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

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ABSTRACT

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)). Role impairment and treatment associated with mental disorders were assessed.
Results: Lifetime and 12-month prevalence of any possible mental disorder was 41.3%(SE = 1.08) and

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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35.7%(SE = 1.05), respectively. Persistence (i.e., ratio of 12-month to lifetime prevalence) was 86.4%(SE = 1.58). Median age-of-onset was 14 for adult ADHD, 15 for mood disorders and AUD, and 16 for anxiety disorders and DUD. One third (29.2%) of 12-month disorders were associated with role impairment. Twelve-month PD (OR = 4.0;95%CI = 1.9-8.5) had the highest odds for role impairment. Only 12.6% of students with 12-month disorder received any mental health treatment. Twelve-month treatment was the highest among those students with 12-month GAD (OR = 7.4;95%CI = 3.7-14.8).

Limitations: The assessment of mental disorders was based on self-reports. Cross-sectional nature of the data prevents causal associations.

Conclusion: One third of Spanish university students report a common mental disorder in the past year, and one third of those report severe role impairment. Only one out of eight students with 12-month mental disorders receives mental health treatment.

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; McLafferty et al., 2017). A recent cross-national study reported that approximately one third of first-year students screened positive for one or more common mental disorders (Auerbach et al., 2018b). In addition, comorbid mental disorders have been found to be common in this population (Auerbach et al., 2018a).

The occurrence of mental disorders during the university period is associated with considerable impairment of psychosocial functioning and reduced educational achievement (Alonso et al., 2018). Despite the high prevalence of mental disorders among university students, various studies indicate that many of them do not receive treatment, showing rates of mental health treatment use in the range 18-36% (Blanco et al., 2008; Eisenberg et al., 2011; Verger et al., 2010). To our knowledge, there have been no epidemiological studies carried out in Spain to provide a broad epidemiological picture of common mental disorders in university students. While previous studies provided valuable information on mental health among Spanish university students, they were carried out on limited samples (e.g. only female students or in a single university) (Balanza et al., 2009; Vázquez et al., 2011) or they evaluated a limited range of mental health problems (Arias-de la Torre et al., 2019; Caamaño-Isorna et al., 2008; Moure-Rodríguez et al., 2014; Vázquez and Blanco, 2008). In addition, these studies did not report on mental health related role impairment and use of services.

The objectives of the current study were to: i) estimate lifetime and 12-month prevalence, persistence and levels of comorbidity of common mental disorders in first year university students; ii) estimate age-of-onset of mental disorders; and iii) test the association of mental disorders and role impairment and the receipt of mental health treatment.

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), Valencian (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.

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).

2.3. 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

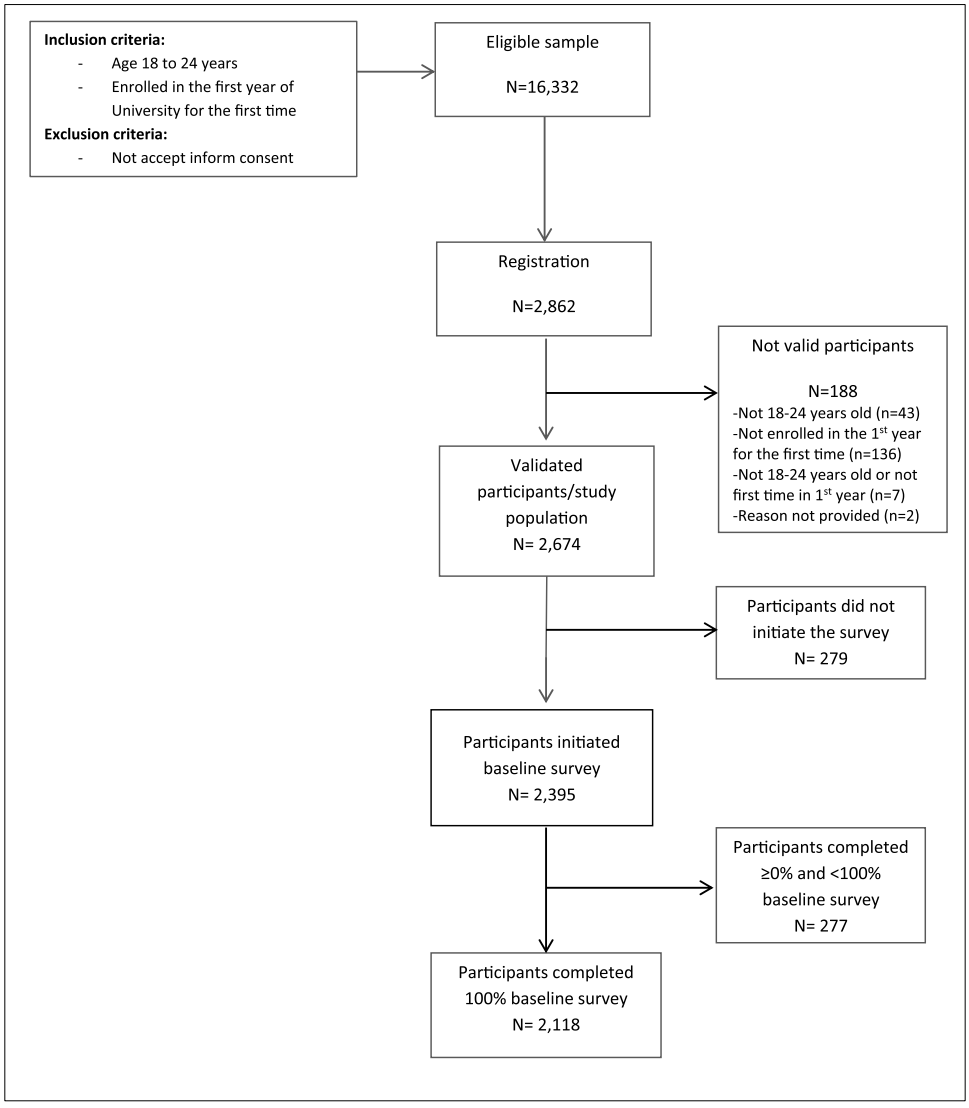

Figure 1. Flow diagram of the study sample. The UNIVERSAL (University and Mental Health) project.

alpha ranging from 0.72 to 0.89 and supported the discriminatory validity 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 received 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, standard 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 distribution of the population regarding sex, age, country of birth, and academic field within each university, as well as population distributions across universities (results available upon request). Analyses were performed using SAS v9.4 (SAS Institute Inc., 2014) and RStudio v1.1.383 (RStudio Inc., 2017).

Lifetime and 12-month prevalence of possible mental disorders and comorbidity were estimated. F-tests for independence based on MI examined gender differences in prevalence rates. Persistence was estimated 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 between sociodemographic/university characteristics and 12-month possible 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 exponentiated 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 1was 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 variables 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 significantly different form the product associated with having one disorder. 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 different disorders and their interactions. Models were adjusted by sociodemographic and university variables: age, sex, university, academic 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 criterion (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 distributions 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 distributions on all these variables and have been accounted different response 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 university studies, 13.8% had separated or divorced parents and 66.1% were raised in a city. Over half of students reported no religious affiliation (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 significantly 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 experienced 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

Table 1
Description of the students included in the analysis (absolute numbers and weighted proportions)

	Total Sample (n = 2,118)		Male (n = 582)		Female (n = 1,536)	
	n	%	n	%	n	%
Socio-demographics						
Age						
18	1506	62.1	387	59.6	1119	64.1
>18	612	37.9	195	40.4	417	35.9
Country of birth						
Spain	2005	97.1	551	97.3	1454	97
Other	113	2.9	31	2.7	82	3
Parents University Studies						
At least one	952	42.7	273	44.5	678	41.4
Neither	1166	57.3	309	55.5	858	58.6
Parents separated or divorced						
Yes	369	13.8	82	10.9	287	16.2
No	1749	86.2	500	89.1	1249	83.8
Religion						
Christian	766	40.2	192	38.6	574	41.5
No religion	1306	58.0	377	59.5	929	56.8
Another religion	46	1.8	13	1.8	33	1.7
Place raised						
Large city/Small city	1373	66.1	404	68.7	969	64
Suburbs	99	5.2	26	4.5	73	5.9
Town/village/ rural area	645	28.7	152	26.8	493	30.2
Sexual orientation						
Heterosexual	1882	89.3	497	87.9	1385	90.4
Non-heterosexual	236	10.7	85	12.1	151	9.6
University socio-demographics						
University						
Balearic Islands University (UIB)	300	12.3	62	11.5	238	13
Basque Country University (UPV-EHU)	642	43.9	188	45.9	454	42.2
Cadiz University (UCA)	299	19.7	89	19.2	210	20
Miguel Hernandez University (UMH)	292	10.6	106	11.7	186	9.8
Pompeu Fabra University (UPF)	585	13.5	137	11.7	448	15
Academic Field						
Arts and Humanities	242	9.8	29	7	213	12
Engineering and Architecture	203	8.4	75	8.9	128	8
Health Sciences	543	15.7	116	10	427	20.2
Science	291	18.6	170	31.8	121	7.9
Social and Legal Sciences	839	47.6	192	42.3	647	51.8
Living at first term						
Parents' home	1193	56.2	344	60.5	849	52.8
Other	925	43.8	238	39.5	687	47.2

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 SUD. 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 possible 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 slight 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)

	Lifetime prevalence				12-month prevalence				Persistence[f]			
	Total % (SE)	Male % (SE)	Female % (SE)	F (ndf, ddf)[g]	Total % (SE)	Male % (SE)	Female % (SE)	F (ndf, ddf)[g]	Total % (SE)	Male % (SE)	Female % (SE)	F (ndf, ddf)[g]
Mental disorders												
Major depressive episode	23.1 (0.92)	17.2 (1.23)	27.9 (1.31)	33.9 (1,106324349)**	18.9 (0.85)	13.8 (1.12)	23.0 (1.23)	28.9 (1,5578023)**	81.4 (1.77)	80.0 (3.14)	82.2 (2.14)	0.3 (1, 871896)
Broad mania	3.4 (0.42)	2.5 (0.51)	4.2 (0.63)	4.6 (1,14520)*	3.1 (0.4)	2.3 (0.49)	3.8 (0.60)	3.9 (1,13768)*	91.3 (1.80)	92.6 (2.30)	90.7 (2.34)	0.1 (1, 42840)
Any mood disorder[a]	24.5 (0.94)	18.2 (1.26)	29.6 (1.34)	36.7 (1,984383)**	20.2 (0.88)	14.8 (1.16)	24.5 (1.26)	30.6 (1,776400)**	82.3 (1.73)	81.3 (3.06)	82.8 (2.10)	0.2 (1, 823221)
Generalized anxiety disorder	19.3 (0.86)	11.7 (1.05)	25.3 (1.27)	62.6 (1,2121470)**	16.0 (0.80)	9.3 (0.97)	21.4 (1.20)	55.8 (1,67967)**	83.1 (1.78)	79.5 (3.63)	84.5 (2.02)	1.2 (1, 2115)
Panic Disorder	2.5 (0.35)	1.7 (0.43)	3.1 (0.52)	4.2 (1,16944)*	2.0 (0.31)	0.8 (0.31)	2.9 (0.50)	11.3 (1,23551)**	80.5 (2.67)	49.2 (4.81)	94.1 (1.92)	13.3 (1, 12896)**
Any anxiety disorder[b]	20.1 (0.88)	12.9 (1.10)	26.0 (1.29)	55.2 (1,428977)**	16.6 (0.82)	9.7 (0.99)	22.2 (1.22)	57.3 (1,46979)**	82.6 (1.81)	75.3 (3.75)	85.5 (1.97)	5.5 (1, 3162)**
Alcohol abuse or dependence	7 (0.56)	9.7 (0.97)	4.8 (0.63)	19.6 (1,1501642)**	6.7 (0.54)	9.3 (0.94)	4.6 (0.61)	18.3 (1,966250)**	95.2 (1.05)	95.0 (1.73)	95.5 (1.45)	0.1 (1 ,1206802)
Drug abuse or dependence	5.3 (0.5)	7.1 (0.86)	3.8 (0.57)	11.1 (1,15267)**	2.2 (0.33)	2.9 (0.57)	1.6 (0.39)	4.2 (1,5857)*	41.0 (2.71)	40.9 (4.22)	41.2 (3.83)	0.1 (1,19780)
Any substance use disorder[c]	11.1 (0.69)	15.1 (1.18)	7.8 (0.79)	27.0 (1,52216)**	8.0 (0.6)	11.0 (1.03)	5.5 (0.68)	20.2 (1,44271)**	71.9 (2.17)	72.7 (3.61)	70.7 (2.81)	0.1 (1,26280)
Attention deficit hyperactivity disorder[d]	11.2 (0.68)	9.6 (0.96)	12.5 (0.97)	4.5 (1,38342293)**	11.2 (0.68)	9.6 (0.96)	12.5 (0.97)	4.5 (1,38342293)*	NA	NA	NA	
Any mental disorder[e]	41.3 (1.08)	35.1 (1.57)	46.3 (1.47)	36.6 (1,122925)**	35.7 (1.05)	29.0 (1.5)	41.1 (1.45)	32.6 (1,87867)**	86.4 (1.58)	82.6 (3.06)	88.7 (1.76)	6.0 (1,6813)*
Number of disorders												
One disorder	21.3 (0.9)	19.6 (1.31)	22.7 (1.24)	11.0 (3,176409)**	19.1 (0.87)	16.3 (1.23)	21.3 (1.21)	11.5 (3,98476)**	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)	6.4 (0.73)		13.6 (1.56)	13.3 (2.68)	13.8 (1.93)	

a.-Any mood disorder: Major depressive episode or Broad mania; b.-Any anxiety disorder: Generalized anxiety disorder or Panic Disorder; c.- Any substance use disorder: Alcohol abuse or dependence or Drug abuse or dependence; d.-Attention deficit hyperactivity disorder (ADHD) only surveyed at last 6 months prevalence; e.- 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; f.- Persistence defined as 12-month prevalence among lifetime cases; g.-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)

	Any severe role impairment		**Model 1**		**Model 2**		**Model 3**		**Model 4**		**Model 5**	
	%	SE	aOR (95% CI)	F (ndf, ddf)[a]	aOR (95% CI)	F (ndf, ddf)[a]	aOR (95% CI)	F (ndf, ddf)[a]	aOR (95% CI)	F (ndf, ddf)[a]	aOR (95% CI)	F (ndf, ddf)[a]
Mental disorders												
Major depressive episode	38.0	2.44	2.4 (1.8-3.3)	32.5 (1,397744)**	–	–	–	–	2.5 (1.7-3.7)	21.1 (1,151995)**	2.7 (1.8-4.0)	24.1 (1, 69424)**
Broad mania	45.8	6.5	1.8 (1.0-3.4)	3.8 (1, 6130)	–	–	–	–	1.9 (0.9-4.1)	2.9 (1, 9489)	1.9 (1.0-3.8)	3.4 (1, 8352)
Generalized anxiety disorder	38.2	2.65	2.3 (1.6-3.2)	24.7 (1,101327)**	–	–	–	–	2.3 (1.5-3.6)	14.1 (1,52281)**	2.6 (1.6-4.0)	17.1 (1,27859)**
Panic Disorder	61.7	7.9	4.0 (1.9-8.5)	12.6 (1, 3077)**	–	–	–	–	4.1 (1.8-9.7)	10.8 (1, 4976)**	4.2 (1.9-9.4)	12.5 (1,4872)**
Alcohol abuse or dependence	25.4	3.67	1.8 (1.1-2.8)	5.6 (1,271176)*	–	–	–	–	1.8 (1.3-3.6)	4.9 (1,177513)*	1.9 (1.1-3.1)	6.0 (1,241339)*
Drug abuse or dependence	26.9	6.67	0.8 (0.3-1.8)	0.4 (1,11830)	–	–	–	–	0.8 (0.3-2.0)	0.2 (1, 15399)	0.8 (0.3-2.0)	0.2 (1,6626)
Attention deficit hyperactivity disorder	31.2	3.02	1.3 (0.9-1.9)	2.1 (1, 260028)	–	–	–	–	1.3 (0.8-2.2)	1.4 (1, 169988)	1.4 (0.9-2.3)	2.2 (1, 51547)
Number of disorders (continuous)			–	–	2.0 (1.8-2.2)	134.2 (1, 152112)**	–	–	1.0 (0.6-1.5)	0.0 (1, 52310)	–	–
Number of disorders (categorical)												
One disorder	19.7	2.01	–	–	–	–	2.1 (1.5-2.9)	43.9 (3, 155194)**	–	–	–	–
Two disorders	33.6	3.13	–	–	–	–	3.9 (2.7-5.5)		–	–	0.8 (0.4-1.4)	0.5 (2, 30081)
Three or more disorders	52.8	4.63	–	–	–	–	9.0 (5.9-13.7)				0.8 (0.3-2.1)	
AUC				0.735		0.736		0.736		0.735		0.736
AIC				1729.4		1737.1		1748.0		1731.3		1732.3

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

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

	Any treatment		Multiple model	
	%	SE	aOR (95%CI)	F (ndf, ddf)[a]
Mental disorders				
Major depressive episode	16	1.83	3.4 (1.8-6.4)	14.6 (1,32542)**
Broad mania	16.1	4.69	1.7 (0.6-4.9)	1.1 (1, 1316)
Generalized anxiety disorder	20.1	2.2	7.4 (3.7-14.8)	32.7 (1, 4974)**
Panic Disorder	35.3	7.6	4.3 (1.7-10.8)	9.6 (1, 10790)**
Alcohol abuse or dependence	7.6	2.35	1.1 (0.5-2.5)	0.1 (1, 411338)
Drug abuse or dependence	10.7	4.62	2.7 (0.8-9.2)	2.4 (1, 11102)
Attention deficit hyperactivity disorder	10.3	1.97	1.7 (0.8-3.4)	2.0 (1,19327)
Number of disorders (continuous)			–	–
Number of disorders (categorical)				
One disorder	7.6	1.36	–	–
Two disorders	19.0	2.64	0.6 (0.3-1.5)	3.9 (2, 8786)*
Three or more disorders	18.0	3.61	0.2 (0-0.7)	
AUC				0.805
AIC				798.0

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; Klemenc-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 association of PD with severe role impairment was also found in clinical samples (Barrera and Norton, 2009; Lochner et al., 2003). Another interesting finding is that 31.2% of Adult ADHD cases reported impairment, showing statistically significant association in the bivariate analyses (OR = 2.5; CI95% = 1.9-3.4). It is likely that these results are due the direct effect being diluted by the presence of other mental disorders (Jacob et al., 2007). These results could be cautiously interpreted that in a student with a mental disorder and its related impairment, a comorbid disorder adds the impairment expected for this latter disorder if it happened in isolation. These results are in contrast with than those reported by Alonso et al. (2018) but in the same direction, pointing to the fact that comorbidity is highly disabling.

Only 12.6% of first year students with a possible mental disorder received any treatment in the last 12-months. These results are similar to findings reported in previous studies (Bruffaerts et al., 2019; Hunt and Eisenberg, 2010; Verger et al., 2010). According to a recent study by Bruffaerts et al. (2018), anxiety disorders are the most frequently treated among university population. The associations of specific disorders are similar to those of the previous study (Bruffaerts et al., 2019) which rates vary across types of mental disorders. Again, PD presents the highest treatment rate, requiring in-depth study in our Spanish sample in further longitudinal analyses. Substance use disorders and Adult ADHD are not significantly 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.

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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

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.jad.2020.04.050.

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