isorna et al., 2008; Wicki et al., 2010). The association between non-heterosexual orientation and mental disorders that we found is in agreement with previous reports (Auerbach et al., 2018b; Kisch et al., 2005; Said et al., 2013), and might be attributed in part to the additional stress that non-heterosexual people experience (Oswalt and Wyatt, 2011; Przedworski et al., 2015).

4.2. Limitations

Our findings should be considered in light of several limitations. The first set of limitations could limit the generalizability of results. A convenience sample of universities was used; however, the basic sociodemographic characteristics of the students in the participating universities were very similar to all Spanish universities (results available upon request). Also, the fact that the sample included only first-year university students could affect the generalizability of the results to the larger community of university students. Low response rates may have caused non-response bias, including incomplete coverage of the target population (Brick, 2013) that affects the generalizability of our results. But this possible bias was minimized by combining population-based adjustments through post stratification with a specific end-game strategy, a combination that resulted in the use of inverse-probability weights in the analyses to restore population representativeness.
Another limitation is the fact that monetary incentives were offered in our sample. It has been reported that monetary incentives may encourage the participation of individuals who would not otherwise be motivated to respond, thus improving the representativeness of the sample (Singer and Ye, 2013). Nevertheless, we cannot rule out that such incentive could be a possible source of bias (Moyer and Brown, 2008). The assessment of mental disorders was based on self-reports, not in-depth clinical interviews, which may have diminished the validity of the diagnoses. However, a clinical reappraisal was carried out showing good concordance with blinded clinical diagnoses using the Mini-International Neuropsychiatric Interview (Ballester et al., 2019). The adapted version of the SDS used in our study did not differentiate the physical or mental health conditions that caused the impairment but, according to an earlier study (Ormel et al., 2008), only a small sample reported an impairment of the SDS due to physical conditions. Finally, our data are cross-sectional which prevents interpreting associations presented as causal.

4.3. Implications

Despite these limitations, the current study provides relevant information on the high prevalence of mental disorders among Spanish university students and their association with impairment. In addition, this study provides evidence of the low mental health treatment rates. Results suggest the need for conducting a longitudinal monitoring of common mental disorders among university students. This information could allow early identification of those who might benefit from health services. Such monitoring might provide the bases for implementing effective prevention interventions among first-year students (Ebert et al., 2017) to improve mental health during their university years and beyond, as well as, allowing an improvement of mental health services offered.

5. Data availability statement

The data that support the findings of this study are available from the corresponding author, J.A., upon reasonable request.

6. Author contributions

Jordi Alonso had full access to all of the data in this study and takes responsibility for the integrity of the data, and the accuracy of the data analysis.

**Study concept and design:** Ballester, L., Alayo, I., Vilagut, G., and Alonso, J.


**Statistical analysis and interpretation of data:** Ballester, L., Vilagut, G., Alayo, I., Alonso, J.

**Draft of the manuscript:** Ballester, L.

**Critical revision of the manuscript for important intellectual content:** Vilagut, G., Alayo, I., Almenara, J., Blasco, M.J., Cebrià, A.I., Echeburúa, E., Gabilondo, A., Gili, M., Lagares, C., Piqueras, J.A., Roca, M., Bruffaerts, R., Mortier, P., Auerbach, R.P., Nock, M.K., Kessler, R.C., and Alonso, J.

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**Conflict of interest**

In the past 3 years, Dr. Kessler received support for his epidemiological studies from Sanofi Aventis; was a consultant for Johnson & Johnson Wellness and Prevention, Shire, Takeda; and served on an advisory board for the Johnson & Johnson Services Inc. Lake Nona Life Project. Kessler is a co-owner of DataStat, Inc., a market research firm that carries out healthcare research. Dr. Roca received research funds from Lundbeck and Janssen.

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**Supplementary materials**


**References**


