Psychiatry Research 278 (2019) 129–134

Contents lists available at ScienceDirect

Psychiatry Research

journal homepage: www.elsevier.com/locate/psychres

Risk factors for suicidal behavior in a university population in Brazil: A retrospective study

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ARTICLE INFO

Keywords:
Employees
Ideation
Planning
Students
Suicide

ABSTRACT

The present study aimed to evaluate whether variables related to personal and academic characteristics, past history, habits, and addictions were associated with suicidal behavior. Medical records of patients attending the Outpatient Psychiatry Department at the State University of Maringá between July 2016 and December 2017 were included in this retrospective study. The studied population was divided into two groups: 80 employees and 158 students. After performing the univariate analysis using Pearson's chi-square test or Fischer's exact test, the variables with $p < 0.30$ were included in a multivariate analysis using the binary logistic regression's backward stepwise method. The covariates 'childhood and adolescence maltreatment' and 'treatment phase' were highlighted. The first variable acts as a predictor of suicide attempt, increasing its likelihood by 9.86 times in employees and 5.62 times in students. On the other hand, the treatment phase represents a risk in patients in the adjustment phase and it serves as a predictor of SITBs in employees and students, increasing its likelihood by 7.68 and 8.66 times, respectively.

1. Introduction

Non-fatal suicidal behavior is defined by the World Health Organization (WHO) as a kind of physical and psychological self-injurious behavior. The first is associated with thoughts about a dissatisfaction with one's existence, which evolves into suicidal ideation. It fosters a desire to take one's life, which is aggravated when accompanied by a suicidal plan, in which a method for taking one's life is formulated. The second type of behavior comprises self-inflicted injuries ranging from milder forms, such as scratches, cuts, and bites to severe forms, such as self-mutilation (Bahia et al., 2017).

Such self-injurious thoughts and behaviors (SITBs) are considered reliable predictors of future suicide attempts (Fawcett et al., 1990; Ribeiro et al., 2016). The above-mentioned WHO report considered that suicidal behavior encompasses suicide attempt and, in this case, the individual attempts to kill himself, resulting in injury or death (Bahia et al., 2017).

Suicide is a major public health problem worldwide. It is a multidimensional incident that occurs as a result of many factors such as mental, sociological, economic and cultural traits (Karbeyaz et al., 2016), sociodemographic characteristics, physical condition, religion and personality traits (Crump et al., 2014; Na et al., 2013). Among them, gender, age, and working conditions (Karbeyaz et al., 2016; Spicer and Miller, 2000), childhood maltreatment such as physical, emotional, sexual abuse, physical or emotional neglect are associated with increased risk of single and multiple suicide attempts (Guo et al., 2018). Mental illness is one of the possible risk factors associated with elevated risk for suicide since a substantial proportion of suicide victims reportedly suffered from psychiatric disorders (Arsenault-Lapierre et al., 2004; Na et al., 2018).

Little is known about the occurrence of SITBs and attempted suicide worldwide due to under-reporting, even in countries with relatively complete health statistics information systems (Bahia et al., 2017). According to WHO, it is estimated that 150,000 people in the European region manage to commit suicide and 1500,000 attempt suicide annually (Martins Junior et al., 2016).

The WHO also highlights that worldwide suicide rates ranged from 10 to 15 per 100,000 each year since 2002, totaling approximately 842,000 deaths or 1 death somewhere in the world every 40 s. Suicide is the 15th leading cause of death for all age groups (Abuabara et al., 2017). According to the same author, studies conducted by the United States Centers for Disease Control and Prevention (CDC) reported a

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https://doi.org/10.1016/j.psychres.2019.05.039
Received 7 February 2019; Received in revised form 22 May 2019; Accepted 24 May 2019
Available online 25 May 2019

suicide rate of 12.1 per 100,000 US inhabitants, making it the 10th leading cause of death for all ages.

According to the WHO, suicide rates are highest in Eastern Europe, ranging from 17.84 to 30.72 deaths per 100,000. In Brazil, hospitalization rates for suicide attempts are unknown, despite the existence of a system (Brazilian Public Hospital Information System - SIH) that records all hospitalizations for suicide attempts in the public health system (Martins Junior et al., 2016). A law establishing the National Policy for Self-harm and Suicide Prevention was recently enacted in Brazil, although it still needs to be implemented. This regulation aims to prevent these incidents and to promotes the treatment of risk factors, besides requiring mandatory notification of all cases (BRASIL, 2019).

The suicide rate in Brazil is considered low, ranging from 3.3 to 5.3 per 100,000 in the period between 1980 and 2012 (Martins Junior et al., 2016). An increase was observed among young adults, especially males (Abuabara et al., 2017).

Among the world's university population, suicide is the second leading cause of death (Turecki and Brent, 2016). It is estimated that approximately 7.5 per 100,000 university students committed suicide each year (Silverman et al., 1997). Fifteen percent to 32% university students had suicidal thoughts at some point in their lives (Chan et al., 2008; Drum et al., 2009; Garlow et al., 2008), while 8% of undergraduate students and 5% of graduate students had made actual suicide attempts at some point in their lives (Drum et al., 2009).

Seven out of nine scientific papers in the last ten years cited by Karbeyaz et al. (2016) dealt with university students who attempted or committed suicide, emphasizing that such students had mental health problems.

Overall, research suggests that university students are susceptible to suicide (Cerel et al., 2013) as a result of new challenges brought by this life stage, such as living away from family, making new friends and adapting to a new level of academic pressure. It is also associated with an age at which several mental disorders often occur, and these become more symptomatic (Blanco et al., 2008; Campos et al., 2017; Facundes and Ludermir, 2005; O'Connor et al., 2014).

The present study aimed to evaluate whether variables related to personal and academic characteristics, past history, habits, and addictions were associated with self-injurious thoughts and behaviors and suicide attempts in university students and employees.

2. Methods

2.1. Population and variables

Medical records of all patients attending the Outpatient Psychiatry Department at the State University of Maringá in the northwestern Paraná, Brazil, between July 2016 and December 2017 were included in this retrospective study, after approval by the Ethics Committee in Human Research under the protocol no. 2,852,545.

The studied population was divided into two groups: employees (any individual who is affiliated with the institution and who is not a student) and undergraduate and graduate students of the State University of Maringá. Independent variables are detailed in Chart 1. These variables were associated with two dependent variables (outcome): self-injurious thoughts and behaviors (SITBs), which include thoughts, ideation, suicide plan or self-harm occurred during outpatient treatment; and suicide attempts, which occurred at any time in the patient's life.

The variables were evaluated in all patients during outpatient treatment, and the dependent variables were obtained using questions drawn from the Sheehan Suicidality Tracking Scale (S-STS) (Sheehan et al., 2014).

2.2. Statistics

In the univariate analysis, Pearson's chi-squared test or Fisher's exact test were used for analyzing the association between independent and dependent variables (SITBs and suicide attempt) at 5% level of significance. The strength of association was assessed using Odds Ratio (OR). After measuring the collinearity between independent variables, a multivariate analysis on the relationship between variables with $p \leq 0.30$ in the univariate analysis and SITBs and suicide attempt was performed using the binary logistic regression (Hosmer and Lemeshow, 2000). It resulted in covariates that were significantly related to the prediction of SITBs and suicide attempt in employees and students. The backward stepwise logistic regression method was used to select covariates in the final model. Hosmer–Lemeshow test was used for verification of the goodness-of-fit of the final model. The level of significance for multivariate analysis was established at 5%, and the analyses were performed using the Statistical Package for the Social Science (SPSS ver. 22.0, IBM Corp., Armonk, NY).

3. Results

Employees attending the Outpatient Psychiatry Department at the State University of Maringá showed an association between self-injurious thoughts and behaviors (SITBs) with a family history of psychiatric disorder (OR = 4.64, CI95% 1.17–18.43, $p = 0.032$) and childhood and adolescence maltreatment (OR = 5.51, CI95%, 1.24–24.43, $p = 0.034$). The variables age group, gender, marital status, children, living status, education, treatment phase, smoking, alcohol and drug use were not statistically significant ($p > 0.05$), as shown by Table 1.

The suicide attempt, classified as actual, interrupted and/or aborted, was not associated with any studied variables in employees ($p > 0.05$). Although the same trend was observed for childhood and adolescence maltreatment ($p = 0.06$), it was found to be a risk factor for suicide attempt in employees (OR = 9.86, CI95%, 1.20–81.19), according to Table 2.

University students under the age of 25 have a 2.13 times greater chance of exhibiting SITBs (CI95%, 1.03–4.41, $p = 0.043$). Ph.D. students had a lower likelihood of exhibiting SITBs (OR = 0.35, CI95%, 0.13–0.99, $p = 0.045$) when compared with undergraduate students, indicating that the education degree is a protective factor against SITBs. However, the adjustment phase was found to be a risk factor for SITBs in students (OR = 9.72, CI95%, 3.30–28.61, $p < 0.001$) when compared to students during the remission phase (Table 3).

The variables gender, marital status, children, living status, university department, family history of psychiatric disorders, childhood and adolescence maltreatment, smoking, alcohol and drug use were not statistically significant ($p > 0.05$), according to Table 3.

The adjustment phase was found to be a risk factor for suicide attempt in students. Students in the adjustment phase had 5.01 times greater chance of attempting suicide (CI95%, 1.21–20.67, $p = 0.043$) in relation to those in remission. Childhood and adolescence maltreatment (OR = 6.80, CI95%, 1.74–26.52, $p = 0.013$) or smoking (OR = 3.89, CI95%, 1.17–12.90, $p = 0.034$) were found to be risk factors for suicide attempt in students. The other variables were not statistically significant ($p > 0.05$), according to Table 4.

According to the result of the logistic regression analysis for employees, the covariates family history of psychiatric disorder (OR = 6.68, CI95% 1.44–30.92, $p = 0.015$) and adjustment phase of treatment (OR = 5.76, CI95% 1.02–35.54, $p = 0.048$) were identified as a risk factors for SITBs, while the covariate childhood and adolescence maltreatment (OR = 9.86, CI95% 1.20–81.18, $p = 0.033$) was associated with suicide attempts (Table 5).

For the group of students, the covariates that best explain the incidence of SITBs included education degree and treatment phase. Being enrolled in an undergraduate program (OR = 3.35, CI95% 1.07–10.49, $p = 0.038$) and being in the adjustment phase (OR = 10.14, CI95% 3.29–31.20, $p < 0.001$) were important risk factors for SITBs. Within this group, the covariates associated with the risk for suicide attempt

Table 1
Percentage and association between self-injurious thoughts and behaviors (SITBs - ideation, suicidal planning or self-harm) with the variables analyzed in employees attending the Outpatient Psychiatry Department at the State University of Maringá, in the state of Paraná, from 2016 to 2017.

Variable	SITBs/*n* (%)	OR (CI95%)	*p*-value
Age group			
<40	1/19 (5.26)	4.41 (0.53–36.72)	0.173
>40	12/61 (19.67)		
Gender			
Male	11/57 (19.30)	2.51 (0.51–12.34)	0.328
Female	2/23 (8.70)		
Marital status			
Married	7/37 (19.92)	–	0.684
Divorced	4/21 (19.05)	1.01 (0.26–3.94)	
Single	1/16 (6.25)	0.28 (0.03–2.54)	
Widowed	1/6 (16.67)	0.86 (0.08–8.54)	
Children			
Yes	12/59 (20.34)	0.19 (0.02–1.61)	0.166
No	1/21 (4.76)		
Living status			
Family	12/68 (17.65)	2.36 (0.28–20.03)	0.678
Alone	1/12 (8.33)		
Education			
Middle/High school	6/42 (14.29)	0.74 (0.22 −2.43)	0.764
Higher education	7/38 (18.42)		
Treatment phase			
Abandonment	4/26 (15.38)	–	0.283
Adjustment	4/13 (30.77)	2.44 (0.50–11.96)	
Remission	5/41 (12.20)	0.77 (0.19–3.15)	
Childhood and adolescence maltreatment			
Yes	4/9 (44.44)	**5.51 (1.24–24.43)**	0.034*
No	9/71 (12.68)		
Family history of psychiatric disorders			
Yes	10/38 (26.32)	**4.64 (1.17–18.43)**	0.032*
No	3/42 (7.14)		
Smoking			
Yes	3/17 (17.65)	1.14 (0.28–4.69)	1.000
No	10/63 (15.87)		
Alcohol use			
Yes	4/14 (28.57)	2.53 (0.65–9.83)	0.227
No	9/66 (13.64)		
Drug use			
Yes	1/5 (20.00)	1.31 (0.13–2.79)	1.000
No	12/75 (16.00)		

* *p*-value < 0.05; bold OR values were significant in relation to reference values.

n: number of patients; OR: *Adjusted Odds Ratio*; CI95%: 95% confidence interval; *p*: probability, NR: Not reported.

Table 2
Percentage and association between suicide attempt (actual, aborted and/or interrupted) with the variables analyzed in employees attending the Outpatient Psychiatry Department at the State University of Maringá, in the state of Paraná, from 2016 to 2017.

Variable	Suicide attempts/*n* (%)	OR (CI95%)	*p*-value
Age group			
Up to 55	1/56 (1.79)	0.13 (0.01–1.29)	0.078
>55	3/24 (12.50)		
Gender			
Male	0/23 (0.00)	ND	0.319
Female	4/57 (7.02)		
Marital status			
Married	3/37 (8.11)	ND	0.590
Divorced	1/21 (4.76)		
Single	0/16 (0.00)		
Widowed	0/6 (0.00)		
Children			
Yes	3/59 (5.08)	1.07 (0.11–10.9)	1.000
No	1/21 (4.76)		
Living status			
Family	3/68 (4.41)	0.5 (0.05–5.33)	0.485
Alone	1/12 (8.33)		
Education			
Middle/High school	1/42 (2.38)	0.29 (0.03–2.86)	0.341
Higher education	3/38 (7.89)		
Treatment phase			
Abandonment	2/26 (7.69)	–	0.560
Adjustment	1/13 (7.69)	1.00 (0.08–12.16)	
Remission	1/41 (2.44)	0.30 (0.03–3.49)	
Childhood and adolescence maltreatment			
Yes	2/9 (22.22)	**9.86 (1.20–81.19)**	0.060
No	2/71 (2.82)		
Family history of psychiatric disorders			
Yes	3/38 (7.89)	3.51 (0.35–35.32)	0.341
No	1/42 (2.38)		
Smoking			
Yes	0/17 (0.00)	ND	0.573
No	4/63 (6.35)		
Alcohol use			
Yes	2/14 (14.29)	5.33 (0.68–41.62)	0.139
No	2/66 (3.03)		
Drug use			
Yes	0/5 (0.00)	ND	1.000
No	4/75 (5.33)		

**p*-value < 0.05; bold OR values were significant in relation to reference values.

n: number of patients; OR: *Adjusted Odds Ratio*; CI95%: 95% confidence interval; *p*: probability, ND: Not done.

included smoking (OR = 3.58, CI95% 1.02–12.53, $p = 0.046$) and childhood and adolescence maltreatment (OR = 6.26, CI95% 1.53–25.56, $p = 0.011$), according to Table 5.

4. Discussion

The present study evaluated all patients attending the Outpatient Psychiatry Department at the State University of Maringá; then, students and employees. In the literature consulted, the scientific reports related to suicide and university population are focused on assessing students, not mentioning the employees. The total number of patients was originally 238, but due to the intrinsic characteristics of each population, the analysis was performed separately. Then, two groups of 80 employees and 158 students were formed.

The decrease in the number of individuals in each group has a direct implication in the statistical analysis. It is evidenced by the greatest number of statistically significant results with a lower amplitude (CI95%) in the group of students.

In the present study, 13/80 of employees exhibited SITBs (16.25%, CI95%, 8.95–26.18%). There are no studies available in the literature with university employees for a fair comparison with the results presented here. However, in the study performed by Botega et al. (2009) in a population sample from the city of Campinas, in the state of São Paulo, the prevalence of suicidal ideation and suicidal plans were 88/515 (17.1%) and 25/515 (4.8%), respectively.

Santos et al. (2017) observed that the past 30-day suicidal ideation among students of the Federal University of Mato Grosso (UFMT) was 63/367 (9.9%). The suicidal ideation among university students in Portugal (Pereira and Cardoso, 2015), Austria and Turkey (Eskin et al., 2011) at some point in their lives were 12.6; 35.3 and 25.9%, respectively. The SITBs rate in the present study was 40/158 (23.32%, CI95%, 18.74–32.84%).

It is known that the occurrence of sexual abuse in childhood is directly associated with suicidal ideation (Bahk et al., 2017; Brown et al., 1999; Eisenberg et al., 2007) and suicide attempt in adult life (Bahk et al., 2017; Teicher et al., 2003). Physical and emotional child abuse were considered direct (Bensley et al., 1999; Thompson et al., 2012) and indirect (Bahk et al., 2017) predictors of suicidal ideation.

Overall, the mentioned studies support the findings of the present study, especially regarding suicide attempts among adults that experienced childhood and adolescence maltreatment. Although no variable was significant in the univariate analysis for employees who attempted

Table 3
Percentage and association between self-injurious thoughts and behaviors (SITBs - ideation, suicidal planning or self-harm) with the variables analyzed in undergraduate and graduate students attending the Outpatient Psychiatry Department at the State University of Maringá, in the state of Paraná, from 2016 to 2017.

Variable	SITBs/*n* (%)	OR (CI95%)	*p*-value
Age group			
<25	22/65 (33.85)	**2.13 (1.03–4.41)**	0.043*
>25	18/93 (19.35)		
Gender			
Male	10/59 (16.95)	0.47 (0.21–1.05)	0.088
Female	30/99 (30.3)		
Marital status			
Married	4/14 (28.57)	ND	0.685
Divorced	0/2 (0.00)		
Single	36/142 (25.35)		
Children			
Yes	3/7 (42.86)	2.31 (0.49–10.80)	0.370
No	37/151 (24.50)		
Living status			
Friends	14/55 (25.45)	–	0.878
Family	17/63 (26.98)	1.08 (0.48–2.47)	
Alone	9/40 (25.50)	0.85 (0.33–2.22)	
Education degree			
Undergraduate	33/105 (31.43)	–	0.045*
Master's	5/36 (13.89)	0.29 (0.06–1.35)	
PhD	2/17 (11.76)	**0.35 (0.13–0.99)**	
University department			
DT	7/17 (41.18)	–	0.208
DAS	1/16 (6.25)	**0.10 (0.01–0.90)**	
DBS	1/11 (9.09)	0.14 (0.01–1.38)	
DMS	9/42 (21.43)	0.39 (0.12–1.31)	
DHLA	13/42 (30.95)	0.64 (0.2–2.06)	
DHS	5/15 (33.33)	0.71 (0.17–3.03)	
DSS	4/15 (26.67)	0.62 (0.12–2.32)	
Treatment phase			
Remission	13/72 (18.06)	–	< 0.001*
Abandonment	12/64 (18.75)	1.05 (0.44–2.50)	
Adjustment	15/22 (68.18)	**9.72 (3.30–28.61)**	
Childhood and adolescence maltreatment			
Yes	6/12 (50.00)	3.29 (0.99–10.88)	0.076
No	34/146 (23.29)		
Family history of psychiatric disorders			
Yes	26/96 (27.08)	1.27 (0.60–2.69)	0.578
No	14/62 (22.58)		
Smoking			
Yes	8/23 (34.78)	1.72 (0.67–4.42)	0.301
No	32/135 (23.7)		
Alcohol use			
Yes	18/61 (29.51)	1.43 (0.69–2.95)	0.353
No	22/97 (22.68)		
Drug use			
Yes	13/39 (33.33)	1.70 (0.77–3.76)	0.206
No	27/119 (22.69)		

* *p*-value < 0.05; bold OR values were significant in relation to reference values.

n: number of patients; OR: *Adjusted Odds Ratio*; CI95%: 95% confidence interval; *p*: probability, ND: Not done;

DT (Department of Technology), DAS (Department of Agricultural Sciences), DBS (Department of Biological Sciences), DMS (Department of Mathematical Sciences), DHLA (Department of Human Sciences, Languages and Arts), DHS (Department of Health Sciences) or DSS (Department of Applied Social Sciences).

Table 4
Percentage and association between suicide attempt (actual, aborted and/or interrupted) with the variables analyzed in undergraduate and graduate students attending the Outpatient Psychiatry Department at the State University of Maringá, in the state of Paraná, from 2016 to 2017.

Variable	Suicide attempts/*n* (%)	OR (CI95%)	*p*-value
Age group			
<29	13/113 (11.50)	5.72 (0.73–45.09)	0.070
>29	1/45 (2.22)		
Gender			
Male	4/59 (6.78)	0.65 (0.19–2.16)	0.570
Female	10/99 (10.10)		
Marital status			
Married	1/14 (7.14)	ND	0.878
Divorced	0/2 (0.00)		
Single	13/142 (9.15)		
Children			
Yes	2/7 (28.57)	4.63 (0.81–26.47)	0.120
No	12/151 (7.95)		
Living status			
Friends	6/55 (10.91)	–	0.261
Family	7/63 (11.11)	1.02 (0.32–3.24)	
Alone	1/40 (2.50)	0.21 (0.02–1.81)	
Education degree			
Undergraduate	13/105 (12.38)	ND	0.086
Master's	1/36 (2.78)		
Ph.D.	0/17 (0.00)		
University department			
DT	1/17 (5.88)	ND	0.229
DAS	0/16 (0.00)		
DBS	0/11 (0.00)		
DMS	6/42 (14.29)		
DHLA	4/42 (9.52)		
DHS	3/15 (20.00)		
DSS	0/15 (0.00)		
Treatment phase			
Remission	4/72 (5.56)	–	0.043*
Abandonment	5/64 (7.81)	1.44 (0.37–5.61)	
Adjustment	5/22 (22.73)	**5.01 (1.21–20.67)**	
Childhood and adolescence maltreatment			
Yes	4/12 (33.33)	**6.80 (1.74–26.52)**	0.013*
No	10/146 (6.85)		
Family history of psychiatric disorders			
Yes	12/96 (12.50)	4.29 (0.93–19.86)	0.051
No	2/62 (3.23)		
Smoking			
Yes	5/23 (21.74)	**3.89 (1.17–12.90)**	0.034*
No	9/135 (6.67)		
Alcohol use			
Yes	8/61 (13.11)	2.29 (0.75–6.96)	0.157
No	6/97 (6.19)		
Drug use			
Yes	6/39 (15.38)	2.52 (0.82–7.79)	0.111
No	8/119 (6.72)		

* *p*-value < 0.05; bold OR values were significant in relation to reference values.

n: number of patients; OR: *Adjusted Odds Ratio*; CI95%: 95% confidence interval; *p*: probability, ND: Not done;

DT (Department of Technology), DAS (Department of Agricultural Sciences), DBS (Department of Biological Sciences), DMS (Department of Mathematical Sciences), DHLA (Department of Human Sciences, Languages and Arts), DHS (Department of Health Sciences) or DSS (Department of Applied Social Sciences).

suicide, the childhood and adolescence maltreatment was the only covariate that remained in the final multivariate model. The same was observed in the group of students, although the covariates associated with suicide attempts included smoking and childhood and adolescence maltreatment.

Evidences that smoking increases the likelihood of a suicide attempt in students were well-reported in a meta-analysis of 63 studies conducted by Poorolajal and Darvishi (2016) aiming to determine the relationship between smoking and suicide demonstrated that the smokers' group had 2.05 times greater chances of exhibiting ideation, 2.36 times greater chances of planning suicide and 2.84 times greater chances of attempting suicide when compared with the non-smokers group. It does not necessarily indicate that smoking causes suicide, as the role of this addiction to suicidal behavior is not yet clear.

In the univariate analysis, the treatment phase was found to be a risk factor when considering students in the adjustment phase in relation to those in remission, increasing their chances of exhibiting SITBs

Table 5
Final logistic regression model with explanatory variables associated with self-injurious thoughts and behaviors (SITBs) and suicide attempts in the employees and students groups attending the Outpatient Psychiatry Department at the State University of Maringá, in the state of Paraná, from 2016 to 2017.

Variable	B	SE	Wald	DF	OR (CI95%)	*p*-value
Employees (Self-injurious thoughts and behaviors - SITBs)[a]						
Family history of psychiatric disorders	1.899	0.782	5.900	1	**6.68 (1.44–30.92)**	**0.015**
Adjustment/Remission	1.751	0.884	3.924	1	**5.76 (1.02–35.54)**	**0.048**
Abandonment/Remission	0.312	0.753	0.171	1	1.37 (0.31–5.97)	0.697
Constant	−3.266	0.814				**<0.001**
Employees (Suicide attempts)[b]						
Childhood and adolescence maltreatment	2.288	1.076	4.524	1	**9.86 (1.20–81.18)**	**0.033**
Constant	−3.541	0.717				**<0.001**
Students (Self-injurious thoughts and behaviors - SITBs)[c]						
Undergraduate/Master's	1.209	0.582	4.319	1	**3.35 (1.07–10.49)**	**0.038**
Ph.D./Master's	0.115	0.954	0.141	1	1.12 (0.17–7.28)	0.904
Adjustment/Remission	2.316	0.574	16.305	1	**10.14 (3.29–31.20)**	**<0.001**
Abandonment/Remission	0.013	0.451	0.010	1	1.01 (0.42–2.45)	0.978
Constant	−2.396	0.590				**<0.001**
Students (Suicide attempts)[d]						
Smoking	1.275	0.639	3.977	1	**3.58 (1.02–12.53)**	**0.046**
Childhood and adolescence maltreatment	1.834	0.718	6.532	1	**6.26 (1.53–25.56)**	**0.011**
Constant	−2.885	0.385				**<0.001**

[a] Hosmer–Lemeshow test: chi-square = 5.357; degrees of freedom = 4; $p = 0.253$.
[b] Hosmer–Lemeshow test: no results.
[c] Hosmer–Lemeshow test: chi-square = 0.530; degrees of freedom = 4; $p = 0.971$.
[d] Hosmer–Lemeshow test: chi-square = 0.057; degrees of freedom = 1; $p = 0.811$.
Bold values were significant.
B: B coefficient; SE: Standard Error; DF: Degrees of freedom; OR: *Adjusted Odds Ratio*; CI95%: 95% confidence interval.

and attempting suicide. In the multivariate analysis, the treatment phase was present in the both final models when evaluating covariates that best predict the occurrence of SITBs in employees and students. On the other hand, this covariate was not relevant in the final models for suicide attempts. Thus, there is evidence that the empirically determined cut-off of up to three sessions may be a useful parameter to infer the effectiveness of the patient's response to treatment.

This analysis demonstrates in some way the therapeutic effect of psychiatric consultations on cooperative patients. Thus, the patient becomes stable, and it acts as a protective factor, reducing the incidence of SITBs. On the other hand, when the patient does not follow through on psychiatric recommendations or presents with a chronic condition,

Chart 1
Independent (predictive) variables, their respective description, and criteria used for the statistical analysis in student and employee populations.

Variable	Categories and criteria used for analysis	Population
Age group	Age groups were established according to the maximum difference in proportions between groups formed during the statistical analysis of the data.	Students and employees
Gender	Male or female.	Students and employees
Marital status	Employees: married, divorced, single or widowed. Students: married, divorced or single.	Students and employees
Education	Two groups were formed: no higher education (incomplete or complete middle school and incomplete or complete high school) and incomplete and complete higher education.	Employees
Education degree	Undergraduate, Master's or PhD student.	Students
University department	DT (Department of Technology), DAS (Department of Agricultural Sciences), DBS (Department of Biological Sciences), DMS (Department of Mathematical Sciences), DHLA (Department of Human Sciences, Languages and Arts), DHS (Department of Health Sciences) or DSS (Department of Applied Social Sciences).	Students
Living status	Employees: family or alone. Students: friends, family or alone.	Students and employees
Children	Yes or no.	Students and employees
Childhood and adolescence maltreatment	Yes or no (We grouped the experiences of physical and emotional violence experienced by the patient and caused by parents or guardians. Physical abuses included: being hit with a hand or object, kicked, shaken, punched, knocked out, burned, strangled and sexually abused. Emotional abuses comprised: verbal abuse, threats of harm, affection and emotional negligence).	Students and employees
Family history of psychiatric disorders	Yes or no (first and second-degree relatives).	Students and employees
Smoking	Yes or no (current).	Students and employees
Alcohol use	Yes or no (current or previous alcohol use).	Students and employees
Drug use	Yes or no (current or previous drug use).	Students and employees
Treatment phase	Abandonment: the patient attended two sessions but failed to complete the psychiatric treatment. Adjustment: the patient attended three or more sessions, and he/she was still in the medication adjustment phase. Remission: maintenance of clinical remission after three sessions.	Students and employees

he/she remains in the adjustment phase, which proves to be a risk factor, increasing the incidence of SITBs in employed and students.

Besides treatment phase, the covariate family history of psychiatric disorders in first and second-degree relatives was included in the final multivariate model for employees exhibiting SITBs. In a review of suicidal ideation and behavior conducted by Korczak et al. (2015), relatives with psychiatric disorders and family history of suicide are risk factors for adolescents with suicidal behavior.

Finally, the covariates that predict SITBs in students included education degree and treatment phase, not including age group and university department, which were significant in the univariate analysis. Master's and Ph.D. students had lower chances of exhibiting SITBs, corroborating with the expectation of greater psychological maturity in these groups. The undergraduate degree period brings new challenges, changes, expectations, doubts, and demands, and immaturity may limit the student's ability to cope with new situations (Blanco et al., 2008; Campos et al., 2017; Facundes and Ludermir, 2005; O'Connor et al., 2014).

We conclude that a family history of psychiatric disorder and treatment phase are predictors of SITBs in employees, whereas education degree and treatment phase predicts SITBs in students.

In addition, employees who experienced childhood and adolescence maltreatment are more likely to attempt suicide, while the variables smoking and childhood and adolescence maltreatment were present in the final model for students.

Consent report

The free and informed consent form was not used, as it is a retrospective study to analyze medical records. The non-violation, integrity, confidentiality, and privacy of the documents were guaranteed and ensured, as well as the non-use of information to the detriment of patients involved in the research. This investigation was performed after approval by the Ethics Committee in Human Research of the State University of Maringá, under the protocol no. 2,852,545.

Declaration of Competing Interest

The authors declare that there is no conflict of interest.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.psychres.2019.05.039.

References

Abuabara, A., Abuabara, A., Tonchuk, C.A.L., 2017. Comparative analysis of death by suicide in Brazil and in the United States: descriptive, cross-sectional time series study. Sao Paulo Med. J. 135 (2), 150–156.

Arsenault-Lapierre, G., Kim, C., Turecki, G., 2004. Psychiatric diagnoses in 3275 suicides: a meta-analysis. BMC Psychiatry [Electronic Resource] 4, 37.

Bahia, C.A., Avanci, J.Q., Pinto, L.W., Minayo, M.C.d.S., 2017. Self-harm throughout all life cycles: profile of victims using urgent and emergency care services in Brazilian state capitals. Ciênc. Saúde Coletiva 22 (9), 2841–2850.

Bahk, Y.C., Jang, S.K., Choi, K.H., Lee, S.H., 2017. The relationship between childhood trauma and suicidal ideation: role of maltreatment and potential mediators. Psychiatry Investig. 14 (1), 37–43.

Bensley, L.S., Van Eenwyk, J., Spieker, S.J., Schoder, J., 1999. Self-reported abuse history and adolescent problem behaviors. I. Antisocial and suicidal behaviors. J. Adolesc. Health 24 (3), 163–172.

Blanco, C., Okuda, M., Wright, C., Hasin, D.S., Grant, B.F., Liu, S.M., Olfson, M., 2008. Mental health of college students and their non-college-attending peers: results from the National Epidemiologic Study on Alcohol and Related Conditions. Arch. Gen. Psychiatry 65 (12), 1429–1437.

Botega, N.J., Marín-León, L., Oliveira, H.B.d., Barros, M.B.d.A., Silva, V.F.d., Dalgalarrondo, P., 2009. Prevalências De ideação, Plano e Tentativa De suicídio: Um Inquérito De Base Populacional Em Campinas 25. Cad. Saúde Pública, São Paulo, Brasil, pp. 2632–2638.

BRASIL, 2019. Política Nacional de Prevenção da Automutilação e do Suicídio (Lei nº 13. 819, de 26 de abril de 2019). http://www.planalto.gov.br/ccivil_03/_ato2019-2022/2019/Lei/L13819.htm#art11 (Accessed 06 May 2019).

Brown, J., Cohen, P., Johnson, J.G., Smailes, E.M., 1999. Childhood abuse and neglect: specificity of effects on adolescent and young adult depression and suicidality. J. Am. Acad. Child Adolesc. Psychiatry 38 (12), 1490–1496.

Campos, C.R., Oliveira, M.L., Mello, T.M., Dantas, C.R., 2017. Academic performance of students who underwent psychiatric treatment at the students' mental health service of a Brazilian university. Sao Paulo Med. J. 135 (1), 23–28.

Cerel, J., Chandler Bolin, M., Moore, M.M., 2013. Suicide exposure, awareness and attitudes in college students. Adv. Ment. Health 12 (1), 46–53.

Chan, K.L., Straus, M.A., Brownridge, D.A., Tiwari, A., Leung, W.C., 2008. Prevalence of dating partner violence and suicidal ideation among male and female university students worldwide. J. Midwifery Womens Health 53 (6), 529–537.

Crump, C., Sundquist, K., Sundquist, J., Winkleby, M.A., 2014. Sociodemographic, psychiatric and somatic risk factors for suicide: a Swedish national cohort study. Psychol. Med. 44 (2), 279–289.

Drum, D.J., Brownson, C., Burton Denmark, A., Smith, S.E., 2009. New data on the nature of suicidal crises in college students: shifting the paradigm. Prof. Psychol. Res. Pract. 40 (3), 213–222.

Eisenberg, M.E., Ackard, D.M., Resnick, M.D., 2007. Protective factors and suicide risk in adolescents with a history of sexual abuse. J. Pediatr. 151 (5), 482–487.

Eskin, M., Voracek, M., Stieger, S., Altinyazar, V., 2011. A cross-cultural investigation of suicidal behavior and attitudes in Austrian and Turkish medical students. Soc. Psychiatry Psychiatr. Epidemiol. 46 (9), 813–823.

Facundes, V.L.D., Ludermir, A.B., 2005. Common mental disorders among health care students. Rev. Bras. Psiquiatr. 27, 194–200.

Fawcett, J., Scheftner, W.A., Fogg, L., Clark, D.C., Young, M.A., Hedeker, D., Gibbons, R., 1990. Time-related predictors of suicide in major affective disorder. Am. J. Psychiatry 147 (9), 1189–1194.

Garlow, S.J., Rosenberg, J., Moore, J.D., Haas, A.P., Koestner, B., Hendin, H., Nemeroff, C.B., 2008. Depression, desperation, and suicidal ideation in college students: results from the American Foundation for Suicide Prevention College Screening Project at Emory University. Depress. Anxiety 25 (6), 482–488.

Guo, L., Wang, W., Gao, X., Huang, G., Li, P., Lu, C., 2018. Associations of childhood maltreatment with single and multiple suicide attempts among older Chinese adolescents. J. Pediatr. 196, 244–250 e241.

Hosmer, D.W., Lemeshow, S., 2000. Applied Logistic Regression, 2nd ed. John Wiley & Sons, New York.

Karbeyaz, K., Toygar, M., Celikel, A., 2016. Completed suicide among University student in Eskisehir, Turkey. J. Forensic Leg. Med. 44, 111–115.

Korczak, D.J., Canadian Paediatric Society, M.H., Developmental Disabilities, C., 2015. Suicidal ideation and behaviour. Paediatr. Child Health 20 (5), 257–264.

Martins Junior, D.F., Felzemburgh, R.M., Dias, A.B., Caribe, A.C., Bezerra-Filho, S., Miranda-Scippa, A., 2016. Suicide attempts in Brazil, 1998-2014: an ecological study. BMC Public Health [Electronic Resource] 16, 990.

Na, K.S., Oh, K.S., Lim, S.W., Ryu, S.H., Lee, J.Y., Hong, J.P., Cho, S.J., 2018. Association between age and attitudes toward suicide. Eur. J. Psychiatry 32 (1), 44–51.

Na, K.S., Oh, S.J., Jung, H.Y., Irene Lee, S., Kim, Y.K., Han, C., Ko, Y.H., Paik, J.W., Kim, S.G., 2013. Alexithymia and low cooperativeness are associated with suicide attempts in male military personnel with adjustment disorder: a case-control study. Psychiatry Res. 205 (3), 220–226.

O'Connor, P.J., Martin, B., Weeks, C.S., Ong, L., 2014. Factors that influence young people's mental health help-seeking behaviour: a study based on the health belief model. J. Adv. Nurs. 70 (11), 2577–2587.

Pereira, A., Cardoso, F., 2015. Suicidal ideation in university students: prevalence and association with school and gender. Paidéia (Ribeirão Preto) 25 (62), 299–306.

Poorolajal, J., Darvishi, N., 2016. Smoking and Suicide: a meta-analysis. PLos One 11 (7), e0156348.

Ribeiro, J.D., Franklin, J.C., Fox, K.R., Bentley, K.H., Kleiman, E.M., Chang, B.P., Nock, M.K., 2016. Self-injurious thoughts and behaviors as risk factors for future suicide ideation, attempts, and death: a meta-analysis of longitudinal studies. Psychol. Med. 46 (2), 225–236.

Santos, H.G.B.d., Marcon, S.R., Espinosa, M.M., Baptista, M.N., Paulo, P.M.C.d., 2017. Fatores associados à presença de ideação suicida entre universitários. Rev. Latino-Am. Enfermagem 25.

Sheehan, D.V., Giddens, J.M., Sheehan, I.S., 2014. Status Update on the Sheehan-Suicidality Tracking Scale (S-STS) 2014. Innov. Clin. Neurosci. 11 (9–10), 93–140.

Silverman, M.M., Meyer, P.M., Sloane, F., Raffel, M., Pratt, D.M., 1997. The big ten student suicide study: a 10-year study of suicides on midwestern university campuses. Suicide Life Threat. Behav. 27 (3), 285–303.

Spicer, R.S., Miller, T.R., 2000. Suicide acts in 8 states: incidence and case fatality rates by demographics and method. Am. J. Public Health 90 (12), 1885–1891.

Teicher, M.H., Andersen, S.L., Polcari, A., Anderson, C.M., Navalta, C.P., Kim, D.M., 2003. The neurobiological consequences of early stress and childhood maltreatment. Neurosci. Biobehav. Rev. 27 (1–2), 33–44.

Thompson, R., Proctor, L.J., English, D.J., Dubowitz, H., Narasimhan, S., Everson, M.D., 2012. Suicidal ideation in adolescence: examining the role of recent adverse experiences. J. Adolesc. 35 (1), 175–186.

Turecki, G., Brent, D.A., 2016. Suicide and suicidal behaviour. Lancet 387 (10024), 1227–1239.