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Suicidal Thoughts and Behaviors: Prevalence and Association with Distal and Proximal Factors in Spanish University Students

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Objective: We report on the prevalence of suicidal thoughts and behaviors in Spanish university students and their risk and protective factors (distal/proximal; individual/environmental).

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The members of *UNIVERSAL* study group are in Appendix 1.

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Methods: First-year university students completed an online survey including Self-Injurious Thoughts and Behaviors Interview (SITBI) items, the screening version of the Columbia-Suicide Severity Rating Scale (C-SSRS) along with adversities and positive relationships during childhood/adolescence, recent stressful experiences, and lifetime mental disorders. Nested logistic regression models were estimated and areas under the curve (AUC) compared.
Results: A total of 2,118 students completed the survey (mean age = 18.8 [*SD* = 1.4] years; 55.4% female). Twelve-month prevalence of suicide ideation (SI) was 9.9%, plans, 5.6%, and attempts, 0.6%. Risk factors of 12-month SI were as follows: parental psychopathology (OR = 1.7, 95% CI 1.2–2.5); sexual assault (OR = 5.6, 95% CI 1.4–22.1); lifetime mood disorder (OR = 5.2, 95% CI 3.5–7.7); and lifetime anxiety disorder (OR = 1.7, 95% CI: 1.1–2.5). Childhood positive relationships protected from SI were as follows: peers/others (OR = 0.6, 95% CI 0.4–0.9 for the second highest tertile) and family (OR = 0.4, 95% CI 0.3–0.7 for the highest tertile). AUC of the final model was 0.82 (*SE* = 0.015).
Conclusion: Our results indicate a high prevalence of SI among Spanish university students and identify protective and risk factors from a comprehensive conceptual model.

Suicide is the second leading cause of death for those between the ages of 15 and 29 years globally (World Health Organization, 2016). Despite the increasing amount of research, rates among young people continue unabated (Franklin et al., 2016). Suicidal thoughts and behaviors (STB) are complex phenomena resulting from the presence of vulnerability factors (distal factors) which increase the probability of suicidal behavior and more immediate precipitants (proximal factors) that occurs near in time to STB (Mościcki, 2001). A large number of risk factors of suicidal thoughts and behaviors (STB) have been reported for adolescents and young people (Brent, 1995).

There is strong evidence of risk of STB for distal factors: childhood adversities; other types of family-related factors, such as parental psychopathology, loss of a parent to death, or divorce or family discord (Bridge, Goldstein, & Brent, 2006; Brodsky et al., 2008); and interpersonal violence, such as bulling or dating violence in the childhood or adolescence (Castellví et al., 2017; King & Merchant, 2008). Among proximal factors, evidence of risk of STB is also strong for stressful life events (Daniel, Goldston, Erkanli, Heilbron, & Franklin, 2017; Nock et al., 2013; Reinherz et al., 1995). There is also evidence that mental disorders, especially depression and substance use disorders, are major risk factors for STB (Bukstein et al., 1993; Wu et al., 2004). Most college interventions focus on identifying and treating mental disorders for preventing in-campus suicide (Gould, Greenberg, Velting, & Shaffer, 2003).

But the evidence about factors associated with STB is fragmented, as most studies have assessed individual factors in isolation. Few studies have simultaneously tested several risk factors to determine the potential individual impact on STB in young population (Arria et al., 2009; Beautrais, Joyce, & Mulder, 1996). Beautrais et al. (1996) examined the joint effects of childhood adversity, social disadvantage, and psychiatric morbidity on the risks of attempted serious suicide in youths aged 13–24 years, describing a significant contribution of all of them both independently and jointly. Arria et al. (2009) tested a multidimensional model in a sample of university students. They found that some risk factors only predict suicide ideation when other risk factors such as depression symptoms are not present. In addition, only a few studies have addressed possible protective factors of STB. Among those, social support

and family support have been shown to protect of STB (Franklin et al., 2016). Two recent studies documented the protective effect of childhood family support on suicide ideation (SI), an effect that extends beyond the adolescence and into adulthood (Kuramoto-Crawford, Ali, & Wilcox, 2016; Susukida, Wilcox, & Mendelson, 2016). But, the possible protection of distal factors, such as positive relationships during childhood, has not been studied.

We are not aware of any study jointly assessing protective and risk effects of STB, while there is a critical need to integrate both factors highlighted when planning prevention programs (Nock, Borges, & Ono, 2012).

University students are an increasingly higher proportion of the population younger than 25 in developed countries (Organisation for Economic Co-operation and Development (OECD), 2016). This group is particularly important in terms of human capital (Abel & Deitz, 2011). Among college-aged young adults, suicide has been found to be the second leading cause of death behind unintentional injury (e.g., fatal traffic accidents) in the United States (Centers for Disease Control, 2012). In other countries, epidemiological studies suggest that mental disorders and STB are also highly prevalent among university students (Auerbach et al., 2016; Eskin et al., 2016; Pedrelli, Nyer, Yeung, Zulauf, & Wilens, 2015), but cross-national data, especially from non-English-speaking countries, are limited. This high prevalence is significant not only for the distress it causes at a time of major life transition, but also because it is associated with substantial impairment in academic performance (Auerbach et al., 2016; Bruffaerts et al., 2018) as well as suicidal thoughts and behaviors (Mortier, Auerbach, et al., 2018). The UNIVERSAL study is part of the WHO World Mental Health (WMH) Survey International College Surveys (WMH-ICS), which were launched in an effort to address this critical knowledge gap. WMH-ICS is administering Web-based mental health needs assessment surveys to representative samples of incoming first-year students in colleges and universities throughout the world and then following these students over their college careers to examine patterns and baseline predictors of onset and persistence of common mental disorders and impairments in academic performance associated with those disorders.

The objectives of this study were to (1) estimate the 12-month prevalence of suicide ideation, plans, and suicide attempts among Spanish university students and (2) investigate the association between STB with childhood/adolescence adversities and positive relationships, previous-year stressful experiences, and lifetime mental disorders.

In this study, we have assessed the risk and protective factors following proposed guidelines for epidemiological studies (Mościcki, 2001). Our adaptation of that work model is depicted in Figure 1, differentiating distal and proximal exposures, as well as environmental and individual factors.

METHOD

Study Design

Cross-sectional baseline data from the UNIVERSAL project were used for this study. A detailed description of the rationale and methods of the UNIVERSAL project is provided elsewhere (Blasco et al., 2016).

Setting

Online surveys, via a secure Web platform specifically designed for the study, were completed between October 2014 and October 2015. Five public universities from different Autonomous Regions of Spain, Balearic Islands University (UIB), Basque Country University (UPV-EHU), Cadiz University (UCA), Miguel Hernández University (UMH), and Pompeu Fabra University (UPF), were selected for convenience. These universities represented 8.2% of the total students in public universities of Spain in the year 2014–15 (Table S1), and their distribution in terms of age, percentage of foreign students, and study field was similar to that of

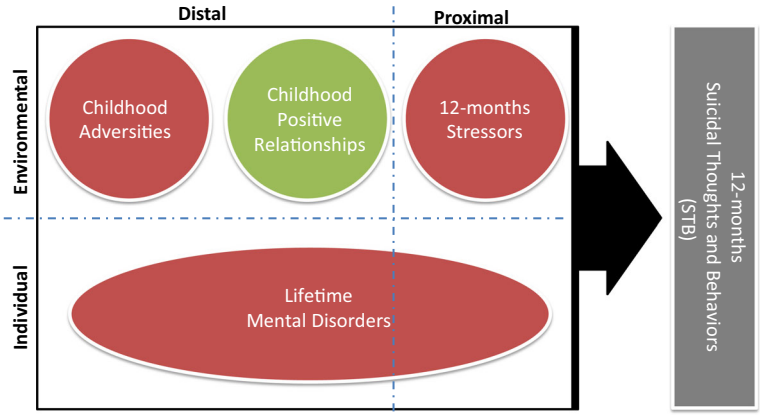

Figure 1. Risk and protective factors for STB (adapted from Mościcki (2001)). [Color figure can be viewed at wileyonlinelibrary.com]

the overall population of students in public universities of Spain.

Participants

All incoming first-grade students of a bachelor degree at the participating universities that were 18–24 years old and enrolled for the first time in a university were eligible for the study. A total of 16,332 students fulfilled inclusion criteria (Table S1). The sample was recruited in two stages. In the first stage, all eligible students were invited to participate. In a second stage, a random subsample of nonrespondents to the first stage was personally contacted by mail and an economic incentive of €25 was offered them to complete the survey. In UPV-EHU university, only Stage 1 was carried out. Invitation methods included advertising campaigns (e.g., stands with information, information in the classrooms, university Web) and e-mail invitation letters from university authorities. A raffle of academic materials (€40) among all students who complete baseline and first follow-up was announced in recruitment campaigns.

Participation was voluntary. Participants had to register to the survey and provide their informed consent before receiving a personalized link and password to access the survey. Eligibility of registered individuals was validated by the corresponding universities. The final sample size was determined by all eligible students that completed the baseline interview. At the end of the survey, all respondents were given information on how to access local health services. Individuals with positive responses on suicide items received a specific alert with indications for consulting with a health professional. Ethical approval was provided by the Parc de Salut MAR-Clinical Research Ethics Committee (Reference: 2013/5252/I).

Variables

Suicidal Thoughts and Behaviors (STB). Suicidal thoughts and behaviors items were taken from modified versions of the Self-Injurious Thoughts and Behaviors Interview (SITBI) (Nock, Holmberg, Photos, & Michel, 2007) and a screening version of the Columbia-Suicide Severity Rating Scale (C-SSRS) (Posner, Oquendo, Gould, Stanley, & Davies, 2007). STB was conceptualized as a continuum (Nock et al., 2012), starting with suicide ideation (SI) ("thoughts of killing yourself?"), possibly accompanied by suicide plan (SP) ("think about how you might kill yourself [e.g., taking pills, shooting yourself] or work out a plan of how to kill yourself?") and in some cases by suicide attempt (SA) ("made a suicide attempt [i.e., purposefully hurt yourself with at least some intent to die]?"). Construct validity of the SITBI is good to excellent compared with the

Schedule for Affective disorders and Schizophrenia for School-Age Children (K-SADS-PL; $K = 0.48–0.65$; Kaufman et al., 1997) and the Beck Scale for Suicide Ideation (BSI; $K = 0.59$; Beck, Kovacs, & Weissman, 1979). Interrater reliability and test–retest reliability after 6-month follow-up are excellent ($K = 0.7–1.0$; Nock et al., 2007).

Childhood/Adolescence Adversities. Childhood/adolescence adversities prior to the age of 17 were assessed using 22 items adapted from the Composite International Diagnosis Interview version 3.0 (CIDI-3.0) (Kessler, Ustun, Ustün, & Üstün, 2004), the Adverse Childhood Experience Scale (Felitti et al., 1998), and the Bully Survey (Swearer & Cary, 2003). Childhood/adolescence adversities included breakdown of family structure (by parental death or divorce), parental psychopathology, parental attempted or died by suicide, or household dysfunction (criminal activities or violence). Child maltreatment emotional, physical, sexual abuse, and neglect were assessed. Traumatic experiences at school or with peers included bully victimization and dating violence. Response options consisted of 5-point Likert-type items from "never" to "very often." The presence of any specific adversity was considered when the corresponding item was different than "never," except for bullying, which was considered positive when the frequency reported was "sometimes" or more.

Childhood/Adolescence Positive Relationships. Childhood/adolescence positive relationships were assessed using 13 items adapted from the CIDI 3.0 (Kessler et al., 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, Ahluvalia, Pogge, & Handelsman, 1997). Response options consisted of 5-point Likert-type items from "very often" to "never." Three constructs were considered from the positive relationships items, representing relationships within school (six items), family (four items), and peers/others (four items). Confirmatory factor analysis showed good fit with the data (comparative fit index = 0.986; Tucker–Lewis index = 0.983; root mean square error of approximation = 0.055) and good reliability, with omega coefficient of 0.7 for peers/others and 0.9 for school and family relationships. Scores for the constructs were obtained as the mean of the items and ranged from 1 through 5, with higher values indicating more positive relationships. Scales scores were then categorized into tertiles for the analysis after having checked that the linearity assumption of the logit in the continuous variables was not fulfilled. The least positive relationship category was chosen as the reference.

Recent Stressful Experiences. A list of stressful experiences adapted from items of Life Events Questionnaire (Brugha & Cragg, 1990), the Deployment Risk and Resilience Inventory (Vogt, Proctor, King, King, & Vasterling, 2008), and the Department of Defense Survey of Health-Related Behaviors (Bray et al., 2009) were used to assess recent stressful experiences. That list included death, life-threatening illness, or injury of a friend or family member; breakup or cheated with romantic partner; betrayal, arguments, or breakup with friends or family member; and physically or sexually assaulted, among others. Respondents indicated whether they had suffered any of those experiences in the previous 12 months.

Mental Disorders. Mental disorders included mood, anxiety, and substance use disorders. Items for assessing probable case of mood and anxiety disorders were drawn from the CIDI 3.0 (Kessler et al., 2004) and the Epi-Q Screening Survey (EPIQ-SS) (Kessler et al., 2010). Mood disorders included major depression episode and bipolar disorder. Anxiety disorders included panic disorder and generalized anxiety disorder. The CIDI-SC scales have been shown to have good concordance with blinded clinical diagnoses based on the Structured Clinical interview for DSM-IV (SCID) (First, Spitzer, Gibbon, & Williams, 1994), with AUC in the range 0.70–0.78 (Kessler, Calabre, et al., 2013). However, these validation studies have not yet been carried out in samples of college students. A modified version of the Alcohol Use

Disorders Identification Test, 10-item version (AUDIT-10) (Saunders, Aasland, Babor, De la Fuente, & Grant, 1993), and items from the CIDI 3.0 were used to screen for substance use disorders, which included alcohol and other substance abuse or dependence. Cases of mental disorders were defined based on a prior calibration study of the instrument (Kessler, Santiago, et al., 2013). The version of the AUDIT we used, which defined alcohol use disorder as either a total score of 8+ or a score of 4+ on the AUDIT dependence questions (Babor, Higgins-Biddle, Saunders, & Monteiro, 2001), has been shown to have concordance with clinical diagnoses in the range AUC = 0.78–0.91(Reinert & Allen, 2002).

Sociodemographic Characteristics. Sociodemographic factors were asked at the beginning of the survey and included age, gender, country of birth, parent's studies, and a set of college-related sociodemographic characteristics, such as academic field and their first-term living location during the university period (parents' home or other kind of residence). Academic field was classified based on the official Spanish Government classification university degrees, which keeps high correspondence with International Standard Classification of Education (UNESCO Institute for Statistics, 2011).

Analyses

The proportion of missing values on each of the variables ranged from 0.02% to 2.9%. Listwise deletion due to missingness in at least one of the variables included in the models ranged from 11.4% to 13.6%. Missing values included in the analysis were imputed with multiple imputation (MI) with $n = 5$ imputations using the fully conditional specification method. Pooled estimates from multiple imputations and MI-based standard errors taking into account within-imputation and between-imputation variances were obtained. Assuming a 12-month prevalence of 10% (conservative estimate) and a significance level alpha of 0.05 and for a sample of 2,700 respondents, the absolute precision estimated that would be achieved for the prevalence estimate of STB was ±0.81%.

Descriptive analyses were performed to describe the sample characteristics. Twelve-month prevalence of STB was estimated. Differences in prevalence across subgroups depending on each variable (e.g., parent deceased yes vs. no) were tested using chi-square test. Bivariate analyses were performed to examine the associations between factors selected and STB. Crude ORs were estimated and MI-based confidence intervals (CIs) were calculated at the 95% level, and statistical significance was set at the 5% level, after adjustment for multiple comparisons using the Benjamini–Hochberg procedure (Benjamini, Drai, Elmer, Kafkafi, & Golani, 2001) with a false discovery rate of 5%. Finally, multiple logistic regression models of 12-month STB were performed. Logistic models were devised in a block-nested manner, so that we could compare the contribution of clusters of similar factors to 12-month STB. Model I included childhood/adolescence factors, which can be considered distal factors. Model II added proximal factors: previous-year stressful experiences. Model III tested the role of lifetime mental disorders, as an individual characteristic in front of the previous correlates, which can be considered environmental correlates.

Models were adjusted by sociodemographic variables: age, gender, university, academic field, country of birth, parent's studies, and living location. Odds ratios (ORs) and confidence intervals were obtained. Statistical significance was evaluated with two-sided F test based on multiple imputations and α level of significance of 0.05. The area under the curve (AUC) was estimated to assess discriminant capacity of the models.

Inverse-probability weighting was applied to hard-to-reach respondents that were randomly selected and offered a monetary incentive to participate in the survey (endgame strategy weights). Poststratification weights were applied to restore population distribution of sex, 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 Mplus v7.11 (Muthén & Muthén, 2015).

RESULTS

Participants

A total of 2,118 students responded to the complete survey (see flow diagram in Figure S1). Overall weighted response rate was 19%, ranging from 9% (Basque Country University) to 44% (Pompeu Fabra University) (Table S1). Unbalanced distributions of the sample with respect to available census information were observed, with higher proportion of females in the UNIVERSAL sample (72.5% vs. 55.2%) and oversampling of foreign students (5.3% vs. 3.2%) and health sciences students (25.6% vs. 15.8%). Post-stratification weights restored population distributions on these variables (results available upon request).The characteristics of the weighted sample are shown in Table 1. Mean age was 18.8 (*SD* = 1.4) years. More than half of the respondents were female (55.4%), had neither parent who had a university degree (57.3%), and lived with their parents (56.2%). A majority were studying a Social Sciences or a Legal Sciences degree (47.6%). About six in 10 (or 61.9%) of the students reported at least one adversity prior to the age of 17 (the most frequent being parental psychopathology [30.8%] and emotional abuse [20.7%]). Bullying was reported by 31.4% and dating violence by 6.3%. Distribution of positive relationships is shown as tertiles (from high to low). Stressful experiences in the previous year were frequent (79.4%), the most frequent ones being with death/life-threatening illness/injury of a friend/family member (51.6%), and betrayal/arguments/breakup with friends/family members (45.7%). Twelve (0.5%) students reported having been sexually assaulted/raped. 37.1% of the students screened positive for lifetime mental disorders: mood (24%), anxiety (19.9%), or substance use (10.1%).

Prevalence of Suicidal Thoughts and Behaviors (STB)

Figure 2 shows the 12-month prevalence of STB. 9.9% (*n* = 227) of respondents reported SI in the last 12-months; 5.6% (*n* = 137) had a suicidal plan and 0.6% (*n* = 12) attempted suicide. No differences were found by gender.

The 12-month prevalence of STB by sociodemographic, environmental (proximal and distal), and individual variables is shown in Table S2. No significant differences were found in most of the sociodemographic categories, including gender for suicide ideation (SI) and suicidal plan (SP). Few significant differences were found for suicide attempt (SA), very likely due to the low numbers involved.

Correlates of Suicide Ideation (SI)

The association analyses of 12-month SI are presented in Table 2, where the first column shows the bivariate associations and the results of the multiple logistic regression models for 12-month are presented in subsequent columns. Bivariate analyses revealed that most of the factors were significantly associated with 12-month SI, in particular emotional abuse (OR = 3.1), sexually assaulted/raped in the past year (OR = 7.3), lifetime mood (OR = 8.3), and substance use disorders (OR = 2.2). A significant protective relationship was observed for childhood positive relationships at school (OR = 0.3 for high and 0.4 for second highest tertile), with family (OR = 0.2 for high and 0.6 for middle tertile), and with peers/others (OR = 0.4 for high and 0.5 for middle tertile).

Multiple Models of Suicide Ideation (SI)

Model I of multiple logistic regression shows adjusted ORs between childhood/adolescence (adversities and positive relationships) and 12-month SI, adjusting by sociodemographic variables. Parental psychopathology (OR = 1.9) and dating violence (OR = 1.9) were the adversities with highest odds of SI (OR attenuated in

TABLE 1
Sociodemographic, environmental (distal and proximal), and individual characteristics of the students included in the analysis (absolute numbers and weighted proportions)

	Total sample		Male		Female	
	n = 2,118	100%	*n* = 582	44.60%	*n* = 1,536	55.40%
Sociodemographics						
Age, mean (*SD*)	18.8	1.4	18.9	1.9	18.7	1.2
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 Hernández University (UMH)	292	10.6	106	11.7	186	9.8
Pompeu Fabra University (UPF)	585	13.5	137	11.7	448	15
Country of birth						
Spain	1,963	94.8	542	94.4	1,421	95.1
Other	155	5.2	40	5.6	115	4.9
Parent's university studies						
At least one	953	42.7	275	44.4	679	41.4
Neither	1,165	57.3	307	55.6	857	58.6
University sociodemographics						
Academic field						
Arts and Humanities	242	9.8	29	7.0	213	12
Engineering and Architecture	291	18.6	170	31.8	121	7.9
Health Sciences	543	15.7	116	10.0	427	20.2
Science	203	8.4	75	8.9	128	8
Social and Legal Sciences	839	47.6	192	42.3	647	51.8
Living at first term						
Parent's home	1,192	56.2	344	60.5	848	52.7
Other	926	43.8	238	39.5	688	47.3
Childhood/adolescence adversities						
Parents and family						
Parents deceased	78	3.8	21	3.9	56	3.6
Separation or Divorce	370	13.9	83	10.9	288	16.2
Parental psychopathology	708	30.8	186	27.9	522	33.2
Attempted or died by suicide	62	2.5	22	2.7	40	2.4
Household dysfunction	233	10.3	69	10.8	164	10
Any parent/family adversities	943	40.7	246	37.8	697	43.1
Childhood maltreatment						
Emotional	472	20.7	124	19.9	348	21.4
Physical	220	9.9	71	11.3	149	8.8
Sexual	35	1.7	8	0.8	28	2.4
Neglect	175	7.6	53	7.9	122	7.3
Any maltreatment	599	27.2	169	28.2	430	26.4
Bully victimization	674	31.4	188	33.1	486	30.1
Dating violence	171	6.3	24	3.2	147	8.8

(continued)

TABLE 1
(continued)

	Total sample		Male		Female	
	n = 2,118	100%	*n* = 582	44.60%	*n* = 2,118	100%
Any adversities	1,382	61.9	362	59.6	1,020	63.8
Positive relationships[a]						
School						
High	620	29.1	165	29.9	455	28.4
Middle	820	37.9	234	37.6	585	38.2
Low	678	33.1	183	32.6	496	33.4
Family						
High	826	35.4	180	30.7	645	39.1
Middle	709	34.8	221	34.8	488	34.7
Low	584	29.9	181	34.5	403	26.1
Peers/others						
High	594	28.3	132	25.8	462	30.3
Middle	854	36.8	217	34.9	637	38.3
Low	670	34.9	232	39.3	437	31.4
Recent stressful experiences						
Death, life-threatening illness, or injury of a friend or family member	1,112	51.6	288	47.4	824	55.0
Stressors related to romantic partner (breakup or cheated)	634	27.8	155	23.7	479	31.1
Betrayal, arguments, or breakup with friends or family member	964	45.7	215	39.9	750	50.3
Life-threatening accident	90	5.2	41	8.6	49	2.5
Seriously physically assaulted	81	5.0	41	8.1	40	2.6
Sexually assaulted or raped	12	0.5	1	0.3	11	0.8
Trouble with the police or serious legal problems	58	5.7	41	11.0	16	1.4
Any past-year stressful experiences	1,685	79.4	438	75.7	1,247	82.4
Physical and mental conditions						
Chronic health problems or physical impairment	403	20.6	107	18.4	296	22.3
Mental disorders[b]						
Mood	603	24.0	134	18.0	469	28.8
Anxiety	511	19.9	91	12.6	420	25.7
Substance	173	10.1	63	13.3	110	7.5
Any mental disorder	873	37.1	193	31.7	680	41.4

[a]School: lowest tertile [1–3.33], middle tertile (3.33–4.17], and high tertile (4.17–5.0]; family: lowest tertile [1–3.75], middle tertile (3.75–4.5], and highest tertile (4.5–5.0]; and peers/others: lowest tertile [1–2.75], middle tertile (2.75–3.5], and highest tertile (3.5–5.0].

[b]Mood includes major depression or bipolar disorder; Anxiety includes panic disorder or generalized anxiety disorder; and Substance includes alcohol and other substance abuse or dependence.

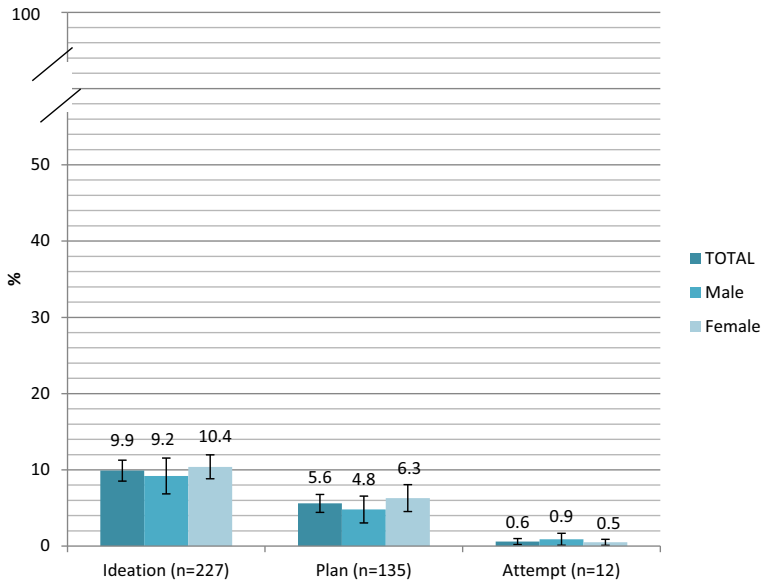

Figure 2. Twelve-month prevalence of suicidal thoughts and behaviors by gender ("weighted proportions"). [Color figure can be viewed at wileyonlinelibrary.com]

comparison with the bivariate model). School (OR = 0.5 for highest and 0.6 for second highest tertile) and family (OR = 0.4 for highest tertile) relationships were inversely associated with SI.

Model II includes 12-month stressful experiences variables in Model I. Only betrayal/arguments showed a higher odds of SI (OR = 1.8), whereas having had a life-threatening accident showed lower odds (OR = 0.2). Most of the associations for 12-month stressful experiences observed in the bivariate model attenuated in the adjusted model.

When lifetime mental disorders were added to the analysis (Model III), we still found a significant association of mental disorders with 12-month SI. The ORs were substantially reduced in comparison with the bivariate model (mood: OR = 4.9; anxiety: OR = 1.9). Substance use disorders were not statistically significant.

The inclusion of mental disorders in the model attenuated the protective effect of school positive relationships on SI, which were now nonsignificantly associated with SI. In Model III, few ORs were still significant; these were parental psychopathology (OR = 1.8); positive relationships: school (OR = 0.6 for middle), family (OR = 0.4 for high), and peer/others (OR = 0.6 for middle tertile); life-threatening accident (OR = 0.2); and lifetime mood (OR = 4.9) or anxiety disorders (1.9).

The area under the curve (AUC) obtained was 0.76 for Model I, 0.78 for Model II, and 0.82 for Model III. AUC from Model I (i.e., childhood/adolescent) was significantly different than that of Model III (final model).

Correlates and Multiple Models of Suicide Plan (SP)

Associations with SP are presented in Table S3. Results are similar to those obtained for SI. The AUC obtained were 0.79 for Model I, 0.80 for Model II, and 0.85 for Model III.

DISCUSSION

The study provides the first data on STB among Spanish university students. Three major findings emerged. First, there is

TABLE 2
Bivariate and multivariate associations of sociodemographic, environmental (distal and proximal), and individual variables with 12-month suicide ideation

	Bivariate			Model I			Model II			Model III		
	OR	95% CI	*p*-value	OR	95% CI	*p*-value	OR	95% CI	*p*-value	OR	95% CI	*p*-value
Gender (ref = Female)	0.9	0.7–1.2	.36	0.9	0.6–1.2	.372	0.9	0.6–1.2	.394	1.0	0.7–1.4	.969
Childhood/adolescence												
Adversities												
Parents and family												
Parents deceased	2.0	1.1–3.7	.02*	1.5	0.8–2.9	.221	1.5	0.8–3.0	.232	1.7	0.9–3.4	.127
Separation or divorce	1.3	0.9–2.0	.13	0.8	0.5–1.3	.357	0.8	0.5–1.3	.393	0.8	0.5–1.3	.430
Parental psychopathology	2.7	2.0–3.6	<.01*	1.9	1.3–2.7	<.01	1.8	1.3–2.6	<.01	1.8	1.2–2.7	<.01
Attempted or died by suicide	0.8	0.2–2.7	.76	0.2	0.1–0.9	.040	0.2	0.1–0.9	.045	0.3	0.1–1.1	.078
Household dysfunction	2.9	2.0–4.3	<.01*	1.4	0.9–2.4	.153	1.5	0.9–2.5	.119	1.3	0.8–2.3	.279
Childhood maltreatment												
Emotional	3.1	2.2–4.2	<.01*	1.5	1.0–2.2	.044	1.4	1.0–2.1	.088	1.4	0.9–2.0	.138
Physical	3.0	2.1–4.3	<.01*	1.5	0.9–2.4	.113	1.4	0.9–2.4	.155	1.3	0.7–2.1	.382
Sexual	1.4	0.5–4.4	.54	0.8	0.2–2.9	.727	0.7	0.2–2.5	.537	0.4	0.1–1.7	.242
Neglect	3.2	2.1–4.8	<.01*	1.1	0.7–1.9	.633	1.0	0.6–1.8	.938	1.2	0.6–2.1	.626
Bully victimization	2.5	1.8–3.3	<.01*	1.3	0.9–1.8	.178	1.2	0.8–1.7	.373	1.0	0.6–1.4	.823
Dating violence	2.9	1.9–4.5	<.01*	1.9	1.2–3.2	.012	1.5	0.9–2.6	.133	1.2	0.7–2.2	.478
Positive relationships[a]												
School (ref = Low)												
High	0.3	0.2 – 0.4	<.01*	0.5	0.3 – 0.8	<.01	0.5	0.3 – 0.8	<.01	0.6	0.3 – 1.0	.051
Middle	0.4	0.3 – 0.6		0.6	0.4 – 0.9		0.6	0.4 – 0.9		0.6	0.4 – 0.9	
Family (ref = Low)												
High	0.2	0.2–0.4	<.01*	0.4	0.3–0.7	<.01	0.4	0.3–0.7	<.01	0.4	0.3–0.7	<.01
Middle	0.6	0.4–0.8		0.8	0.5–1.1		0.8	0.5–1.2		0.8	0.5–1.2	
Peers/others (ref = Low)												
High	0.4	0.2–0.5	<.01*	0.7	0.4–1.1	.106	0.6	0.4–1.0	.032	0.6	0.4–1.1	.042
Middle	0.5	0.4–0.7		0.7	0.5–1.0		0.6	0.4–0.9		0.6	0.4–0.9	

(continued)

TABLE 2
(continued)

	Bivariate			Model I			Model II			Model III		
	OR	95% CI	*p*-value	OR	95% CI	*p*-value	OR	95% CI	*p*-value	OR	95% CI	*p*-value
Recent stressful experiences												
Death, life-threatening illness, or injury of a friend or family member	1.1	0.8–1.5	.56				0.9	0.7–1.3	.603	1.0	0.7–1.4	.846
Stressors related to romantic partner (breakup or cheated)	1.6	1.2–2.1	<.01*				1.3	0.9–1.9	.109	1.4	0.9–2.0	.105
Betrayal, arguments, or breakup with friends or family member	2.9	2.1–3.9	<.01*				1.8	1.3–2.6	<.01	1.4	0.9–2.0	.117
Life-threatening accident	0.4	0.2–1.1	.07				0.2	0.1–0.7	<.01	0.2	0.1–0.6	<.01
Seriously physically assaulted	1.6	0.9–2.8	.10				1.5	0.8–3.0	.221	1.9	0.9–3.9	.084
Sexually assaulted or raped	7.3	2.2–23.8	<.01*				2.4	0.6–9.2	.194	4.0	1.0–15.7	.046
Trouble with the police or serious legal problem	1.3	0.7–2.3	.41				1.7	0.8–3.5	.135	1.8	0.8–4.0	.135
Physical and mental conditions												
Chronic health problems or physical impairment	0.8	0.6–1.2	.39							0.6	0.4–1.0	.038
Mental disorders[b]												
Mood	8.3	6.1–11.3	<.01*							4.9	3.3–7.1	<.01
Anxiety	3.8	2.8–5.2	<.01*							1.9	1.3–2.8	<.01
Substance	2.2	1.5–3.2	<.01*							1.5	0.9–2.5	.137
AUC (*SE*)				0.76 (0.018)			0.78 (0.017)			0.82 (0.015)		

OR, odds ratio; CI, confidence interval; ref, reference category; AUC, area under the curve. Models I–III adjusted by age, gender, university, academic field, country of birth, parents' studies, and living location.

[a]School: lowest tertile [1–3.33], middle tertile (3.33–4.17], and high tertile (4.17–5.0]; family: lowest tertile [1–3.75], middle tertile (3.75–4.5], and highest tertile (4.5–5.0]; peers/others: lowest tertile [1–2.75], middle tertile (2.75–3.5], and highest tertile (3.5–5.0].

[b]Mood includes major depression or bipolar disorder; Anxiety includes panic disorder or generalized anxiety disorder; and Substance includes alcohol and other substance abuse or dependence.

*Raw *p*-value statistically significant after adjustment for multiple comparisons using the Benjamini–Hochberg procedure with false discovery rate .05.

a high prevalence of STB among Spanish university students. Second, SI is strongly associated with socioeconomic, environmental (both distal and proximal), and individual factors. Third, our data suggest that positive relationships in childhood/adolescence are protective of later SI.

Prior studies of STB among university students in Spain were specific to a single university (or even degree) (Vázquez & Blanco, 2008), and this is the first to estimate the prevalence of STB from a sample comprised of several Spanish universities. The 12-month prevalence of STB among Spanish students in our study is relatively high, although well within the bounds of what has been observed in other countries, with 12-month SI among university students between 5%–35% and 0.6%–11% for SA (Mortier et al., 2017). A recent meta-analysis including college samples from different countries provided pooled estimates of prevalence of 10.6% for SI, 3.0% for plans, and 1.2% for attempts (Mortier, Cuijpers, et al., 2018). The heterogeneity among studies involves difficulties for cross-country comparisons. The prevalence reported in our study was higher than that of the Spanish general population (Gabilondo et al., 2007). However, the specific scope (i.e., ideation severity, plans) of the questions addressing STB in different studies limits direct comparisons. Obtaining comparable data at the national and international levels is needed.

In our study, the main risk factors associated with 12-month SI were parental psychopathology, sexual assault, and lifetime mood and anxiety disorders. The mechanism of such association remains unclear, but multiple perspectives, from genetics to environmental influences such as imitation or socioeconomic family adversities, are likely (Brent & Melhem, 2008). In recent years, sexual assaults in college campuses are of growing interest (Carey, Norris, Durney, Shepardson, & Carey, 2018; Fedina, Holmes, & Backes, 2018; Halstead, Williams, & Gonzalez-Guarda, 2017). Also, mood, anxiety, and substance use disorders have been associated with SI (Brent et al., 1993) and these disorders are the most common focus of college suicide prevention strategies. The expected association of alcohol or substance use disorders with suicide ideation was not found. Previous studies have suggested that the association is related to other risk factors such as depression (Arria et al., 2009), and our results could be consistent with this hypothesis. Given the importance of alcohol and drug use in universities, more research about the pathways of the association between substance use disorders and STB is needed. Finally, an unexpected result between SI and having suffered a life-threatening in the last year was found in our study. According to our results, a recent accident is associated with minor SI. A similar negative association, although statistically nonsignificant, is observed for suffering from medical conditions. We are not aware of other studies reporting similar results. Replication of these findings seems necessary before further interpretation.

Our study suggests that positive relationships with others during childhood/adolescence may have a long-term protective effect on young-adult STB. We are only aware of two studies examining long-term protective effects on SI. Kuramoto-Crawford et al. (2016), in a sample of American adolescents, found that after adjusting for depressive symptoms, adolescents who reported higher parent–child connectedness during adolescence had lower relative risk of having ideation in their adulthood. Susukida et al. (2016) reported that individuals who perceived love from caregivers during childhood had significantly 42%–43% lower odds of lifetime suicide ideation as compared with those who did not perceive love from caregivers. In addition to the family context, our study obtained information about school and other relationships (with both peers and adults). We are not aware of any previous study having analyzed the long-term protective effect of STB of relationships with peers/others. Our study provides thus new evidence suggesting the importance of connectedness beyond not only in the family context but also in the

community context. Although traditionally the preventive interventions are focused in reducing the potential risk factors, these results support the importance of increasing the preventive effort also in protective factors from early ages. More information is needed about the mechanisms through which these protective distal factors act on prevention of SI (buffering the effect of risk factors or directly reducing the SI independent of presence of risk factors).

STRENGTHS AND LIMITATIONS

An important strength of our study was that the online methodology used tends to deliver more reliable information about STB than face-to-face interviews (Tourangeau & Yan, 2007). This data collection approach is used in common across the World Mental Health (WMH) consortium International College Surveys (WMH-ICS), which will allow for international comparison. The fact that the data include a large number of both distal and proximal factors as well as information about both environmental and individual risk and protective variables is another relevant strength.

Several limitations of our study should be considered. The cross-sectional nature of the study precludes interpreting associations as causal. Although we used a chronological perspective model, from distal to proximal correlates, which could be more consistent with a causal analysis, longitudinal studies are needed to establish temporal linkages. Second, some factors may have compromised generalizability of the results. Low response rates may have potentially caused nonresponse bias (Groves, Singer, & Corning, 2000). However, we applied population-based adjustments through poststratification and inverse-probability weights which reducing nonresponse bias (Brick, 2013; Dey, 1997). Comparisons of main results among lower and higher response rate universities show no important differences (data available upon request). While only a convenience sample of universities was studied, their geographical dispersion over Spain was considered. In fact, sample characteristics of the participating universities are very similar to the overall Spanish university students. Also, monetary incentives were offered in our study. Incentives may encourage participation of individuals that would otherwise not be motivated to respond and, thus, improve sample representativity. But the evidence on this issue is mixed, with some studies indicating that they may also introduce bias (Moyer & Brown, 2008). The low response rate has caused some loss of precision of survey estimates (Van Horn, Green, & Martinussen, 2009), and low number of relatively rare events, thus precluding specific analyses, such as testing the suicidal attempt model. Thus, the results for SP model should be treated with caution due to the low frequency of cases. While ideation and plan are different types of thoughts, attempt is a behavior and it is likely that different association pathways exist.

Our assessment of mental and substance use disorders was based on self-reports and not on direct clinical assessments, and therefore should be better considered "probable case" of disorder. Although a good diagnostic agreement has been reported with clinical judgment (Janca, Robins, Bucholz, Early, & Shayka, 1992; Wittchen, 1994), our instruments provide only a proxy measure of disorders. Self-reports of SI and childhood factors may be subject to recall bias. To minimize recall bias, we focused on STB in the previous 12-months. Studies have shown that retrospective reports of childhood events, such as emotional neglect and family discord, although with some controversy, are sufficiently reliable (Hardt & Rutter, 2004). Although we examined a broad set of potential risk and protective factors, many important correlates were not included in this study. For instance, we did not include several psychological (e.g., hopelessness, impulsivity), social (e.g., current social support), or biological factors known to be associated with STB. Whereas any one study cannot assess all such correlates, the limited focus used is

important to bear in mind when interpreting the results.

Finally, we did not include sexual orientation in our analyses, although it has been pointed out to be associated with suicidality. The possible association of LGBT with suicidality will be assessed in a specific study.

IMPLICATIONS

The high prevalence of STB among Spanish university students requires seriously considering an active detection of the risk for STB. Assessing individualized risk profiles for STB among first-year students may facilitate effective prevention interventions.

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APPENDIX 1

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.

Figure S1. Flow-chart of study population. The UNIVERSAL (University and Mental Health) project.

Table S1. Baseline response rate by participating universities, UNIVERSAL study.

Table S2. Twelve-month prevalence of suicide ideation plan and attempt (STB) by sociodemographic, environmental (distal and proximal) and individual variables (n = 2,118) (weighted proportions).

Table S3. Bivariate and Multiple associations of sociodemographic, environmental (distal and proximal) and individual variables with 12-month suicide plan.