Received: 29 April 2019 | Revised: 12 August 2019 | Accepted: 7 September 2019

DOI: 10.1002/da.22960

ANXIETY AND DEPRESSION ASSOCIATION OF AMERICA

WILEY

RESEARCH ARTICLE

Gender commonalities and differences in risk and protective factors of suicidal thoughts and behaviors: A cross-sectional study of Spanish university students

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Funding information
Fondo de Investigación Sanitaria, Instituto de Salud Carlos III-FEDER, Grant/Award Number: PI13/00343; Ministerio de Sanidad, Servicios Sociales e Igualdad, Grant/Award Number: PNSD Exp. 2015I015; ISCIII (Río Hortega, Grant/Award Numbers: CD12/00440, CD18/00049, CM14/00125; Sara Borrell; Ministerio de Educación, Cultura y Deporte, Grant/Award Number: FPU15/

Abstract

Aim: To assess gender differences in the association between risk/protective factors and suicidal thoughts and behaviors (STB); and whether there is any gender-interaction with those factors and STB; among Spanish university students.

Methods: Data from baseline online survey of UNIVERSAL project, a multicenter, observational study of first-year Spanish university students (18–24 years). We assessed STB; lifetime and 12-month negative life-events and family adversities; mental disorders; personal and community factors. Gender-specific regression models and gender-interactions were also analyzed.

Results: We included 2,105 students, 55.4% women. Twelve-month prevalence of suicidal ideation (SI) was 10%, plans 5.7%, attempts 0.6%. Statistically significant

05728; Generalitat de Catalunya, Grant/Award Number: 2017 2017 SGR 452

gender-interactions were found for lifetime anxiety disorder, hopelessness, violence between parents, chronic health conditions and family support. Lifetime mood disorder was a common risk factor of SI for both genders (Females: OR= 5.5; 95%CI 3.3–9.3; Males: OR= 4.4; 95%CI 2.0–9.7). For females, exposure to violence between parents (OR= 3.5; 95%CI 1.7–7.2), anxiety disorder (OR= 2.7; 95%CI 1.6–4.6), and alcohol/substance disorder (OR= 2.1; 95%CI 1.1–4.3); and for males, physical childhood maltreatment (OR= 3.6; 95%CI 1.4–9.2), deceased parents (OR= 4.6; 95% CI 1.2–17.7), and hopelessness (OR= 7.7; 95%CI 2.8–21.2), increased SI risk. Family support (OR= 0.5; 95%CI 0.2–0.9) and peers/others support (OR= 0.4; 95%CI 0.2–0.8) were associated to a lower SI risk only among females.

Conclusions: Only mood disorder was a common risk factor of SI for both genders, whereas important gender-differences were observed regarding the other factors assessed. The protective effect from family and peers/others support was observed only among females. Further research assessing underlying mechanisms and pathways of gender-differences is needed.

KEYWORDS

anxiety/anxiety disorders, depression, gender, mood disorders, suicide/self-harm

1 | INTRODUCTION

Suicide is the second leading cause of death among 15- to 29-year-olds (World Health Organization, 2016). In Spain in 2015, suicide was the first cause of death among 15- to 19-year-old women and the second among 20- to 24-year-old men (Instituto Nacional de Estadísticas, 2015). More current data shows that suicide rates among 15- to 29-year-olds represent 7.77% of the total suicide deaths in the country (Navarro-Gómez, 2017).

Prevalence estimates of suicidal thoughts and behaviors (STB) among college students are consistently high. Before ending university, over one-tenth of the students would seriously consider suicide and one-sixth would attempt suicide (Ashrafioun, Bonar, & Conner, 2016). Results from 19 colleges from eight countries showed 17.2%, 8.8%, and 1.0% 12-month prevalence of suicidal ideation (SI), plans and attempts, respectively (Mortier et al., 2018). From those, Northern Ireland results raise attention: almost the double individuals (31% total; 24.3% males, 36.9% females) reported 12-month SI, with almost 1 in 5 students have made a suicide plan (O'Neill et al., 2018).

Mental disorders are highly prevalent among university students (Auerbach et al., 2016; Eskin et al., 2016; Pedrelli, Nyer, Yeung, Zulauf, & Wilens, 2015). Mood, anxiety, disruptive, alcohol/substance abuse disorders increase STB more frequently (Cash & Bridge, 2009; Mortier et al., 2018). Mental disorders also increase distress (Eskin et al., 2016) and substantial impairment in academic performance (Auerbach et al., 2016). Childhood and adolescent adversities, bullying, stressful life experiences, and personal traits could also be related (Holt et al., 2015; Johnson et al., 2002; L. Wang et al., 2014; Werbart Törnblom, Werbart, & Rydelius, 2015). On the contrary, positive relationships with peers and family might be STB protective factors (Cash & Bridge, 2009; Thompson, Eggert, & Herting, 2000).

A "gender paradox" exists regarding suicidal behavior. Males have higher rates of completed suicide and lower rates of suicide attempt, compared to females. Likewise, males are three- to four-fold more likely to die by suicide than females (Eaton et al., 2012; Werbart Törnblom et al., 2015). The association between suicide and masculinity may play a role in creating a genuine gender gap in suicide rates (Canetto & Sakinofsky, 1998). Males are more likely to resort to more lethal means to reduce the likelihood of surviving (Mergl et al., 2015; Värnik et al., 2008). Gender-differences between internalizing (e.g., mood disorders) and externalizing (e.g., conduct disorders) disorders may also be related (Boyd et al., 2015). The few empirical data available about gender paradox in Spain suggest similar gender trends for STB (Navarro-Gómez, 2017).

Most of the evidence about STB risk and protective factors come from Anglo-Saxon countries; Spanish cross-national data is limited. Moreover, the available evidence of gender-differences in STB risk and protective factors is not specific for university students (Miranda-Mendizabal et al., 2019). This study aims to determine the association between risk and protective factors and STB stratified by gender and to assess whether there is any interaction between those factors and gender with STB among Spanish university students. Results from the present study will advance the understanding of the epidemiological gender-differences of STB among university students.

2 | METHODS

2.1 | Study design and setting

Data came from baseline survey (October 2014 to October 2015) of the UNIVERSAL (University and Mental Health) project, an ongoing,

multicenter and observational study of first-year Spanish university students. This project is part of the World Mental Health International College Student Initiative (WMH-ICS; http://www.hcp.med.harvard.edu/wmh/college_student_survey.php). More project details can be found elsewhere (Blasco et al., 2016).

Sample was recruited from five Spanish public universities: Cadiz University (UCA), Balearic Islands University (UIB), Basque Country University (UPV-EHU), Pompeu Fabra University (UPF), and Miguel Hernández University (UMH), representing about 8% of the undergraduate enrollment capacity annually offered in the country. Inclusion criteria were: a) students aged 18–24 (subjects under 18 at the start of the academic year were eligible when they turned 18); and b) being enrolled in the first university year for the first time. Students not accepting the study's informed consent were excluded. Based on eligibility criteria, 16,332 students were suitable to participate (Figure 1). Participants underwent an online survey via a secure web-based platform designed for the study.

Sample recruitment was performed in two stages. First, all first-year undergraduates were invited to participate in the baseline survey (e.g., census sampling). Invitation methods across the universities included: campus advertising campaigns (e.g., information stands, university website) and up to four personal e-mail invitation letters from the university authorities. Second, a random subsample of non-respondents to the first stage was contacted by e-mail including an economic incentive of 25 € to complete the survey ("endgame strategy"). In UPV-EHU, only stage one was carried out. The protocol of the study was approved by Parc de Salut MAR-Clinical Research Ethics Committee *(Reference number 2013/525/I)*.

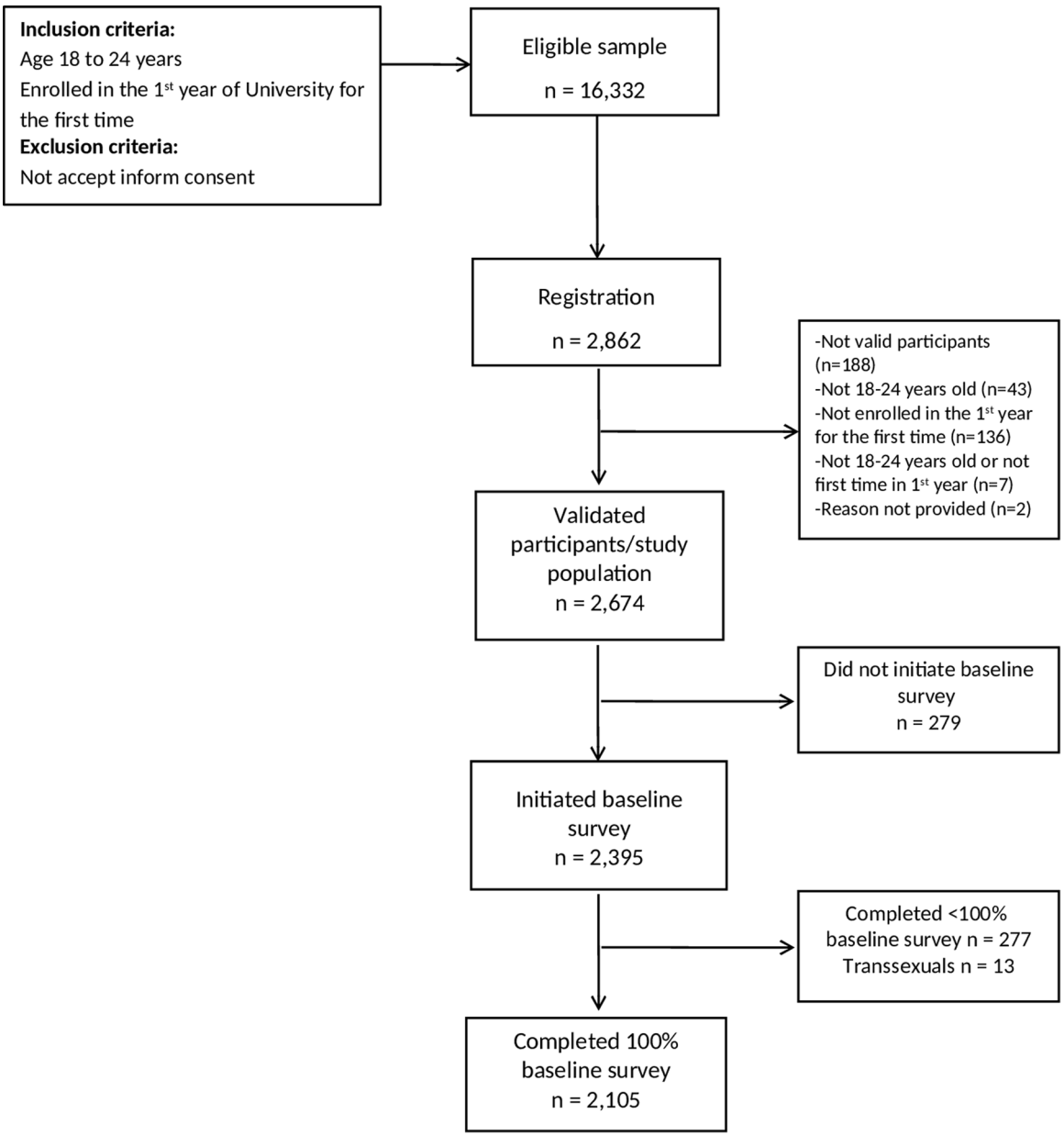

FIGURE 1 Flow diagram of the number of individuals at each participation stage. The UNIVERSAL (University and Mental Health) project

2.2 | Variables

2.2.1 | Suicidal thoughts and behaviors (STB)

STB was assessed through ideation (*"Have you ever had thoughts of killing yourself?"*); possibly accompanied by plans (*"Did you ever think about how you might kill yourself or work out a plan of how to kill yourself?"*) or attempts (*"Did you ever have a suicide attempt (i.e., purposefully hurt yourself with at least some intent to die)?"*); from modified versions of the Self-Injurious Thoughts and Behaviors Interview (SITBI; Nock, Holmberg, Photos, & Michel, 2007) and Columbia-Suicide Severity Rating Scale (C-SSRS; Posner, Oquendo, Gould, Stanley, & Davies, 2007).

2.2.2 | Negative life events and family adversity

Childhood maltreatment items, before the age of 17, included emotional maltreatment (e.g., *"Someone in your family repeatedly said hurtful or insulting things to you"*), physical abuse (e.g., *"Someone in your family hit you so hard that it left bruises or marks"*), sexual abuse (*"Someone in your family touched you or made you touch them in a sexual way against your will"*), and neglect (e.g., *"You were seriously neglected at home"*). Four items assessed physical, verbal, and cyberbullying victimization: *"How often were you bullied at school: physically/verbally by someone who purposefully ignored you, excluded you, or spread rumors about you behind your back?"* and *"How often were you bullied over the internet or by text messaging?"* Dating violence was evaluated with *"How often were you in a romantic relationship where your partner repeatedly hit you/said hurtful or insulting things to you?"* Family adversity included deceased parents, parental separation or divorce, psychopathology or criminal activities, any parent attempted or died by suicide, and violence between parents. Items were adapted from the CIDI 3.0 (Kessler & Ustün, 2004), the Adverse Childhood Experiences Scale (CES; Felitti et al., 1998) and the Bully Survey (BS; Swearer & Cary, 2003).

2.2.3 | Stressful events experienced in the past 12 months

These included death of a friend/family member, life-threatening illness or injury of a friend/family member, stressors related to a romantic partner (breakup or cheating), betrayal, arguments or breakup with friends/family member, interpersonal conflicts (fights with romantic partner/family member/someone else you know/stranger), life-threatening accidents, serious physical assault, sexual assault or rape, trouble with police or serious legal problems, and others stressful experiences. Items were adapted from the Life Events Questionnaire (Brugha & Cragg, 1990), the Deployment Risk and Resilience Inventory Survey (Vogt, Proctor, King, King, & Vasterling, 2008), and the Department of Defense Survey of Health-Related Behaviors among active-duty military personnel (Bray et al., 2009).

2.2.4 | Individual factors

Probable lifetime mood disorder (major depressive or bipolar disorder) and anxiety disorder (panic or generalized anxiety disorder) were evaluated using CIDI 3.0 (Kessler & Ustün, 2004) and Epi-Q Screening Survey (EPIQ-SS; Kessler et al., 2010). Probable lifetime alcohol or substance disorder (abuse or dependence) was screened through 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 (Kessler & Ustün, 2004). Hopelessness was evaluated with selected items from the Beck Hopelessness Scale (BHS; Beck, Weissman, Lester, & Trexler, 1974). Students were asked whether they had epilepsy, seizure disorder or any chronic condition (e.g., asthma, diabetes, migraine). Physical impairment (e.g., vision, hearing, movement) was also assessed.

2.2.5 | Community factors

Access to means was assessed with *"In the past 12 months, how many times did you carry a weapon such as a gun, knife, or club?"* Positive relationships, such as family support, peers/others support and school connectedness, were evaluated using 13 adapted items from CIDI 3.0 (Kessler & Ustün, 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). Scales' scores were categorized into tertiles (high, middle, or low) 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 the reference.

2.2.6 | Socio-demographics and educational

These factors included gender, center, and academic field, country of birth, parents' studies and the living location at first term (parents' home or others).

2.3 | Analysis

Missing values were imputed with multiple imputations (MI; $n = 5$ imputations) using a 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 (Van Buuren, 2012). Inverse-probability weighting was applied to hard-to-reach respondents that were randomly selected in the second sampling stage (endgame strategy weights). Poststratification weighting was used to adjust for differences between respondents and population distribution of sex, country of birth, academic field, and university. Descriptive analyses were performed. Twelve-month prevalence of ideation, plan, and attempt, stratified by gender, was estimated.

Risk and protective factors were classified on a modification of the socio-ecological model from the WHO (World Health Organization, 2014). As the model states, categories are not mutually exclusive, and factors can contribute to STB directly and indirectly by interrelating between them. Understanding the categories moving from systemic to individual represents a more useful approach. While previous analyses of UNIVERSAL project used a distal/proximal-factor epidemiological model (Blasco et al., 2019), a gender approach of suicidal risk does not correspond to a linear model and WHO socio-ecological model may be more adequate and complementary.

Bivariate analyses were performed to examine the associations of selected candidate risk and protective factors and 12-month STB. Crude ORs and 95% confidence intervals (CI) were estimated and differences across subgroups (e.g., parent deceased yes vs. no) were evaluated using MI-based Wald statistic. Gender-differences in the associations between candidate predictors and 12-month STB were assessed using multiple logistic regression models including, one at a time, a gender-interaction term with each factor. Based on those results, gender-stratified multiple logistic regression models of 12-month STB were built adjusting by center, academic field, parents' university studies and living at first term. Group lasso regularization was applied for the selection of variables to be included in the final multivariable models. Analyses excluded variables that showed low numbers within cells. Statistical significance was evaluated with a two-sided F-test based on multiple imputations and level of significance of 0.05. SAS software version 9.4 was used. Although we aimed to evaluate STB, due to the low prevalence of suicide plan and attempts, we were not able to calculate its risk estimates. Only estimates of SI are presented.

3 | RESULTS

A total sample of 2,105 students was included, with more than half being female (55.4%, weighted restored proportion of 72.4%). Suicidal ideation (SI) and suicide plans showed a higher likelihood among females (Females: 10.5% SI; 6.4% plans. Males: 9.2% SI; 4.8% plans), while suicide attempts were more frequent among males (Females: 0.5%. Males: 0.9%).

Some negative life events, recent stressful experiences and family adversities, among females and males, were as follows: dating violence (Females, 8.9%; Males, 3.2%); parental psychopathology (33.5%; 28%) and stressors related to romantic partner (31.5%; 23.8%). Mood (28.8%; 18.1%) and anxiety (25.8%; 12.7%) disorders were almost twice more frequent among females. Males reported a higher alcohol or substance abuse disorder than females (Females, 7.5%; Males, 13.4%), as well as physical maltreatment (8.8%; 11.3%), physical bully victimization (4%; 9.5%) and seriously physically assault (2.6%; 8.1%). In contrast, females showed higher family support (39%; 30.5%) and peers/others support (30.1%; 25.9%; Table 1).

Table 2 shows bivariate associations of risk and protective factors with 12-month SI, stratified by gender. Common risk factors of SI for both genders included: mood disorders, childhood maltreatment, and verbal bully victimization. Among stressful experiences in the last 12 months, common risk factors for both genders were betrayal, arguments or breakup with friends or family members (Females: OR 2.4; 95%CI 1.6–3.6; $p < .01$. Males: OR 3.5; 95%CI 2.1–5.6, $p < .01$), interpersonal conflicts (Females: OR 2.1; 95%CI 1.2-3.6; $p < .01$. Males: OR 1.8; 95%CI 1.1–2.9; $p = .02$) and parental psychopathology (Females: OR 2.2; 95%CI 1.5–3.2; $p < .01$. Males: OR 3.4; 95%CI 2.1–5.3; $p < .01$). For males only, SI was associated with parents' university studies (OR 2.4; 95% 1.3–4.3; $p = .01$), and hopelessness (OR 12.7; 95%CI 6.1–26.3; $p < .01$). Positive relationships (high family, peers support, and high school connectedness) were significantly associated to a lower SI risk for both genders.

Table 3 shows gender-specific risk and protective factors associated with 12-month SI adjusting for socio-demographic variables. Mood disorder predicted 12-month SI for both genders (Females: OR 5.5; 95%CI 3.3–9.3; $p < .01$; Males: OR 4.4; 95%CI 2.0–9.7; $p < .01$), with no gender-interaction. Females exposed to violence between parents had higher odds of 12-month SI (OR 3.5; 95%CI 1.7–7.2; $p < .01$), whereas unexpected protective effect was seen for males (OR 0.3; 95%CI 0.1–0.9; $p = .03$) with significant gender-interaction ($p < .01$). Anxiety disorder (OR 2.7; 95%CI 1.6–4.6; $p < .01$) and alcohol or substance disorder (OR 2.1; 95%CI 1.1–4.3; $p = .04$) also increased SI risk among females, gender-interaction was observed for anxiety disorder ($p < .01$). Exposure to physical childhood maltreatment (OR 3.6; 95%CI 1.4–9.2; $p < .01$), death of any of the parents (OR 4.6 95%CI 1.2–17.7; $p = .03$), parental psychopathology (OR 2.4; 95%CI 1.1-5.1; $p = .03$) and hopelessness (Agree strongly/moderate OR 7.7; 95%CI 2.8–21.2; $p < .01$) were predictors of 12-month SI in males. Except for hopelessness ($p = .02$), these gender-interactions were not significant. Family support (High: OR 0.5; 95%CI 0.2-0.9; Middle: OR 0.4; 95%CI 0.2-0.7; $p < .01$) and peers/others support (Middle: OR 0.4; 95%CI 0.2–0.8; $p = .01$) were protective factors only for females. Chronic health conditions reduced SI risk among males (OR 0.3; 95%CI 0.1–0.8; $p = .02$) with significant gender-interaction ($p = .04$).

4 | DISCUSSION

4.1 | Main findings

The present study assessed gender-differences in suicidal ideation (SI) and in SI risk and protective factors among Spanish university students. Females presented SI and plans more often than males, whereas suicide attempts were more prevalent among males, which was consistent with previous reports (Cash & Bridge, 2009; Eaton et al., 2012). Mood disorders were the only common risk factor of SI for both genders. Others risk factors assessed for the whole sample were specific either for females or males only. Among females, anxiety disorder, alcohol or substance disorder and violence between parents were major risk factors, with significant gender-interaction for anxiety and violence between parents. Hopelessness, physical

TABLE 1 Socio-demographic, individual, community risk, and protective factors of the students included in the analysis (absolute numbers and weighted proportions). The UNIVERSAL (University and Mental Health) project.

		Total *n* = 2,105		Female *n* = 1,525		Male *n* = 580	
		n	%	n	%	n	%
Socio-demographics and educational							
Centre	Balearic Islands University (UIB)	300	12.4	238	13.1	62	11.5
	Basque Country University (UPV-EHU)	636	43.8	449	42.1	187	45.8
	Cadiz University (UCA)	297	19.7	208	20.1	89	19.2
	Miguel Hernández University (UMH)	291	10.5	185	9.5	106	11.7
	Pompeu Fabra University (UPF)	581	13.6	445	15.1	136	11.7
Academic field	Arts and Humanities	240	9.8	211	12	29	7
	Engineering and Architecture	290	18.6	121	8	169	31.7
	Health Sciences	541	15.6	425	20	116	10.1
	Science	202	8.4	127	8	75	8.9
	Social and Legal Sciences	832	47.6	641	51.9	191	42.3
Country of birth	Spain	1951	94.8	1411	95.1	540	94.4
	Other	154	5.2	114	4.9	40	5.6
Parent´s studies	At least one	950	42.8	676	41.4	275	44.5
	Neither	1155	57.2	849	58.6	305	55.5
Living at first term	Parents home	1185	56.2	842	52.5	343	60.6
	Other	920	43.8	683	47.5	237	39.4
Negative life events and family adversity							
Childhood maltreatment	Emotional	470	20.8	348	21.6	122	19.7
	Physical	218	9.9	148	8.8	70	11.3
	Sexual	35	1.7	28	2.4	8	0.8
	Neglect	173	7.5	121	7.3	52	7.9
	Any	596	27.2	429	26.6	167	28
Bully victimization	Physical	131	6.4	70	4	60	9.5
	Verbal	654	30.8	471	29.6	184	32.2
	Cyber	69	3	58	3.2	11	2.7
	Any	670	31.5	483	30.2	187	33.1
Dating violence	Yes	169	6.4	146	8.9	23	3.2
Family adversity	Any parents deceased	78	3.8	56	3.7	21	3.9
	Parents separation or divorce	367	13.8	286	16.3	82	10.7
	Parental psychopathology	707	31	521	33.5	186	28
	Attempted or died by suicide	62	2.6	40	2.5	22	2.7
	Violence between parents	217	9.5	152	9.1	65	10
	Parental criminal activities	50	2.2	36	2	14	2.5
Recent stressful experiences (12-month)							
	Death, life-threatening illness or injury of a friend or family member	1106	51.6	819	55.1	287	47.3
	Stressors related to romantic partner (break-up or cheated)	633	28	478	31.5	155	23.8
	Betrayal, arguments or break up with friends or family member	959	45.8	745	50.6	215	40
	Interpersonal conflicts	218	13.5	121	8.5	97	19.8
	Life-threatening accident	90	5.3	49	2.6	41	8.6
	Seriously physically assaulted	81	5.1	40	2.6	41	8.1
	Sexually assaulted or raped	12	0.5	11	0.8	1	0.3
	Trouble with the police or serious legal problems	57	5.6	15	1.3	41	11
	Other stressful experience	151	6.6	118	6.3	32	6.9
	Any past year stressful experiences	1677	79.5	1240	82.6	437	75.7
Individual							
Mental disorders[a]	Mood disorder	598	24	465	28.8	133	18.1
	Anxiety disorder	509	19.9	418	25.8	91	12.7

(Continues)

TABLE 1 (Continued)

		Total *n* = 2,105		Female *n* = 1,525		Male *n* = 580	
		n	%	n	%	n	%
	Alcohol or substance disorder	172	10.1	109	7.5	63	13.4
	Any mental disorder	867	37.1	675	41.4	192	31.7
Psychological							
Hopelessness	Agree strongly/moderate	297	14	229	16.3	68	11.2
	Neither agree or disagree	949	45.9	692	44.1	257	48.2
	Disagree strongly/moderate	859	40	604	39.6	255	40.6
Chronic health conditions or physical impairment		403	20.7	296	22.5	107	18.5
Community							
Access to means	Yes	52	2.7	22	1.1	30	4.7
Positive Relationships[b]							
Family support	High	818	35.2	638	39	179	30.5
	Middle	707	34.8	486	34.7	221	34.9
	Low	581	30	401	26.2	180	34.6
Peers/others support	High	589	28.2	457	30.1	132	25.9
	Middle	849	36.7	633	38.3	216	34.8
	Low	667	35.1	435	31.6	231	39.4
School connectedness	High	617	29.1	453	28.6	164	29.7
	Middle	813	37.7	579	37.8	233	37.6
	Low	675	33.2	493	33.6	183	32.7

[a]Mood includes major depression or bipolar; Anxiety includes panic disorder or generalized anxiety disorder; Alcohol or substance includes abuse or dependence.

[b]Family support lowest tertile [1-3.75], middle tertile [4-4.5], highest tertile [4.75-5]. Peers/others support lowest tertile [1-2.75], middle tertile [3-3.5], highest tertile [3.75-5]. School connectedness lowest tertile [1.17-3.33], middle tertile [3.5-4.17], highest tertile [4.33-5].

childhood maltreatment, deceased parents, and parental psychopathology were male-specific risk factors, with significant gender-interaction for hopelessness. Family and peers/others support were SI protective factors for females, with gender-interaction for family support. Surprisingly, violence between parents and chronic health conditions decreased SI risk among males. A comparative cross-gender summary of the magnitude of the association between significant risk and protective factors is presented in Table 4.

4.2 | Strengths and limitations

This is the first original study systematically assessing gender-differences and interaction in a wide range of SI risk and protective factors among Spanish college students. Moreover, being part of the World Mental Health International College Survey (WMH-ICS) facilitates future comparisons and analyses.

Several limitations of this study deserve attention. First, although a convenience sample of universities was included, potentially limiting the generalizability of our study's findings, geographical dispersion over Spain was considered. In fact, the population's characteristics of the participating universities are similar to that of the overall Spanish university students. Also, the low response rate and a high proportion of females on the final respondents could limit representativeness. However, population-based adjustments through post-stratification and inverse probability weighting were applied to restore it (Brick, 2013). Second, the low number of individuals in some of the target factors limited the possibility to compare their association with SI for females and males when these variables were included in the models. Third, although our goal was to evaluate STB, low frequencies of suicide plans and attempts did not allow us to estimate multivariable logistic regression models for these outcomes. Therefore, only SI results are reported. However, for both genders, SI is one of the main predictors of suicidal behaviors; its assessment and prevention are of high concern. Moreover, we identified significant gender-interactions with some SI risk factors. Nevertheless, studies with larger samples, including a higher number of males, are necessary to obtain a more reliable assessment of STB gender-differences. Fourth, results are based on self-reported data, without a clinical interview. It is unknown to what extent these two sources coincide but we addressed this limitation by undergoing a clinical reappraisal study to control the validity of the research, which indicates a good concordance with these results (Ballester et al., 2019). Fifth, analyses according to sexual orientation were not performed and transsexual individuals were excluded. We are aware there are important suicidal risk differences among sexual minorities and we have reported some of them in a recent systematic review of

TABLE 2 Bivariate associations between risk and protective factors with 12-month suicidal ideation among Spanish university students, stratified by sex. The UNIVERSAL (University and Mental Health) project.

		Female *n* = 1,525			Male *n* = 580		
		OR	95%CI	*p* value*	OR	95%CI	*p* value*
Socio-demographics and educational							
Country of birth (ref = Spain)	Other	1.6	0.8–3.4	.19	0.6	0.1–3.2	.51
Parents University Studies (ref = Neither)	At least one	1.0	0.7–1.4	.83	2.4	1.3–4.3	**.01**
Living at first term (ref = Parents home)	Other	0.6	0.4–0.8	**<0.01**	1.0	0.6–1.6	.95
Negative life events and family adversity[a]							
Childhood maltreatment[a]	Emotional	3.1	2.1–4.6	**<0.01**	2.9	1.8–4.8	**<0.01**
	Physical	2.4	1.4–4.1	**<0.01**	3.8	2.2–6.4	**<0.01**
	Sexual	1.7	0.5–5.7	.38		Insufficient data	
	Neglect	2.6	1.5–4.7	**<0.01**	4.1	2.3–7.3	**<0.01**
	Any	2.9	2.0–4.3	**<0.01**	3.7	2.3–5.9	**<0.01**
Bully victimization[a]	Physical	2.6	1.3–5.4	**<0.01**	2.0	1.0–3.7	.04
	Verbal	2.3	1.6–3.3	**<0.01**	2.9	1.9–4.7	**<0.01**
	Cyber	2.2	0.9–5.0	.07	0.6	0.1–4.6	.60
	Any	2.2	1.5–3.3	**<0.01**	2.8	1.8–4.5	**<0.01**
Dating violence[a]	Yes	2.1	1.2–3.7	**<0.01**	6.3	2.8–13.9	**<0.01**
Family adversity[a]	Deceased parents	1.7	0.7–3.9	.23	2.5	1.0–5.8	**.04**
	Parents separation or divorce	1.3	0.8–2.1	.24	1.3	0.7–2.6	.37
	Parental psychopathology	2.2	1.5–3.2	**<0.01**	3.4	2.1–5.3	**<0.01**
	Attempted or died by suicide	0.6	0.2–2.7	.55	1.0	0.1–6.9	.99
	Violence between parents	4.4	2.8–7.1	**<0.01**	1.7	0.8–3.4	.15
	Parental criminal activities	1.4	0.4–5.2	.58	1.2	0.2–7.3	.87
Recent stressful experiences (12-month)[a]							
	Death, life-threatening illness or injury of a friend or family member	1.3	0.9–1.9	.19	0.8	0.5–1.3	.48
	Stressors related to romantic partner (break-up or cheated)	1.4	0.9–2.0	.11	1.9	1.1–3.0	**.01**
	Betrayal, arguments or break up with friends or family member	2.4	1.6–3.6	**<0.01**	3.5	2.1–5.6	**<0.01**
	Interpersonal conflicts	2.1	1.2–3.6	**<0.01**	1.8	1.1–2.9	**.02**
	Life-threatening accident	0.7	0.2–2.8	.66	0.3	0.1–1.1	.08
	Seriously physically assaulted	2.2	0.8–5.6	.11	1.4	0.7–3.0	.31
	Sexually assaulted or raped	3.2	0.7–14.5	.12		Insufficient data	
	Trouble with the police or serious legal problems	0.4	0.0–4.8	.46	1.6	0.9–3.0	.13
	Other stressful experience	1.4	0.6–3.1	.46	1.3	0.5–3.1	.61
	Any past year stressful experiences	2.3	1.2–4.3	**.01**	7.3	2.7–20.2	**<0.01**
Individual							
Mental disorders[ab]	Mood disorder	9.7	6.3–15.0	**<0.01**	7.3	4.6–11.8	**<0.01**
	Anxiety disorder	5.6	3.8–8.4	**<0.01**	2.0	1.1–3.5	**.02**
	Alcohol or substance disorder	2.3	1.3–4.0	**<0.01**	2.2	1.3–3.9	**<0.01**
	Any mental disorder	15.6	8.5–28.8	**<0.01**	3.9	2.4–6.2	**<0.01**
Psychological							
Hopelessness (ref = Disagree strongly/moderate)	Agree strongly/moderate	3.4	2.1–5.6	**<0.01**	12.7	6.1–26.3	**<0.01**
	Neither agree or disagree	1.2	0.8–1.9		3.4	1.8–6.6	
Chronic health conditions or physical impairment[a]		1.2	0.7–1.8	.51	0.4	0.2–0.9	**.03**
Community							
Access to means[a]	Yes	4.1	1.2–13.4	**.02**	4.5	2.3–9.1	**<0.01**

(Continues)

TABLE 2 (Continued)

		Female *n* = 1,525			Male *n* = 580		
		OR	95%CI	*p* value*	OR	95%CI	*p* value*
Positive relationships[c]							
Family support (ref = Low)	High	0.3	0.2–0.4	**<0.01**	0.1	0.0–0.3	**<0.01**
	Middle	0.3	0.2–0.5		1.2	0.7–1.9	
Peers/others support (ref = Low)	High	0.5	0.3–0.7	**<0.01**	0.1	0.0–0.4	**<0.01**
	Middle	0.3	0.2–0.5		0.9	0.5–1.4	
School connectedness (ref = Low)	High	0.4	0.2–0.6	**<0.01**	0.1	0.1–0.3	**<0.01**
	Middle	0.4	0.2–0.6		0.5	0.3–0.9	

Note: OR, odds ratio; 95%CI, 95% confidence interval. *p values for F-test to evaluate significance of each categorical predictor based on multiple imputation. $p < 0.05$ highlighted in bold.

[a]Reference category: no.

[b]Mood includes major depression or bipolar; Anxiety includes panic disorder or generalized anxiety disorder; Alcohol or substance includes abuse or dependence.

[c]Family support lowest tertile [1-3.75], middle tertile [4-4.5], highest tertile [4.75-5]. Peers/others support lowest tertile [1-2.75], middle tertile [3-3.5], highest tertile [3.75-5]. School connectedness lowest tertile [1.17-3.33], middle tertile [3.5-4.17], highest tertile [4.33-5].

the literature (Miranda-Mendizábal et al., 2017). To assess these issues, a specific paper based on the UNIVERSAL project survey will be performed. Finally, associations found cannot be considered as causal due to the cross-sectional nature of the data. Longitudinal studies are needed to determine causality.

4.3 | Comparisons with other studies

Mood disorders are one of the most prevalent mental disorders among university students (Auerbach et al., 2016). Our results indicated that lifetime major depression and bipolar disorders are the only risk factors for SI common for both genders, accordingly with previous literature (Skogman, Alsén, & Öjehagen, 2004). Alcohol and substance disorder and anxiety disorder were strongly associated with SI only among females, with significant gender-interaction for the latter. Previous findings showed a strong correlation between anxiety and SI among university students (O'Neill et al., 2018) and specifically among females (Goel et al., 2018). Probable gender-differences in the association between anxiety and SI might be implied based on interaction results. Our findings of the association between alcohol/substance disorder and SI among females are novel. Previous research has shown no increased risk of SI associated with alcohol/substance abuse among university students. However, those analyses were not specific for either male or female students. Anxiety is strongly associated with severe impairment (e.g., college-related problems) (Alonso et al., 2018). Meanwhile, the effects of alcohol/substance use/abuse include failure in developmental tasks (e.g., healthy interaction with peers) and in daily obligations (e.g., attending school); and impair users' judgment (Mann, 2003; P.-W.Wang & Yen, 2017).

A gender-interaction was observed for hopelessness, and increased risk of SI was observed only for males. Previous research has consistently found that hopelessness increased SI risk (Lane & Miranda, 2018) or mediates the relationship of some other risk factors with SI (Abdollahi, Abu Talib, Siti Nor, & Zanariah, 2016; Lamis, Ballard, May, & Dvorak, 2016). However, there is a lack of evidence about the association between hopelessness and STB according to gender among university students, showing the need for further studies.

The protective effect from family and peers/others support for SI among females was observed, is consistent with previous literature (Cash & Bridge, 2009; Macalli et al., 2018; Miller, Esposito-Smythers, & Leichtweis, 2015). Higher levels of support exert its protective effect by increasing self-efficacy or reducing stress (Arria et al., 2009; Thompson et al., 2000). Unexpected results observed in the association between violence between parents and chronic health conditions or physical impairment with SI are probably due to low numbers in these and some other variables included in the model. Further analyses that include wider samples and a higher number of males are needed to draw robust conclusions.

4.4 | Implications for prevention and future research

Our findings contribute substantially to the existing literature on gender-differences in SI risk and protective factors. Profound knowledge of SI gender-risk factors might help increase awareness about students who could be at serious risk. Results showed gender-interactions with some mental disorders and psychological factors; which have a profound impact on students' physical, emotional, cognitive, and interpersonal functioning, affecting their academic performance, retention, and graduation rates (Kitzrow, 2009).

Students' mental health should be a priority for universities. Prompt detection of high-risk suicidal cases may reduce suicide mortality (Paschall & Bersamin, 2018). Gatekeeper prevention interventions are an example of intervention on college campuses to improve knowledge, skills, and self-efficacy regarding suicide

TABLE 3 Results of the multivariable models of gender-specific risk and protective factors of 12-month suicidal ideation among Spanish university students. The UNIVERSAL (University and Mental Health) project

		Female			Male			*p* value for intxn**
		OR	95%CI	*p* value*	OR	95%CI	*p* value*	
Negative life events and family adversity[a]								
Childhood maltreatment	Emotional	1.2	0.7–2.2	.49	1.0	0.4–2.4	.94	.56
	Physical	0.7	0.3–1.6	.39	3.6	1.4–9.2	**<0.01**	.48
	Neglect	---	----	---	1.8	0.6–4.9	.27	.42
	Verbal	1.0	0.6–1.7	.86	1.1	0.5–2.5	.73	.72
Dating violence	Yes	1.5	0.7–3.0	.28	4.0	0.9–18.1	.08	.41
Family adversity	Deceased parents	---	----	**---**	4.6	1.2–17.7	**.03**	.54
	Parental psychopathology	1.1	0.6–1.8	.79	2.4	1.1–5.1	**.03**	.40
	Violence between parents	3.5	1.7–7.2	**<0.01**	0.3	0.1–0.9	**.03**	**<0.01**
Recent stressful experiences (12-month)								
	Life-threatening illness or injury of a friend or family member	---	----	---	0.5	0.3–1.0	**.04**	.35
	Stressors related to romantic partner (break-up or cheated)	---	----	---	2.0	1.0–4.0	.05	.13
	Betrayal, arguments or break up with friends or family member	1.2	0.7–2.0	.49	1.2	0.6–2.5	.57	.68
	Interpersonal conflicts	1.6	0.8–3.2	.20	1.3	0.6–2.8	.49	.95
	Seriously physically assaulted	---	----	---	1.4	0.5–3.8	.57	.85
	Trouble with the police or serious legal problems	---	----	---	1.9	0.8–4.7	.17	.21
	Other stressful experience	0.7	0.3–2.0	.55	0.4	0.1–1.7	.23	.16
Individual								
Mental disorders[a,b]	Mood disorder	5.5	3.3–9.3	**<0.01**	4.4	2.0–9.7	**<0.01**	.13
	Anxiety disorder	2.7	1.6–4.6	**<0.01**	1.0	0.4–2.6	.94	**<0.01**
	Alcohol or substance disorder	2.1	1.1–4.3	**.04**	0.5	0.2–1.6	.27	.51
Psychological								
Hopelessness (ref = Disagree strongly/moderate)	Agree strongly/moderate	1.4	0.7–2.7	.31	7.7	2.8–21.2	**<0.01**	**.02**
	Neither agree or disagree	0.9	0.5–1.6		2.9	1.2–6.8		
Chronic health conditions or physical impairment[a]	Yes	---	----		0.3	0.1–0.8	**.02**	**.04**
Community								
Access to means[b]	Yes	---	----		1.6	0.5–5.3	.47	.48
Positive Relationships[c]								
Family support (ref = Low)	High	0.5	0.2–0.9	**<0.01**	0.2	0.1–1.0	**<0.01**	**<0.01**
	Middle	0.4	0.2–0.7		2.1	0.9–4.5		
Peers/others support (ref = Low)	High	0.6	0.3–1.1	**.01**	0.2	0.0–1.3	.11	.13
	Middle	0.4	0.2–0.8		0.5	0.2–1.1		
School connectedness (ref = Low)	High	0.8	0.4–1.5	.46	0.7	0.2–2.4	.39	.40
	Middle	0.7	0.4–1.2		0.6	0.3–1.2		

Note: Adjusted by center, academic field, parents' university studies and living at first term; *$p < 0.05$ highlighted in bold.

*p value for F-test to evaluate significance of each variable based on multiple imputation.

**p value for F-test of the interactions between gender with each of the assessed factors based on multiple imputation.

[a]Reference category: no.

[b]Mood includes major depression or nipolar; Anxiety includes panic disorder or generalized anxiety disorder; Alcohol or substance includes abuse or dependence.

[c]Family support lowest tertile [1-3.75], middle tertile [4-4.5], highest tertile [4.75-5]. Peers/others support lowest tertile [1-2.75], middle tertile [3-3.5], highest tertile [3.75-5]. School connectedness lowest tertile [1.17-3.33], middle tertile [3.5-4.17], highest tertile [4.33-5].

TABLE 4 Summary of common and gender-specific risk and protective factors of suicidal ideation among Spanish university students. The UNIVERSAL (University and Mental Health) project.

		Female	Male
Negative life events and family adversity			
Childhood maltreatment	Physical	NS	++
Dating violence	Yes	NS	++
Family adversity	Deceased parents	NS	++
	Parental psychopathology	NS	++
	Violence between parents	++	NS
Individual			
Mental disorders[a]	Mood disorder	+++	++
	Anxiety disorder	++	NS
	Alcohol or substance disorder	++	NS
Psychological			
Hopelessness (ref = Disagree strongly/moderate)	Agree strongly/moderate	NS	+++
Community			
Positive Relationships			
Family support (ref = Low)	High, Middle	**	NS
Peers/others support (ref = Low)	Middle	**	NS

Note: Based on logistic model results of the magnitude of ORs: + >1 to <2, ++ ≥2 to <5, +++ ≥5; **<1. NS, no statistically significant (at $\alpha = 0.05$).
[a]Mood includes major depression or bipolar; Anxiety includes panic disorder or generalized anxiety disorder; Alcohol or substance includes abuse or dependence.

intervention to identify and potentially help suicidal students. There is little evidence about interventions on treatment referrals for students with STB, and studies do not address the effectiveness of the treatment in STB (Wolitzky-Taylor, LeBeau, Perez, Gong-Guy, & Fong, 2019). A combination of individual strategies building personal skills and setting-based approach to improve the overall university setting has also been recommended (Fernandez et al., 2016). Ensuring self-regulation and coping strategies before the onset of college stressful life events might be helpful (O'Neill et al., 2018). Although suicide prevention in universities has increased, there is still room for improvement. Research addressing the effectiveness of interventions to reduce the frequency and intensity of STB, or to change help-seeking behavior and linkage to treatment, as well as secondary and tertiary STB prevention, is needed.

Gender-differences when engaging in preventive strategies also should be taken into account. Females are more willing to communicate and to use prevention centers (Klimes-Dougan, Yuan, Lee, & Houri, 2009). Accordingly, the benefit from school-based programs (Kalafat & Gagliano, 1996) and screening at primary care settings (Rutz, von Knorring, & Wålinder, 1992) is evident. Males are not prone to be actively involved in suicide awareness programs (Shaffer, 1990). School-wide screening (Garlow et al., 2008) and public campaigns (Daigle et al., 2006) may facilitate STB identification among them.

Further research is needed in several areas. In this study, no attempt has been made to interpret the causal associations between the evaluated factors. Future longitudinal research to clarify the mechanisms underlying gender-differences, mediator variables and possible pathways of STB development are required. Tests for analyzing significant interactions/effects or techniques for more accurate baseline screening algorithms are also needed. Finally, improving the quantity and quality of research about preventive strategies of STB in college settings is desirable.

ACKNOWLEDGMENT

This work was supported by Fondo de Investigación Sanitaria, Instituto de Salud Carlos III-FEDER (PI13/00343); ISCIII (Río Hortega, CM14/00125); ISCIII (Sara Borrell, CD12/00440, CD18/00049); Ministerio de Sanidad, Servicios Sociales e Igualdad, PNSD (Exp. 2015I015); Ministerio de Educación, Cultura y Deporte (FPU15/05728); Generalitat de Catalunya (2017(2017 SGR 452).

CONFLICTS OF INTEREST

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

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How to cite this article: Miranda-Mendizabal A, Castellví P, Alayo I, et al. Gender commonalities and differences in risk and protective factors of suicidal thoughts and behaviors: A cross-sectional study of Spanish university students. *Depress Anxiety*. 2019;36:1102–1114. https://doi.org/10.1002/da.22960