

Suicidal ideation among Italian medical students: prevalence and associated factors from a multicenter study

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Abstract

Objectives. To estimate Suicidal Ideation (SI) prevalence among Italian medical students and explore associated factors.

Methods. Multicentre cross-sectional study (2018). Students were enrolled through convenience sampling (sample size=2513). Questionnaires included socio-demographic items and Beck Depression Inventory-II, which has an item on SI. A multivariable regression was performed (p-value<0.05 significant).

Results. SI prevalence was 13.7%. Among students with and without depression SI prevalence was 36.0% and 4.3%. Being female, being in a relationship, good/excellent family cohesion, perceived good economic status were significantly associated with lower SI. Increasing age, bisexual/asexual orientation, psychiatric family history, negative judgment on medical school choice, competitive/hostile climate and unsatisfying friendships among classmates, being worried about not measuring up to the profession significantly increased SI.

Conclusion. There was a high SI prevalence among Italian medical students, consistently with worldwide data. Demographic, relational, and motivational factors seem to influence SI. Determinants should be further investigated to plan university-level interventions.

Key words

- students
- medical
- suicidal ideation
- education
- medical
- depression

INTRODUCTION

Worldwide, almost 800,000 people die due to suicide every year and many more attempt suicide [1]. Suicide accounts for 1.5% of all deaths and is the second cause of death among 15-29-year-olds [1]. Despite medical students are recognized as a high-risk population for depressive disorders [2], a gap exists in knowledge of medical students' Suicidal Ideation (SI) [2, 3].

Indeed, in 2016, a meta-analysis reported a pooled prevalence of SI among medical students of 11.1% (data extracted from 24 studies from 15 countries, with a total of 21,002 students) [2], and, in 2018, a systematic review showed a prevalence of SI among medical students that ranged from 1.8% to 53.6% (data extracted from 17 studies from 13 countries, with a total of 13,244 students) [3]. However, such relevant works did not include studies from Southern Europe, except for one study [4]. Currently, data from this area come only from a single-site study from Portugal where a survey on 456 medical students showed a SI prevalence of 3.9% during medical school [4]. Given the above, there

is the need to extend information about SI, especially collecting data from less studied populations. The present paper aimed to estimate the prevalence of SI and to identify factors associated with SI among a large sample of medical students in Italy.

METHODS

The present study is part of the Psychosocial Report in Italian MEDical Students (PRIMES), which was a multicenter cross-sectional survey performed in 12 Italian medical schools in November 2018 [5]. The Ethics Committee of the University of Turin approved the protocol. Participants were recruited by convenience in the 1st, 4th, 6th year of course and informed consents were obtained from all participants. Participation was voluntary and anonymous, and participants received no compensation. Raosoft® was used to determine that the minimum sample size was 383, based on a 5% margin of error, 95% confidence level, 50% response distribution and population of 78,101 (medical students in 2017). Detailed methods are presented in the PRIMES main paper [5].

The questionnaire

The self-administered questionnaire included a 30-item section, designed after a research about factors that might influence mental health of medical students [5], and the Beck Depression Inventory-II (BDI-II), an instrument to assess depressive symptoms over the past two weeks [6]. The 30-item section mainly included socio-demographic questions, information about social support, health-related and university-related data.

The BDI-II has an item on suicidal thoughts/wishes (item 9), whose options are: (a) "I don't have any thoughts of killing myself", (b) "I have thoughts of killing myself, but I would not carry them out", (c) "I would like to kill myself", (d) "I would kill myself if I had the chance" [6]. To perform the analyses, the binary outcome on SI was created by grouping the last three options, as proposed by other authors [7, 8]. The presence of depressive symptoms was defined with a BDI-II score ≥ 14 , which is a widely used cut-off [2, 5]. Total scores from 0-13 represent no/minimal depression, 14-19 represent mild depression, 20-28 represent moderate depression, and 29-63 represent severe depression [6]. Overall, an increasing BDI-II score corresponds to a great severity of depressive symptoms.

Data analysis

Descriptive analyses were carried out for all variables. The BDI-II score and age reported non-normal distributions (Shapiro-Wilk test) and, therefore, they were expressed as median and interquartile range (IQR). The SI prevalence was computed with a 95% bootstrap CI (simple random sampling method). Concerning categorical variables, chi-squared tests and adjusted residuals were calculated to evaluate differences between participants with/without SI. To assess the difference in BDI-II score and age between participants with/without SI, a non-parametric test, i.e. the Mann-Whitney U test, was used due to the non-normal distribution of these variables.

To explore SI predictors, a multivariable logistic regression model adjusted for age and gender was performed. The independent variables were coded from the items of the socio-demographic section. In particular, the variables entered at the first step were mainly selected because they can be related to medical students' mental health as further explained in the PRIMES main paper [5]. Such variables were: school geographical area, nationality, relationship status, sexual orientation, living condition, family cohesion, working condition, distance from home and economic status, having a hobby, practicing sport, family history of psychiatric disorders and suicides/attempts, personal chronic disease, stimulants consumption, medical school choice judgment, friendships satisfaction, classmates climate, hindrances by medical school, career motivations and worries about future. To achieve the final model (Model 1), a backward elimination method was used (likelihood-ratio statistic greater than 0.10 as removal criterion). Similarly, a model only for 4th-6th year students (Model 2) was executed by adding the variable "grade average and being on time with exams" at the first step.

In addition, we computed another multivariable

model (Model 3) to explore if the variables included in Model 1 were associated with SI independently from the severity of the other depressive symptoms. Thus, we added to Model 1 the BDI-II score (subtracting the score of SI, i.e. item 9) as independent variable.

The results of the multivariable models were expressed as adjusted Odds Ratios (adjOR) with 95% Confidence Interval (CI).

Univariable regressions with the final selected variables of Model 1 as independent variables are presented along with the multivariable models to provide an overview of the relationships before adjusting for covariates. The results of the univariable regressions were expressed as Odds Ratios (OR) with 95% CI.

The data were analyzed using IBM SPSS Statistics software version 25.0 (IBM Corp., USA) and a two-tailed p-value $< .05$ was considered to be significant. Missing values were excluded by pairwise deletion in descriptive analyses and by listwise deletion in regressions.

RESULTS

PRIMES participants were 2,513. In the present paper, we considered 2,457 students (97.8%) who completed the SI item. Females accounted for 61.6% ($n = 1,506$) and the median age was 22 (IQR = 4). The majority was Italian ($n=2416$, 98.6%). First-year students were 42.0% ($n = 1,033$), while fourth- and sixth-year students were 28.4% ($n = 699$) and 29.5% ($n = 725$), respectively. About half of the sample was involved in a relationship ($n = 1,264$, 51.6%). A total of 13.8% had a sexual orientation different from heterosexuality (42 homosexuals, 276 bisexuals, 17 asexuals). Family cohesion was very poor/poor/excessive for 267 students (10.9%), good for 918 (37.5%), and excellent for 1,265 (51.6%). The majority had a good economic status ($n = 2,206$, 89.9%). A total of 24.1% ($n = 589$) declared to have a 1st/2nd degree relative with a psychiatric disorder. Participants who declared to see a psychologist/psychiatrist at the time of the survey were 138 (5.6%).

One out of five judged negatively the choice of medical school or had no opinion ($n = 496$). Few students had unsatisfying friendships with classmates ($n = 125$, 5.2%) and 390 students felt the climate among classmates was competitive and hostile (16.0%). About half of participants thought that medical school hindered having hobbies ($n = 1,286$, 52.5%), 46.6% were worried to not measure up to the profession ($n = 1,141$) and 46.3% were worried about specialty/job limited chances ($n = 1,133$). Considering only 4th and 6th year students, participants with a high grade average were 62.2% (731 students were on time with exams and 148 not on time) and people with a low/medium average were 37.8% (301 students were on time with exams and 234 not on time). More details about the characteristics of the sample can be found in the PRIMES main paper [5].

A total of 336 students (13.7%, 95% CI 12.5-14.9%) reported SI. Specifically, 286 (11.6%) indicated (b), 43 (1.8%) (c), and 7 (0.3%) (d). In addition, 29.5% of the sample ($n = 708$) presented depressive symptoms and the median BDI-II score was 9 (IQR = 4-15). SI was

reported by 36.0% of students with depressive symptoms and by 4.3% of students without such symptoms ($p < .001$). Mild depression was significantly more reported among those who selected (b) (25.7%, adjusted residual = 6.0), moderate depression was significantly more reported among students who chose (b) (32.1%, adjusted residual = 11.9) or (c) (22.0%, adjusted residual = 2.2), and severe depression was significantly more reported among those who marked (b) (17.1%, adjusted residual = 10.9), (c) (63.4%, adjusted residual = 18.4) or (d) (57.1%, adjusted residual = 6.8) ($p < .001$). In particular, students without SI had a median BDI-II score of 8 (IQR = 4-13), while students with SI had a median BDI-II score of 21 (IQR = 14-28) ($p < .001$). Specifically concerning students with SI, the median BDI-II score was 19 (IQR = 13-26) for participants who selected (b), 32 (IQR = 25-36) for those who selected (c), and 44 (IQR = 25-48) for those who selected (d).

According to the chi-squared tests, SI was significantly differently distributed across all the above-mentioned variables, except across gender ($p = 0.780$). For instance, the prevalence of SI ideation was higher in the following categories: single students (15.5%), bisexuals (24.6%), asexuals (52.9%), participants with very poor/poor/excessive family cohesion (27.3%), with poor economic status (23.7%), with a 1st/2nd degree relative with a psychiatric disorder (20.0%), 6th year students (15.7%), students negatively judging medical school choice (26.4%), students with unsatisfying friendships (37.6%), students who considered the climate among classmates hostile (25.4%), students thinking that medical schools hinders having hobbies (17.3%), students worried to not measure up to the profession (19.5%) or about the specialty/job limited chances (16.7%). Last, 27.7% of people seeing a psychologist/psychiatrist presented SI (i.e. 12.2% of all students with SI).

The main multivariable model (Model 1) is presented in *Table 1*. Factors associated with a lower probability of reporting SI were being female, being involved in a relation, good and excellent family cohesion, and good economic status. The higher was the age, the more students were prone to show SI. Bisexual and asexual orientation, family history of psychiatric disorders, negative judgment on medical school choice or no opinion, unsatisfying friendships with classmates, competitive and hostile climate among classmates, and being worried about not measuring up to the profession increased the likelihood of declaring SI.

Overall, Model 1 confirmed the results of the univariable analyses (*Table 1*). However, there were some exceptions. Indeed, year of course, thinking that medical schools hinders having hobbies, and having worries about specialty/job limited chances reported significant relationships with SI in the univariable regressions, while such relationships were no more significant when adjusting for other covariates in Model 1. Conversely, the significant association between gender and SI shown in Model 1 was not found in the univariable analysis.

Moreover, the model with only 4th-6th year students (Model 2) showed also a significance for grade average and timing with exams. Indeed, compared with those

with high average and on time with exams, participants with high average and not on time had an OR of 2.44 (95%CI 1.50-3.99, $p < .001$), students with low/medium average on time of 1.93 (95%CI 1.27-2.94, $p = .002$) and not on time of 1.82 (95%CI 1.18-2.81, $p = .007$) (results not shown in the table).

Last, Model 3 showed that some variables kept a significant association with SI even if the model was adjusted for the overall severity of the depressive symptoms (*Table 1*). Specifically, being female, being involved in a relation, and an excellent family cohesion confirmed to be associated to a lower likelihood of reporting SI. Participants with bisexual and asexual orientation, family history of psychiatric disorders, and unsatisfying friendships with classmates confirmed to be more likely to disclose SI. In addition, the higher was the BDI-II score (excluding item 9), the higher was the probability of declaring SI.

DISCUSSION

The prevalence of SI (13.7%) among medical students of the PRIMES sample resulted consistent with the prevalence reported in the two meta-analyses available in literature: 11.1% (95% CI 9.0%-13.7%) calculated by Rotenstein *et al.* [2] and 11.0% (95% CI 4.0%-19.0%) calculated by Zeng *et al.* [9]. However, there are probably too many differences among the studies considered, both concerning cultural features of the samples and from the methodological point of view. Regarding methods, indeed, tools for measuring SI were different and the time span considered can vary from lifetime to the past 12 months to the last two weeks.

Comparing the SI prevalence of our sample with available data from Europe, our prevalence exceeds estimates by Coentre *et al.* (Portugal, 3.9%) [4] and Wege *et al.* (Germany, 7.4%) [10], is similar to estimates by Chow *et al.* (Germany, 14.7%) [11] and Tyssen *et al.* (Norway, 14%) [12], and is lower than estimates by Miletic *et al.* (Serbia, 23%) [13] and Wallin *et al.* (Sweden, 34-44%) [14]. It should be noted that such European studies were different for included participants and instruments used to evaluate SI. In particular, the studies from Germany considered first year students [10, 11], those from Portugal [4] and Norway [12] enrolled students from the last years, and those from Serbia [13] and Sweden [14] took into account a mixed sample as we did in PRIMES. Interestingly, our study reported a lower prevalence compared with the estimates calculated in samples similar for year of course [13, 14]. About the tools for assessing SI, it is worth highlight two main aspects: the validation and the time span. Most of European studies used one or more items from a validated test (Patient Health Questionnaire-9 [10, 11], Paykel's instrument for measuring suicidal ideation and attempts [12], Suicide Behaviors Questionnaire [13]), while only two works developed *ad hoc* questions [4, 14]. However, there were no clear differences or patterns in prevalence based on this characteristic. Similarly, there are no distinct differences also considering the time span, which was: the last two weeks [10, 11], the last year [12, 14], during medical school [4] and lifetime [13].

Table 1
Univariable logistic regressions and multivariable logistic regression models with Suicidal Ideation as outcome

Outcome: Suicidal ideation	Univariable regression			Multivariable model 1*			Multivariable model 3*		
	OR	95% CI	P value	adjOR	95% CI	P value	adjOR	95% CI	P value
Age	1.09	1.05-1.13	<0.001	1.07	1.01-1.13	0.016	1.04	0.97-1.12	0.261
Gender									
Male	Ref.			Ref.			Ref.		
Female	0.97	0.76-1.23	0.780	0.75	0.56-0.99	0.042	0.54	0.39-0.74	<0.001
Year of course**									
First	Ref.			Ref.			Ref.		
Fourth	2.10	1.58-2.79	<0.001	1.08	0.74-1.58	0.696	1.06	0.69-1.62	0.792
Sixth	1.80	1.35-2.40	<0.001	0.67	0.42-1.08	0.100	0.76	0.44-1.32	0.327
Relationship status									
Single	Ref.			Ref.			Ref.		
Involved	0.74	0.89-0.93	0.010	0.64	0.49-0.83	0.001	0.67	0.50-0.90	0.008
Sexual orientation									
Heterosexual	Ref.			Ref.			Ref.		
Homosexual	2.07	0.98-4.39	0.056	1.34	0.55-3.25	0.519	1.34	0.54-3.33	0.535
Bisexual	2.49	1.83-3.37	<0.001	2.15	1.51-3.05	<0.001	1.93	1.31-2.83	0.001
Asexual	8.55	3.27-22.38	<0.001	7.95	2.71-23.3	<0.001	6.60	1.86-23.4	0.003
Family cohesion									
Very poor/poor/excessive	Ref.			Ref.			Ref.		
Good	0.56	0.41-0.77	<0.001	0.54	0.37-0.78	0.001	0.68	0.45-1.03	0.067
Excellent	0.23	0.17-0.33	<0.001	0.31	0.21-0.45	<0.001	0.40	0.26-0.62	<0.001
Economic status									
Poor	Ref.			Ref.			Ref.		
Good	0.46	0.34-0.63	<0.001	0.63	0.43-0.91	0.014	1.02	0.67-1.55	0.929
1st/2nd degree relatives with psychiatric disorders[#]	1.91	1.49-2.44	<0.001	1.53	1.15-2.04	0.003	1.40	1.03-1.91	0.032
Judging the choice of medical school									
Positively	Ref.			Ref.			Ref.		
Negatively/No opinion	3.06	2.39-3.91	<0.001	1.79	1.34-2.41	<0.001	1.13	0.81-1.57	0.487
Satisfying friendships with a circle of classmates									
Yes/Not yet	Ref.			Ref.			Ref.		
No	4.29	2.93-6.29	<0.001	2.73	1.74-4.30	<0.001	2.08	1.23-3.52	0.007
Climate among classmates									
Friendly/Competitive but stimulating/No opinion	Ref.			Ref.			Ref.		
Competitive and hostile	2.66	2.04-3.47	<0.001	1.95	1.41-2.69	<0.001	1.19	0.83-1.71	0.333
Thinking that medical school hinders: Having hobbies[#]	1.94	1.52-2.47	<0.001	1.29	0.97-1.73	0.085	1.01	0.74-1.39	0.941
Worries about the future[°]: Yes, not measured up to the profession[#]	2.55	2.00-3.25	<0.001	2.08	1.57-2.77	<0.001	1.19	0.87-1.62	0.281
Worries about the future[°]: Yes, about specialty/job limited chances[#]	1.60	1.27-2.02	<0.001	1.27	0.96-1.68	0.089	0.99	0.73-1.34	0.929
BDI-II score (excluding item 9 on suicidal ideation)	1.16	1.14-1.18	<0.001	-	-	-	1.15	1.13-1.17	<0.001

Abbreviations: adjusted Odds Ratios (adjOR); Beck Depression Inventory-II (BDI-II); Confidence Interval (CI); Odds Ratio (OR).

Significant P values in bold.

*The multivariable model 3 is the multivariable model 1 with, in addition, the BDI-II score as independent variable. The results of the multivariable model 2 are described only in the text. Further details about the models are provided in the Methods.

** year of medical school.

[#] Possible options: "No" and "Yes". "No" considered the reference level.

[°] Possibility to select more options.

The prevalence of depressive symptoms (29.5%) in our sample is similar to the prevalence of the meta-analysis of Rotenstein *et al.* (27.2%, 95% CI 24.7%-29.9%) [2] and, as expected, depression seems to be an important factor associated with SI in medical students (36.0% of students with depressive symptoms reported SI vs 4.3% of students without such symptoms), consistently with literature [3, 4, 7, 13]. Additionally, in the PRIMES sample, being female increased likelihood of showing depression [5] but decreased the probability of reporting SI. Notably, in the literature on MSs, there are mixed evidences about associations between gender and SI [3, 7, 9].

Demographic factors associated with a higher probability of reporting SI were having family history of psychiatric disorders and, differently from literature [2], being older (but no significant relationship between SI and year of course was found by PRIMES, as already seen in literature [2, 3]). Coherently with other studies [3, 4, 1], poor economic status emerged as a factor associated with SI among medical students. In addition, consistently with literature about the high risk for mental disorders in sexual minorities [15], students disclosing bisexual or asexual orientation were more likely to declare SI. Since homosexual orientation was not associated with higher SI risk, our results suggest possible differences in SI among sexual minority subgroups that should be further investigated. Indeed, the systematic review by Plöderl and Tremblay highlighted that, although an elevated risk exist within all sexual minorities, bisexuals have reported higher mental health problems compared with homosexual individuals in several studies [15]. Therefore, it would be worth exploring the determinants of such differences, also taking into account the under-studied asexual orientation, and possibly considering features such as stigma and social acceptance.

As expected by previous findings [3, 7, 12], also some relational factors were associated with a higher likelihood of reporting SI, such as having a poor family cohesion, being single, and feeling classroom climate as hostile and not suitable for friendship.

It should be highlighted that the regression model adjusted for the BDI-II score showed that some of the above-mentioned variables were associated with SI independently from the overall depressive symptoms. Such variables included both demographic (i.e. gender, sexual orientation, family history of psychiatric disorders) and relational (i.e. family cohesion, relationship status, friendship with classmates) factors and, thus, such aspects should be particularly taken into account when studying SI and planning preventive and supportive strategies.

Finally, in line with other works [3, 7], PRIMES revealed some motivational factors that can make the students more prone to SI, such as having a negative judgement about their own career choice, dissatisfaction about their own scholar performance or worries about future profession. Both relational and motivational are probably factors that could be addressed by specific interventions at a university level.

Limitations included the cross-sectional design, the

opportunistic sampling, and the use of a single item instead of a multi-item measure for SI. Indeed, a prospective study with structured interview in a random subset of participants would give a more authentic estimate [2].

Nevertheless, PRIMES had the strength to be the first large multicenter study in Italy assessing SI prevalence among medical students. Moreover, it showed that, despite medical students seem a high-risk population for SI, only 12.2% and 14.3% of these students was treated or was followed by a psychologist/psychiatrist, respectively. These findings were similar to the situation Rotenstein and colleagues found in their meta-analysis regarding medical students with depressive symptoms [2], thus underlining the necessity to realize strategies to increase the access to care by accommodating the needs of medical students.

Therefore, given the high SI prevalence, it would be advisable to study more in depth the factors that are involved in SI among medical students in order to implement effective preventive plans and design effective and approachable interventions. Relevant reviews on SI suggest that the primary actions to face SI among medical students should be addressing stigma to reduce barriers to mental health services, identifying depressive symptoms, as they are the most frequent factor associated with SI, and implementing general well-being interventions for all students to lower the overall rates of mental health issues [2, 3]. Based on our findings, we argue that SI interventions should be promoted especially for males and sexual minorities, and the low social support from family and peers that students with SI might experience should be considered when developing such strategies.

Ethical approval

This study was conducted according to the guidelines laid down in the Declaration of Helsinki. The Ethics Committee of University of Torino reviewed and approved the protocol (Prot. 420112, 12/10/2018).

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Author's contribution statement

PL, RS, FB, GLM contributed to the design of the study. PL, FB, GLM performed the investigation and analysed the data. PL, FB, GLM drafted the manuscript. PL, RS, FB reviewed the draft. All Authors approved the final version.

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Conflict of interest statement

The Authors of this paper declare no conflict of interest.

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