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Research paper

Factors associated with high and low mental well-being in Spanish university students

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ABSTRACT

Background: Previous studies conducted in various nationally representative samples of the general population show that positive mental health is related to social prosperity. However, specific studies in university populations are scarce. In this study, we set out to explore factors associated with mental well-being (MWB) in a representative sample of first-year university students in Spain.

Methods: MWB was assessed with the short version of the Warwick-Edinburgh Mental Well-Being Scale. Multinomial logistic regressions were performed to explore the association between different blocks of factors, including relational, adversity, stress, lifestyle, spiritual, health, and self-perceived health variables with high and low MWB, controlling for sociodemographic and university-related variables.

Results: Data from 2082 students (18.6 ± 1.2 years; 56.6 % females) were analysed. Being male, being born in a foreign country, "high" self-perceived support, and "high" self-perceived mental health increased the odds of high MWB. Growing up in the suburbs, stressful experiences, and anxiety disorders reduced the odds of high

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MWB. Mood and anxiety disorders increased the odds of low MWB. "Middle" self-perceived support, sleeping ≥8 h per day, and "high" self-perceived mental health reduced the odds of low MWB.
Limitations: The cross-sectional design precludes establishing causal relationships. Data were collected in the 2014–15 academic year using self-reported online surveys.
Conclusion: The factors associated with high and low MWB do not always mirror each other, so specific plans are needed to successfully address each of the two poles. Interventions and policies targeting these factors for health promotion and disease prevention would improve the MWB of university students.

1. Introduction

The increasing burden of mental disorders worldwide (GBD 2019 Mental Disorders Collaborators, 2022), especially among young people (Castelpietra et al., 2022), has highlighted the importance of promoting positive mental health. Positive mental health goes beyond the mere absence of psychopathology and is related to mental well-being (Barry, 2009). Mental well-being, defined as "feeling good" (hedonic well-being) and "functioning well" (eudaimonic well-being), reflects a positive disposition or state of resilience that enables the individual to cope more easily with the problems and challenges of daily life (Dolan et al., 2008; Huppert, 2009).

Mental well-being is influenced by socioeconomic factors (e.g., ethnicity, income, education) and by people's diverse life experiences and conditions (e.g., relationships, lifestyle, spirituality, health). Socioeconomic factors are structural determinants of mental well-being responsible for health inequalities among the population (Cylus and Smith, 2020), as they affect how people live and work (Hahn and Truman, 2015; Lamu and Olsen, 2016). Positive relationships and social support are two of the most studied relational factors. They are considered to foster a sense of belonging, enhance self-actualization, and provide the emotional, instrumental, and informational resources needed to successfully cope with adverse or stressful circumstances (Lamu and Olsen, 2016; Tough et al., 2017). Like religiosity, spirituality contributes to improved relationships with self, others, and the unknown (Villani et al., 2019). Lifestyle can act as a risk factor or as a protective factor against certain health conditions (Navarra-Ventura et al., 2023; Petrides et al., 2019). Possibly due to the greater difficulty psychiatric patients show in adopting adaptive behaviors, mental disorders often have a greater impact on mental well-being than physical conditions (Binder and Coad, 2013). However, the impact of self-perceived health may be even greater than that of the health condition itself (Alonso et al., 2013) and hence the importance of studying subjective aspects of health, such as positive mental health and quality of life.

The determinants of mental well-being have typically been studied with instruments that assess health-related quality of life (Kaplan and Hays, 2022) or that focus more on mental disorders than on positive aspects of mental health (Bech, 2004; Boscarino, 2004; Diener et al., 1985; Watson et al., 1988). In this context, the Warwick-Edinburgh Mental Well-Being Scale (WEMWBS) emerged as a specific instrument to analyze positive mental health (Stewart-Brown et al., 2009; Tennant et al., 2007). The WEMWBS and its short version have been successfully used in different nationally representative populations of adults (Koushede et al., 2019; Soldevila-Domenech et al., 2021) and adolescents/children (Clarke et al., 2011; McKay et al., 2020; McKay and Andretta, 2017), demonstrating that mental well-being does not conform to traditional determinants of psychopathology and that its associated factors differ from those strictly related to mental disorders (Santini et al., 2020; Stewart-Brown et al., 2015). However, more studies are needed in young populations such as university students, as this is a particularly stress-laden stage of the life cycle in which multiple aspects involved in mental well-being converge (e.g., building a clear sense of self, creating a social support network, adopting lifestyle habits, transitioning to adulthood and independent living) (Wykes et al., 2015).

To date, we are aware of only three studies that have specifically explored factors associated with mental well-being in representative samples of university students using the WEMWBS (Davoren et al., 2013; Elnaem et al., 2022; Paton et al., 2023). In these studies, the main factors associated with high mental well-being were being male, studying at a private university, having one or more sexual partners, and having high academic performance. In contrast, the main factors associated with low mental well-being were identifying as sexually diverse, studying at a public university, having a disability, or having a mental disorder. Associations between lifestyle habits and mental well-being were mixed. No association was found between academic fields of study and mental well-being.

In Spain, we are aware of only one study that has specifically explored the determinants of mental well-being in a large representative sample of the general population of Catalonia (i.e., an Autonomous Community of Spain) using the WEMWBS (Soldevila-Domenech et al., 2021), but none that has done so in university students and including other regions beyond Catalonia. Better understanding the risk and protective factors for high and low mental well-being in university students from different regions of Spain may improve our ability to monitor national and international public health policies and interventions, help us prevent disorders later in life, and promote positive mental health in the population.

In this study we set out to explore the factors associated with high and low mental well-being in a representative sample of first-year university students in Spain using the short version of the WEMWBS. Hereafter we will refer to high mental well-being vs. low mental well-being and to positive mental health vs. mental disorder. However, while we consider high mental well-being as synonymous with positive mental health, we do not consider low mental well-being as synonymous with mental disorder (Santini et al., 2020; Soldevila-Domenech et al., 2021; Stewart-Brown et al., 2015).

2. Methods

2.1. Study design

This study is part of the WHO World Mental Health International College Student (WMH-ICS) Initiative (WMH-ICS, 2015). Data were obtained from the "University and Mental Health" (UNIVERSAL) project, a longitudinal multicenter observational cohort study (Blasco et al., 2016). For this study, baseline cross-sectional data were used.

2.2. Setting

Five public universities selected for convenience from different Autonomous Communities of Spain participated in the UNIVERSAL project: Basque Country (UPV-EHU), Andalusia (UCA), Balearic Islands (UIB), Valencian Community (UMH), and Catalonia (UPF). These universities accounted for 8.2 % of the total number of students in Spanish public universities in the 2014–15 academic year and their distribution in terms of gender, nationality, and academic field was similar to that of the overall student population (Ballester et al., 2020).

At that time, the Spanish social welfare system was in a state of transition due to the aftermath of the global financial crisis of 2008–14, which hit the country particularly hard, forcing the government to implement various measures to address unemployment, poverty, and

social inequality. In fact, Spain's gross domestic product per capita, one of the main structural predictors of mental well-being, was €23,230, while that of the 28 European Union countries was €27,500 (Eurostat, 2015).

2.3. Participants and procedure

Eligible participants were all first-year students aged 18–24 years enrolled for the first time in a bachelor's degree at the participating universities during the 2014–15 academic year. A total of 16,332 students met the inclusion criteria (Fig. 1).

Recruitment was carried out in two stages. In the first stage, all eligible students were invited to participate (i.e., census sampling). Invitation methods included advertising campaigns (e.g., information sessions, stands, university web) and e-mails sent by university authorities. To increase participation, a second stage was conducted in which a random subsample of eligible students who had not responded to the first stage was contacted by e-mail and offered a financial incentive (25€) to complete the online survey (i.e., endgame strategy). Basque Country University only conducted the first stage.

Students wishing to participate had to register on the UNIVERSAL project website and provide informed consent online. They were then provided with a personalized link and password via e-mail to access the online survey that was developed for the first stage of the WMH-ICS surveys initiative (Auerbach et al., 2018). At the end of the survey, information on how to access local health services was provided to all respondents and specific alerts with indication to consult a health professional were provided for those with positive responses on the suicide items. The data collection platform followed international recommendations and guidelines for secure computerized assessment (International Test Comission, 2019).

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 Clinical Research Ethics Committee of Parc de Salut Mar in Barcelona, Catalonia (Spain) (#2013/5252/I).

2.4. Primary outcome

Mental well-being was assessed with the short version of the WEMWBS, a unidimensional questionnaire measuring mental well-being in the previous two weeks (Stewart-Brown et al., 2009). It consists of seven positively worded items (e.g., "I've been feeling optimistic about the future") scored on a 5-point Likert scale, from "None of the time" to "All of the time". The total score, obtained as the sum of all items, ranges from 7 to 35. Higher scores indicate greater mental well-being. The WEMWBS and its short version (SWEMWBS) correlate at 0.95 (r_s) (Stewart-Brown et al., 2009), show good internal consistency (Cronbach's $\alpha > 0.80$) (Koushede et al., 2019; Tennant et al., 2007) and have been validated for use in general population and student samples (Koushede et al., 2019; Ng Fat et al., 2017; Stewart-Brown et al., 2009; Tennant et al., 2007). The Spanish version of the questionnaire has also been validated (Castellví et al., 2014; Forero et al., 2014; López et al., 2013).

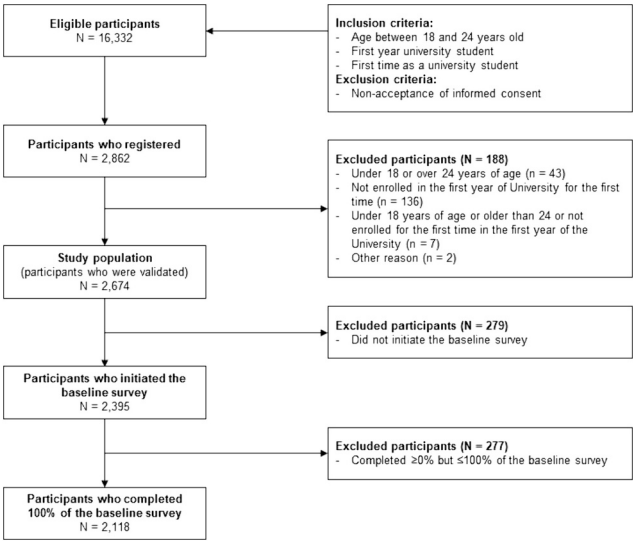

Fig. 1. Flow diagram of the study sample. The UNIVERSAL (University and Mental Health) project.

Three groups of individuals were defined based on WEMWBS scores using the distribution criteria recommended by the developers of the questionnaire (Warwick Medical School, 2023): a) high mental well-being (i.e., individuals with values over the mean plus one standard deviation (SD), corresponding to the upper 15th percentile), b) low mental well-being (i.e., individuals with values below the mean minus one SD, corresponding to the lower 15th percentile), and c) middle-range (average) mental well-being (i.e., all remaining individuals). The original recommendation used representative data from the general population of the United Kingdom (UK) to derive the cut-off points. However, there are differences in mental well-being measured with the WEMWBS between the UK and Spain (Forero et al., 2014; Koushede et al., 2019). Furthermore, our main interest was to compare mental well-being in a sample of younger participants who were expected to have different mental well-being than the general population including all age ranges (Castellví et al., 2014; López et al., 2013; Soldevila-Domenech et al., 2021). Therefore, we calculated the corresponding cut-off points for the three groups based on the weighted SWEMWBS mean (25.7) and SD (4.4) of our representative sample of first-year university students. The resulting cut-off points were as follows: high mental well-being (SWEMWBS $\geq$30.1), average mental well-being (21.3 $>$ SWEMWBS $<$30.1), and low mental well-being (SWEMWBS $\leq$21.3).

2.5. Covariates

The potential predictors were organized into seven blocks of factors comprising a total of 23 variables (Ballester et al., 2019, 2020; Blasco et al., 2016; Soldevila-Domenech et al., 2021).

2.5.1. Sociodemographic variables

Gender (women, men); Age (18, $\geq$19 years); Country of birth (Spain, other); Place raised (town/village/rural area, large/small city, and suburbs); and Parent's university studies (neither, at least one).

2.5.2. University-related variables

University (UPV-EHU, UCA, UIB, UMH, and UPF); Academic field (social and legal sciences, arts and humanities, sciences, health sciences, and engineering and architecture); and Living at first term (i.e., first term living location during university period: parents' home, other).

2.5.3. Relational, adversity and stress variables

Self-perceived support in childhood/adolescence before age 17 was assessed using 14 items adapted from the CIDI version 3.0 (Kessler and Üstün, 2004), the Psychological Sense of School Membership Scale (Goodenow, 1993), the Adverse Childhood Experience Scale (Felitti et al., 1998), and the Childhood Trauma Questionnaire (Bernstein et al., 1997). Response options consisted of 5-point ordinal scales, ranging from "Never" to "Very often". Three additional subconstructs were derived: a) positive relationships at school (6 items), b) with family (4 items), and c) with peers/others (4 items). All scores were obtained as the mean of the corresponding items and classified into tertiles (low, middle, and high).

Adversities in childhood/adolescence before age 17 were assessed

using 20 items adapted from the CIDI version 3.0 (Kessler and Üstün, 2004), the Adverse Childhood Experience Scale (Felitti et al., 1998), and the Bully Survey (Swearer and Cary, 2003). Response options consisted of 5-point ordinal scales, ranging from "Never" to "Very often". Four additional subconstructs were derived: a) family structure breakdown, including parental death, separation, or divorce (3 items), b) family maladaptation, including parental psychopathology, suicide attempt or dead by suicide, and household dysfunction such as criminal activity or violence (5 items), c) childhood maltreatment, divided into emotional abuse or neglect and physical or sexual maltreatment (8 items), and d) bully victimization (4 items). Adversities were present when the response on any of the items was other than "Never", except in the case of bullying, which was considered when it was "Sometimes" or higher. Participants were classified according to whether they had experienced these adversities (yes, no).

Recent stressful experiences in the previous 12 months were assessed using 9 items adapted from the Life Events Questionnaire (Brugha and Cragg, 1990), the Deployment Risk and Resilience Inventory (Vogt et al., 2008), and the Department of Defense Survey of Health-Related Behaviors (Bray et al., 2009), and included: a) death, life-threatening illness, or injury/accident of a friend or family member (3 items), b) betrayal, argument, cheating, or breakup with a romantic partner, friend or family member (4 items), and c) physical or sexual assault (2 items). Participants were classified according to whether they had suffered these stressful experiences (yes, no).

2.5.4. Lifestyle variables

The following lifestyle variables were considered: a) physical activity, b) diet, and c) hours of sleep. Physical activity was assessed by the questions "How often do you currently engage in light exercise (e.g., walking) for 30 minutes or longer?" and "How often do you currently engage in moderate or vigorous exercise (e.g., jogging, working out) for 30 minutes or longer?". Diet was assessed by the question "How often do you currently eat three balanced meals?". Hours of sleep was assessed by the question "How often do you currently get at least 8 hours of sleep?". These questions were drawn from the Youth Risk Behavior Survey (Brener et al., 1995). All questions were scored on a 5-point ordinal scale, ranging from "Every or nearly every day" to "Never", and dichotomized into healthy and unhealthy behaviors, following the recommendations of international and national health agencies, according to a previous study (Roldán-Espínola et al., 2024). A detailed description is provided in the Supplementary Material (SM).

2.5.5. Spiritual variables

Spirituality and religiosity were assessed by the questions: "How spiritual are you?" and "How religious are you?", respectively, scored on a 4-point ordinal scale, ranging from "Not at all" to "Very". For a better fit of the regression models during statistical analysis, these variables were dichotomized into low ("Not at all" and "Not very") and high ("Somewhat" and "Very").

2.5.6. Health conditions

The following mental disorders were considered: a) neurodevelopmental (i.e., attention-deficit/hyperactivity disorder or dyslexia/other learning disorders), b) mood (i.e., major depressive episode or mania/hypomania), c) anxiety (i.e., generalized anxiety disorder or panic disorder), and d) substance use (i.e., alcohol or other substance abuse/dependence). Neurodevelopmental disorders were assessed by the question: "Did you have any of the following health problems, including attention-deficit/hyperactivity disorder, dyslexia, or any other learning disorder?" (yes, no). Possible DSM-IV mood, anxiety, and substance use disorders were assessed using items drawn from the Composite International Diagnostic Interview (CIDI) Screening Scales (Kessler et al., 2013a; Kessler and Üstün, 2004), which have demonstrated good psychometric properties and good concordance with blinded clinical diagnoses (Area Under the Curve, AUC = 0.60–0.90) (Ballester et al., 2019; Kessler et al., 2013b). Possible alcohol use disorder was assessed using the Alcohol Use Disorders Identification Test (AUDIT), 10-item version, as it has shown good concordance with clinical diagnosis (AUC = 0.78–0.91) (Ballester et al., 2021; Reinert and Allen, 2002; Saunders et al., 1993). Participants were classified according to the presence or absence of a lifetime history of these disorders.

Chronic physical conditions were assessed by two questions: "Did you have any of the following health problems, including any serious physical impairment, such as visual or hearing disability, or any other impairment that interferes with your ability to take care of yourself or get around?" (yes, no) and "Did you have any of the following health problems, including any other chronic physical health condition, such as asthma, diabetes, migraine, or chronic pain disorder?" (yes, no). Participants with a body mass index (kg/m^2) $\geq$30 points were also considered to have a chronic physical condition. Participants were classified according to the presence or absence of a lifetime history of any of these disorders.

2.5.7. Self-perceived health variables

Self-perceived mental and physical health were assessed by the questions: "How would you rate your overall mental health?" and "How would you rate your overall physical health?", respectively, scored on a 5-point ordinal scale, ranging from "Excellent" to "Poor". For a better fit of the regression models during statistical analysis, these variables were dichotomized into low ("Fair", "Poor" and "Good") and high ("Very good" and "Excellent").

2.6. Statistical analysis

Of the 2118 students who completed the online survey (Fig. 1), SWEMWBS data were available for 2082 individuals. Analyses were limited to the sample without missing data and weighted using two types of weights: a) inverse probability sampling weights applied to hard-to-reach respondents who were randomly selected and offered a financial incentive to participate (i.e., endgame strategy weights), and b) post-stratification weights to restore the distribution of the population in terms of gender, age, country of birth, and academic field within each university, as well as population distributions across universities. Comparison of the weighted sample and population distributions on these variables is available upon request.

Descriptive data, overall and by SWEMWBS categories (high, average, and low), are shown as absolute numbers and (un)weighted proportions. Differences between the three categories of mental well-being were assessed using Chi-square tests.

To analyze the contribution of each block of variables on high and low mental well-being compared to average, we performed several multinomial logistic regressions. The models were run in a block nested fashion. The first model included the block of sociodemographic variables. The following models consecutively included the blocks of university-related variables, relational, adversity and stress variables, lifestyle variables, spiritual variables, health conditions, and self-perceived health variables (Soldevila-Domenech et al., 2021). The final model included all blocks of variables. The goodness-of-fit of the models by individual blocks of variables and incremental adjustments per block when blocks were entered consecutively are expressed as McFadden's adjusted (Pseudo R^2). Multinomial logistic regressions were also used to analyze differences in the patterns of association of each covariate with high and low mental well-being compared to average. To this end, unadjusted, partially adjusted (for sociodemographic and university-related variables) and fully adjusted (for all variables) models were generated to calculate odds ratios (ORs) and 95 % confidence intervals (CIs) for high and low mental well-being compared to average (Santini et al., 2020; Stewart-Brown et al., 2015). To assess its discriminant ability, the AUC of the fully adjusted model was further estimated using binomial logistic regressions, one for the comparison

between high mental well-being vs. average mental well-being and one for the comparison between low mental well-being vs. average mental well-being. Finally, a series of additional multinomial logistic regressions were performed to determine which specific relational, adversity, and stress variables were associated with high and low mental well-being compared to average.

Statistical significance was set at $p < 0.05$. Analyses were performed with STATA v.17.0.

3. Results

3.1. Sample characteristics

Table 1 and Table S1 (SM) show the characteristics of the participants, overall and by SWEMWBS categories, and the differences in these variables among the three categories of mental well-being. The mean age was 18.6 (±1.2) years and 56.6 % were women. Most of the students were born in Spain (96.4 %) and most had grown up in a city (66.2 %). More than half had parents without university studies (54.7 %), lived at home with their parents (56.6 %) and were not religious (58.9 %). Among the religious, 94.9 % were Christian and 5.1 % belonged to other religions. Nearly half of the students (50.4 %) belonged to the academic field of Social and Legal Sciences. Basque Country University accounted for 30.5 % of the students.

3.2. Mental well-being (SWEMWBS)

Weighted % are shown: 13.9 % of the students had high mental well-being ($n = 273$), 68.9 % had average mental well-being ($n = 1413$), and 17.2 % had low mental well-being ($n = 396$). Table 1 shows the unweighted %.

3.3. Goodness-of-fit of mental well-being models

Table 2 A) shows that the best goodness of fit for individual blocks when blocks were entered individually was for self-perceived health variables (0.077), followed by: health conditions (0.065), relational, adversity and stress variables (0.054), lifestyle variables (0.018), sociodemographic variables (0.012), university-related variables (0.010), and spiritual variables (0.002).

Table 2 B) shows that the consecutive introduction of the blocks resulted in an incremental goodness of fit of the models –with each new model fitting better than the previous one–, as follows: sociodemographic variables (0.012), university-related variables (0.026), relational, adversity and stress variables (0.083), lifestyle variables (0.091), spiritual variables (0.098), health conditions (0.125) and self-perceived health variables (0.160).

Table 2 B) also shows that the greatest increase in goodness of fit of the models when the blocks were entered consecutively was for relational, adversity and stress variables (0.057), followed by: self-perceived health variables (0.035), health conditions (0.027), university-related variables (0.014), lifestyle variables (0.008) and spiritual variables (0.007).

The unadjusted and partially adjusted models for the association between each factor and high and low mental well-being compared to average are shown in the SM (Table S2 and Table S3, respectively). The results of the fully adjusted model and additional analyses of the specific relational, adversity, and stress variables are described below.

3.4. Factors associated with high mental well-being

Table 3 A) and Fig. 2 A) show that being male, being born in a foreign country, having "high" self-perceived support in childhood/adolescence, and having "high" self-perceived mental health increased the odds of having high mental well-being. In contrast, growing up in the suburbs, having had recent stressful experiences, and having an anxiety disorder reduced the odds of having high mental well-being. This model had an AUC of 0.794 (95 % CI, 0.764–0.825).

Table S4 A), Table S5 A) and Fig. S1 A) (SM) show additional unadjusted and partially adjusted analyses to determine which specific relational, adversity, and stress variables were associated with high mental well-being. Results show that "high" positive relationships at school (aOR = 2.99; 95 % CI, 1.55–5.76; $p = 0.001$) and with family (aOR = 3.15; 95 % CI, 1.40–7.08; $p = 0.006$) increased the odds of high mental well-being. In contrast, family maladaptation (aOR = 0.51; 95 % CI, 0.32–0.81; $p = 0.005$), betrayal, argument, cheating, or breakup (aOR = 0.58; 95 % CI, 0.36–0.94; $p = 0.026$) and physical or sexual assault (aOR = 0.28; 95 % CI, 0.09–0.92; $p = 0.036$) reduced the odds of high mental well-being.

3.5. Factors associated with low mental well-being

Table 3 B) and Fig. 2 B) show that having mood and anxiety disorders increased the odds of having low mental well-being. In contrast, having "middle" self-perceived support in childhood/adolescence, sleeping ≥8 h per day, and having "high" self-perceived mental health reduced the odds of having low mental well-being. This model had an AUC of 0.809 (95 % CI, 0.784–0.834).

Table S4 B), Table S5 B) and Fig. S1 B) (SM) show additional unadjusted and partially adjusted analyses to determine which specific relational, adversity, and stress variables were associated with low mental well-being. Results show that betrayal, argument, cheating, or breakup increased the odds of low mental well-being (aOR = 1.53; 95 % CI, 1.01–2.32; $p = 0.044$). In contrast, "middle" (aOR = 0.50; 95 % CI, 0.31–0.80; $p = 0.004$) and "high" (aOR = 0.30; 95 % CI, 0.17–0.55; $p < 0.001$) positive relationships at school and "high" (aOR = 0.54; 95 % CI, 0.32–0.90; $p = 0.018$) positive relationships with family reduced the odds of low mental well-being.

4. Discussion

To our knowledge, this is the first study that has specifically explored factors associated with high and low mental well-being in a representative sample of first-year university students in Spain using the SWEMWBS. Our results show that relational, adversity and stress variables, health conditions and self-perceived health variables were the main blocks associated with mental well-being, above the blocks of sociodemographic, university-related, lifestyle and spiritual variables. These results complement those of previous research conducted in the region of Catalonia using the WEMWBS, of which two studies analysed its psychometric properties (Castellví et al., 2014; López et al., 2013), another added that it is a valid unbiased measure for individual and cross-cultural comparisons (Forero et al., 2014), and the last highlighted that in the general population health and social support are the factors most associated with mental well-being above socioeconomic factors (Soldevila-Domenech et al., 2021). Similar to previous research conducted in other European countries (Ng Fat et al., 2017; Santini et al., 2020; Stewart-Brown et al., 2015), we also found that factors associated with mental well-being do not always mirror each other, such that those linked to high mental well-being are not necessarily related to low mental well-being and vice versa, indicating that specific plans are needed to successfully address each of the two poles. Only a few factors within the blocks of relational, adversity and stress variables (i.e., self-perceived support in childhood/adolescence), health conditions (i.e., anxiety disorders), and self-perceived health variables (i.e., self-perceived mental health) had mirrored associations with high and low mental well-being. Given that most disease prevention programs currently promoted by public health providers focus on risk management and disease prevention (Wykes et al., 2015), our results suggest that they may be especially useful for reducing the risk of low mental well-being, but less so for achieving high mental well-being or positive mental health.

Table 1
Characteristics of participants, overall and by categories of mental well-being. Frequency (weighted %) is reported unless otherwise specified.

Blocks of variables	Variables	Categories	Total	Mental well-being (SWEMWBS)			
				High	Average	Low	*p*-value
			2082 (100.0)	273 (13.1)[1]	1413 (67.9)[1]	396 (19.0)[1]	
Sociodemographic variables	Gender**	Women	1511 (56.6)	158 (41.2)	1040 (57.4)	313 (66.0)	0.001
		Men	571 (43.4)	115 (58.8)	373 (42.6)	83 (34.0)	
	Age	18 years	1480 (62.5)	184 (53.1)	1019 (64.0)	277 (63.9)	0.147
		≥19 years	602 (37.6)	89 (46.9)	394 (36.0)	119 (36.1)	
	Country of birth	Spain	1970 (96.4)	257 (95.4)	1346 (97.1)	367 (94.6)	0.099
		Other	112 (3.6)	16 (4.6)	67 (2.9)	29 (5.4)	
	Place raised	Town, village, or rural area	637 (28.9)	77 (27.4)	441 (29.6)	119 (27.1)	0.359
		Large or small city	1340 (66.2)	187 (70.2)	902 (65.5)	251 (65.4)	
		Suburbs	99 (5.0)	9 (2.3)	66 (4.9)	24 (7.6)	
	Parent's university studies	Neither	1100 (54.7)	141 (54.6)	735 (53.8)	224 (58.5)	0.653
		At least one	923 (45.3)	128 (45.4)	640 (46.2)	155 (41.5)	
University-related variables	University*	UPV-EHU (Basque Country)	627 (30.5)	68 (24.4)	440 (31.8)	119 (30.3)	0.039
		UCA (Andalusia)	294 (13.8)	65 (22.1)	181 (13.5)	48 (8.1)	
		UIB (Balearic Islands)	293 (14.3)	47 (21.7)	184 (12.9)	62 (14.3)	
		UMH (Valencian Community)	290 (13.8)	34 (12.6)	201 (13.3)	55 (16.8)	
		UPF (Catalonia)	578 (27.6)	59 (19.3)	407 (28.5)	112 (30.6)	
	Academic field	Social and Legal sciences	827 (50.4)	98 (49.2)	580 (52.2)	149 (44.5)	0.376
		Arts and Humanities	238 (10.8)	28 (10.3)	153 (9.4)	57 (16.6)	
		Sciences	196 (7.2)	24 (7.3)	126 (6.8)	46 (8.7)	
		Health sciences	536 (15.3)	80 (17.1)	371 (15.3)	85 (13.6)	
		Engineering and Architecture	285 (16.4)	43 (16.1)	183 (16.4)	59 (16.6)	
	Living at first term	Parents' home	1165 (56.6)	158 (50.9)	791 (58.0)	216 (55.5)	0.414
		Other	910 (43.4)	115 (49.2)	617 (42.0)	178 (44.6)	
Relational, adversity and stress variables	Self-perceived support in childhood/adolescence***	Low	664 (35.5)	36 (14.5)	421 (34.9)	207 (54.5)	<0.001
		Middle	654 (33.3)	75 (29.1)	483 (36.0)	96 (26.0)	
		High	655 (31.3)	148 (56.4)	435 (29.1)	72 (19.5)	
	Adversities in childhood/adolescence***	No	739 (37.2)	137 (56.7)	508 (36.4)	94 (24.9)	<0.001
		Yes	1311 (62.8)	129 (43.3)	888 (63.6)	294 (75.1)	
	Recent stressful experiences*	No	480 (22.4)	91 (34.5)	316 (21.2)	73 (17.7)	0.011
		Yes	1602 (77.6)	182 (65.5)	1097 (78.8)	323 (82.3)	
Lifestyle variables	Physical activity	Unhealthy	1057 (46.6)	121 (42.9)	703 (45.5)	233 (53.9)	0.197
		Healthy	1012 (53.4)	151 (57.1)	702 (54.5)	159 (46.1)	
	Diet	Unhealthy	715 (34.2)	64 (30.2)	463 (32.8)	188 (42.9)	0.117
		Healthy	1360 (65.8)	209 (69.8)	945 (67.2)	206 (57.1)	
	Hours of sleep***	Unhealthy	788 (33.8)	69 (25.2)	514 (30.9)	205 (52.3)	<0.001
		Healthy	1287 (66.2)	203 (74.8)	895 (69.1)	189 (47.7)	
Spiritual variables	Spirituality	Low	1527 (70.7)	200 (67.2)	1026 (70.3)	301 (75.1)	0.517
		High	502 (29.4)	70 (32.8)	348 (29.7)	84 (25.0)	
	Religiosity	Low	1650 (79.4)	204 (71.0)	1119 (79.5)	327 (85.8)	0.085
		High	351 (20.6)	58 (29.0)	241 (20.5)	52 (14.2)	
Health conditions	Neurodevelopmental disorders	Absence	2010 (97.2)	266 (98.3)	1365 (97.2)	379 (96.4)	0.648
		Presence	40 (2.8)	6 (1.7)	25 (2.8)	9 (3.6)	

(*continued on next page*)

Table 1 (*continued*)

Blocks of variables	Variables	Categories	Total	Mental well-being (SWEMWBS)			
				High	Average	Low	*p*-value
			2082 (100.0)	273 (13.1)[1]	1413 (67.9)[1]	396 (19.0)[1]	
	Mood disorders***	Absence	1477 (73.6)	240 (84.6)	1061 (78.8)	176 (44.0)	<0.001
		Presence	593 (26.4)	31 (15.4)	343 (21.2)	219 (56.0)	
	Anxiety disorders***	Absence	1565 (77.7)	245 (93.3)	1114 (80.8)	206 (52.6)	<0.001
		Presence	504 (22.3)	26 (6.8)	290 (19.2)	188 (47.4)	
	Substance use disorders	Absence	1887 (88.8)	258 (91.2)	1282 (89.0)	347 (85.9)	0.505
		Presence	178 (11.2)	12 (8.8)	121 (11.0)	45 (14.2)	
	Chronic physical conditions	Absence	1631 (78.6)	216 (74.7)	1117 (79.2)	298 (79.1)	0.579
		Presence	431 (21.5)	56 (25.3)	283 (20.8)	92 (20.9)	
Self-perceived health variables	Self-perceived mental health***	Low	957 (40.1)	43 (12.3)	605 (37.8)	309 (72.1)	<0.001
		High	1122 (59.9)	230 (87.7)	805 (62.2)	87 (27.9)	
	Self-perceived physical health***	Low	1113 (49.7)	80 (29.7)	746 (49.7)	287 (66.3)	<0.001
		High	966 (50.3)	193 (70.3)	664 (50.4)	109 (33.7)	

Some percentages may not add up to 100 % because decimals are rounded. SWEMWBS, Short version of the Warwick-Edinburgh Mental Well-Being Scale; UPV-EHU, Basque Country University; UCA, Cadiz University; UIB, Balearic Islands University; UMH, Miguel Hernandez University; UPF, Pompeu Fabra University.

[1] Unweighted % is reported.

*** $p < 0.001$.

** $p < 0.01$.

* $p < 0.05$.

Table 2
Goodness-of-fit of mental well-being models. Models are fitted by individual blocks of variables (A) and incremental adjustments per block when blocks are entered consecutively (B).

Blocks of variables	A) Individual blocks McFadden's adjusted (Pseudo R^2)	B) Incremental blocks	
		McFadden's adjusted (Pseudo R^2)	Increase in McFadden's adjusted (Pseudo R^2)[1]
Sociodemographic variables	0.012	0.012	N/A
University-related variables	0.010	0.026	0.014
Relational, adversity and stress variables	0.054	0.083	0.057
Lifestyle variables	0.018	0.091	0.008
Spiritual variables	0.002	0.098	0.007
Health conditions	0.065	0.125	0.027
Self-perceived health variables	0.077	0.160	0.035

All models of B) Incremental blocks are significant at $p \leq 0.014$. The final model with the seven blocks of variables contains all the variables studied and is shown in Table 3. N/A, does not apply.

[1] Increase in McFadden's adjusted (Pseudo R^2) compared to the previous model not including variables from this block.

Similar to what was observed in the Spanish adaptation and validation studies of the (S)WEMWBS (Castellví et al., 2014; Forero et al., 2014; López et al., 2013), mental well-being was higher in our sample of first-year university students than in the UK development and validation studies (Stewart-Brown et al., 2009; Tennant et al., 2007). A study in which a cross-cultural comparison was made between different European settings already reported that the region of Catalonia had the highest mental well-being scores compared to Denmark, Iceland and England (Koushede et al., 2019). However, the distribution of our results was not skewed toward high mental well-being as in the Spanish adaptation and validation studies. Instead, it resembled the Gaussian (normal) distribution of the UK development and validation studies. Our results also contrast with another study conducted in a non-European (i.e., Asian) university population that showed a distribution of scores skewed toward low mental well-being (Elnaem et al., 2022). In our study, no differences related to university or academic field were found. Given that the participating universities belong to five different Autonomous Communities in Spain (i.e., Basque Country, Andalusia, Balearic Islands, Valencian Community, and Catalonia), this indicates that the mental well-being of first-year university students may be quite homogeneous across these regions of Spain and across academic fields.

Being male and being born in a foreign country were associated with a greater likelihood of having high mental well-being. The former is a frequent finding in previous literature on positive mental health in university students (Davoren et al., 2013; Elnaem et al., 2022), but the latter may be contradictory to other research indicating that migration is a possible risk factor for mental disorders (Bhugra and Jones, 2001). Considering that factors such as ethnicity, income, and education are some of the main structural determinants of mental well-being (Santini et al., 2020; Soldevila-Domenech et al., 2021; Stewart-Brown et al., 2015), the characteristics of our sample (i.e., first-year university students from a white, Catholic-majority country in the European Union) may help explain this finding. Other possible explanations could be that these students had affluent families who could afford the expenses associated with living and studying in a foreign country and/or that they enjoyed international scholarships awarded for high academic achievement. Both of these factors have been related to high mental well-being in previous studies (Clarke et al., 2011; Elnaem et al., 2022). Our results also showed that growing up in the suburbs was associated with a lower probability of high mental well-being. In Spain, a suburb designates poor residential areas and marginal or degraded neighborhoods, located on the outskirts of a city. This is consistent with the fact that socioeconomic factors are among the most important determinants of mental well-being, as well as with other studies showing that reducing inequalities among the population (e.g., in living conditions) can

Table 3
Variables associated with mental well-being (SWEMWBS). Fully adjusted models for high (A) and low (B) mental well-being compared to average.

Blocks of variables	Variables	Categories	A) High mental well-being		B) Low mental well-being	
			aOR (95 % CI)	*p*-value	aOR (95 % CI)	*p*-value
Sociodemographic variables	Gender (ref. Women)	Men	2.53 (1.39–4.61)**	0.003	0.76 (0.43–1.34)	0.344
	Age (years) (ref. 18)	≥19	1.23 (0.68–2.22)	0.493	1.04 (0.59–1.84)	0.897
	Country of birth (ref. Spain)	Other	2.89 (1.03–8.11)*	0.044	1.27 (0.55–2.91)	0.578
	Place raised (ref. Town/village/rural area)	Large city/small city	1.36 (0.79–2.32)	0.265	1.30 (0.77–2.21)	0.322
		Suburbs	0.28 (0.09–0.93)*	0.038	1.88 (0.66–5.38)	0.239
	Parent's university studies (ref. Neither)	At least one	1.02 (0.63–1.65)	0.943	0.87 (0.56–1.40)	0.603
University-related variables	University (ref. UPV-EHU, Basque Country)	UCA (Andalusia)	1.37 (0.62–3.04)	0.443	0.99 (0.53–1.85)	0.973
		UIB (Balearic Islands)	2.00 (0.85–4.72)	0.114	1.14 (0.46–2.82)	0.780
		UMH (Valencian Community)	0.85 (0.37–1.95)	0.700	1.65 (0.76–3.57)	0.204
		UPF (Catalonia)	0.86 (0.46–1.60)	0.634	1.18 (0.70–1.99)	0.537
	Academic field (ref. Social and Legal sciences)	Arts and Humanities	2.10 (0.99–4.46)	0.054	1.30 (0.65–2.58)	0.463
		Sciences	1.22 (0.57–2.61)	0.601	1.65 (0.76–3.57)	0.204
		Health sciences	1.56 (0.85–2.87)	0.150	0.63 (0.37–1.07)	0.086
		Engineering and Architecture	0.66 (0.27–1.64)	0.375	1.86 (0.98–3.52)	0.056
	Living at first term (ref. Parents' home)	Other	1.55 (0.92–2.62)	0.101	1.24 (0.78–1.95)	0.363
Relational, adversity and stress variables	Self-perceived support in childhood/adolescence (ref. Low)	Middle	2.03 (0.90–4.56)	0.087	0.56 (0.34–0.92)*	0.022
		High	4.22 (1.86–9.58)**	0.001	0.66 (0.37–1.18)	0.163
	Adversities in childhood/adolescence (ref. No)	Yes	0.74 (0.44–1.26)	0.270	0.87 (0.49–1.51)	0.613
	Recent stressful experiences (ref. No)	Yes	0.51 (0.31–0.86)*	0.011	0.95 (0.54–1.69)	0.868
Lifestyle variables	Physical activity (ref. Unhealthy)	Healthy	0.95 (0.59–1.54)	0.841	0.93 (0.58–1.48)	0.759
	Diet (ref. Unhealthy)	Healthy	1.23 (0.69–2.19)	0.489	0.78 (0.49–1.23)	0.283
	Hours of sleep (ref. Unhealthy)	Healthy	1.03 (0.61–1.71)	0.923	0.52 (0.34–0.81)**	0.004
Spiritual variables	Spirituality (ref. Low)	High	0.97 (0.54–1.75)	0.918	0.84 (0.46–1.53)	0.565
	Religiosity (ref. Low)	High	1.25 (0.65–2.39)	0.506	0.86 (0.39–1.93)	0.723
Health conditions	Neurodevelopmental disorders (ref. Absence)	Presence	1.00 (0.33–3.00)	0.996	0.85 (0.21–3.38)	0.814
	Mood disorders (ref. Absence)	Presence	1.63 (0.86–3.08)	0.131	2.11 (1.37–3.26)**	0.001
	Anxiety disorders (ref. Absence)	Presence	0.45 (0.23–0.89)*	0.022	1.78 (1.13–2.79)*	0.013
	Substance use disorders (ref. Absence)	Presence	0.72 (0.25–2.10)	0.547	1.22 (0.68–2.19)	0.509
	Chronic physical conditions (ref. Absence)	Presence	1.47 (0.74–2.93)	0.275	0.95 (0.60–1.50)	0.826
Self-perceived health variables	Self-perceived mental health (ref. Low)	High	2.76 (1.31–5.81)**	0.007	0.32 (0.19–0.53)***	<0.001
	Self-perceived physical health (ref. Low)	High	1.82 (0.99–3.37)	0.055	0.98 (0.59–1.63)	0.935

SWEMWBS, Short version of the Warwick-Edinburgh Mental Well-Being Scale; UPV-EHU, Basque Country University; UCA, Cadiz University; UIB, Balearic Islands University; UMH, Miguel Hernandez University; UPF, Pompeu Fabra University.
*** $p < 0.001$.
** $p < 0.01$.
* $p < 0.05$.

contribute to improved mental well-being (Cylus and Smith, 2020; Hahn and Truman, 2015; Lamu and Olsen, 2016).

Mental disorders and self-perceived mental health were among the main factors associated with mental well-being. Similar to previous research (Alonso et al., 2013; Binder and Coad, 2013; Wilson, 1995), chronic physical disorders were not significant for mental well-being. In contrast, having a mood disorder was associated with a higher likelihood of low mental well-being, and having an anxiety disorder was associated with both a lower likelihood of high mental well-being and a higher likelihood of low mental well-being. Nevertheless, more important than having a possible mental disorder was the person's self-perception of his or her mental health; such that, regardless of whether the person had a possible mental disorder, a positive self-perception of one's mental health was associated with both a higher likelihood of high mental well-being and a lower likelihood of low mental well-being. This discrepancy between objective and subjective perspective has been studied extensively in relation to cognitive performance, showing that subjective cognition is strongly influenced by psychological state (Godoy-González et al., 2023; Serra-Blasco et al., 2019). This finding may be consistent with our result that how a person (subjectively) feels and functions in daily life is a better predictor of mental well-being than the (objective) mental disorder he or she may suffer from.

Self-perceived support during childhood/adolescence also appeared among the main factors associated with mental well-being. Similar to previous research (Lamu and Olsen, 2016; Tough et al., 2017), positive relationships at school and with family were associated with both a higher likelihood of high mental well-being and a lower likelihood of low mental well-being; making it essential to include, in disease prevention programs promoted by public health providers, strategies focused on social interaction and participation and involvement in meaningful social activities (Wykes et al., 2015). We also observed that adversities during childhood/adolescence, such as family maladaptation, and recent stressful experiences, such as betrayal, argument, cheating or breakup, and having been physically or sexually assaulted were associated with a lower probability of high mental well-being. However, only betrayal, argument, cheating or breakup, but not family maladaptation or having been physically or sexually assaulted, were

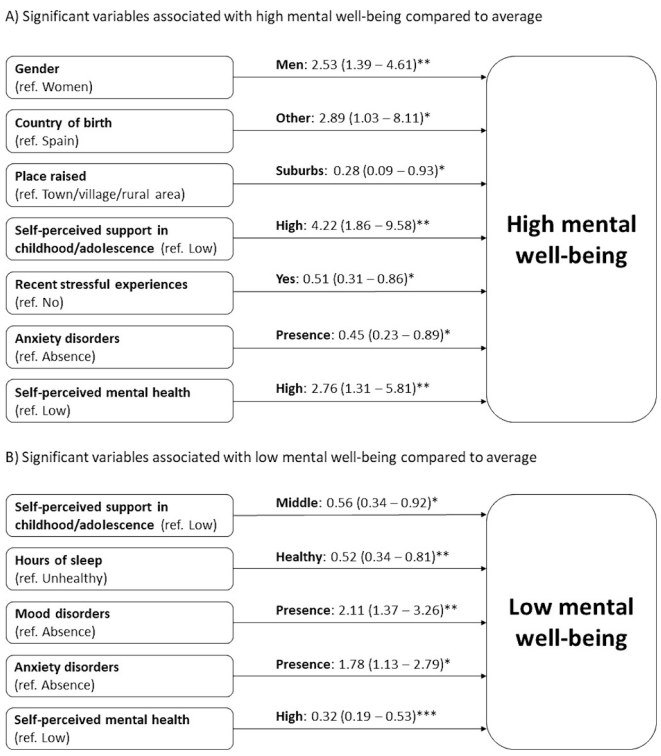

Fig. 2. Significant factors associated with high and low mental well-being compared to average. Adjusted odds ratios and 95 % confidence intervals are reported: aOR (95 % CI). *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$.

also associated with a higher likelihood of low mental well-being. These findings suggest that people exposed to adverse or stressful circumstances may have difficulty achieving positive mental health and/or be more prone to low mental well-being and require special attention from public health providers. Further studies investigating this pattern of associations are needed.

Last but not least, we found that sleeping ≥8 h per day was associated with a lower likelihood of low mental well-being and that neither diet nor physical activity were significant factors for mental well-being. These results partly contradict previous literature (Davoren et al., 2013; Elnaem et al., 2022; Ng Fat et al., 2017). However, the characteristics of our sample (i.e., first-year university students) may help to explain them. One possible explanation would be that in young people diet and physical activity do not (yet) impact mental well-being, whereas they do in older populations due to the cumulative effect of (un)healthy behaviors over time (Navarra-Ventura et al., 2023). This explanation is tentative and further studies are needed. In any case, promoting sleep hygiene may be useful and cost-effective in preventing low mental well-being (Petrides et al., 2019). Finally, in contrast to previous research (Villani et al., 2019), we found that spirituality and religiosity were not associated with mental well-being. Taken together, our results indicate that, beyond structural socioeconomic determinants and (self-perceived) health variables, there are non-material factors, such as lifestyle habits and relational, adversity and stress variables, that are important for the mental well-being of the university population (Barry, 2009; Dolan et al., 2008; Huppert, 2009).

This study is not without limitations. First, the exploratory nature prevents us from drawing definitive conclusions. Nevertheless, our results may be important for guiding future hypothesis-driven studies. Second, the cross-sectional design does not allow us to establish causal relationships or determine the direction of associations. Therefore, studies with longitudinal designs are needed to examine changes in mental well-being over time. Third, although we used a convenience sample of universities, their characteristics were very similar to those of all Spanish public universities in the 2014–15 academic year, as well as geographically dispersed throughout Spain, so the results are generalizable in this context. However, we only included first-year university students, which limits the generalizability of our results to the entire community of university students. Fourth, we had relatively low response rates. This limitation was minimized by applying population-based adjustments through post-stratification and inverse probability weights to reduce non-response bias (Brick, 2013). In addition, to improve the representativeness of the sample, monetary incentives were used, which may have encouraged the participation of individuals who would otherwise not be motivated to respond (Moyer and Brown, 2008; Singer and Ye, 2013). Fifth, all assessments were based on self-reports and not on direct clinical assessments. Therefore, it is best to consider health conditions as an indirect measure of the disorder and only as a "probable case". In any case, a clinical reassessment was performed showing good concordance with blinded clinical diagnoses (Ballester et al., 2019). Sixth, not all mental disorders were considered (e.g., autism spectrum disorders within neurodevelopment disorders, social phobia within anxiety disorders). Finally, a broad set of covariates was examined, but other possible determinants of mental well-being (e.g., personality factors, coping skills, academic performance) were not included (Barry, 2009; Dolan et al., 2008; Huppert, 2009). Despite all these limitations, our study has several strengths. First, although there is no gold-standard measure of mental well-being and the cut-off points are, by definition, arbitrary, the (S)WEMWBS is a valid indicator, which approaches health from a positive point of view and away from its pathological extreme. Second, the online methodology used tends to provide more reliable information on certain sensitive topics related to mental health than face-to-face interviews (Tourangeau and Yan, 2007). In addition, this data collection approach is commonly used in all WMH-ICS surveys, allowing for international comparison. Finally, the large representative sample size and the novelty of the data add value to our results.

5. Conclusion

This study shows that the mental well-being of first-year university students is relatively homogeneous across regions of Spain and across academic fields. It also shows that self-perceived support, mental disorders, and self-perceived mental health are among the most important determinants of mental well-being above sociodemographic, university-related, lifestyle and spiritual factors. The design of intervention programs aimed at promoting social interaction and participation and preventing mental disorders from a universal, holistic, and comprehensive perspective that also considers self-perceived health and healthy lifestyle, with special attention to reducing structural inequalities among the population, could contribute to improving the mental well-being of the university population.

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CRediT authorship contribution statement

Guillem Navarra-Ventura: Conceptualization, Data curation, Formal analysis, Methodology, Writing – original draft, Writing – review & editing. **Pau Riera-Serra:** Data curation, Formal analysis, Methodology, Writing – review & editing. **Miquel Roca:** Conceptualization,

Investigation, Methodology, Supervision, Project administration, Validation, Visualization, Writing – review & editing. **Margalida Gili:** Supervision, Validation, Visualization, Writing – review & editing, Conceptualization, Investigation, Methodology, Project administration. **Mauro García-Toro:** Supervision, Validation, Visualization, Writing – review & editing. **Gemma Vilagut:** Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Supervision, Validation, Visualization, Writing – review & editing. **Itxaso Alayo:** Investigation, Validation, Visualization, Writing – review & editing. **Laura Ballester:** Investigation, Supervision, Validation, Visualization, Writing – review & editing. **Maria Jesús Blasco:** Investigation, Validation, Visualization, Writing – review & editing. **Pere Castellví:** Investigation, Validation, Visualization, Writing – review & editing. **Joan Colom:** Investigation, Validation, Visualization, Writing – review & editing. **Cristina Casajuana:** Investigation, Validation, Visualization, Writing – review & editing. **Andrea Gabilondo:** Investigation, Validation, Visualization, Writing – review & editing. **Carolina Lagares:** Investigation, Validation, Visualization, Writing – review & editing. **José Almenara:** Investigation, Validation, Visualization, Writing – review & editing. **Andrea Miranda-Mendizabal:** Investigation, Validation, Visualization, Writing – review & editing. **Philippe Mortier:** Methodology, Supervision, Validation, Visualization, Writing – review & editing. **José Antonio Piqueras:** Investigation, Validation, Visualization, Writing – review & editing. **Victoria Soto-Sanz:** Investigation, Validation, Visualization, Writing – review & editing. **Jordi Alonso:** Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Validation, Visualization, Writing – review & editing.

Declaration of competing interest

None.

Data availability

The data that support the findings of this study are available from the corresponding author, Gili, M., and Alonso, J. (jalonso@researchmar.net), upon reasonable request.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jad.2024.04.056.

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