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Thinking About Dying and Trying and Intending to Die: Results on Suicidal Behavior From a Large Web-Based Sample

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ABSTRACT

Objective: Suicide is an important worldwide public health problem. The aim of this study was to characterize risk factors of suicidal behavior using a large Web-based sample.

Method: The data were collected by the Brazilian Internet Study on Temperament and Psychopathology (BRAINSTEP) from November 2010 to July 2011. Suicidal behavior was assessed by an instrument based on the Suicidal Behaviors Questionnaire. The final sample consisted of 48,569 volunteers (25.9% men) with a mean ± SD age of 30.7 ± 10.1 years.

Results: More than 60% of the sample reported having had at least a passing thought of killing themselves, and 6.8% of subjects had previously attempted suicide (64% unplanned). The demographic features with the highest risk of attempting suicide were female gender (OR = 1.82, 95% CI = 1.65 to 2.00); elementary school as highest education level completed (OR = 2.84, 95% CI = 2.48 to 3.25); being unable to work (OR = 5.32, 95% CI = 4.15 to 6.81); having no religion (OR = 2.08, 95% CI = 1.90 to 2.29); and, only for female participants, being married (OR = 1.19, 95% CI = 1.08 to 1.32) or divorced (OR = 1.66, 95% CI = 1.41 to 1.96). A family history of a suicide attempt and of a completed suicide showed the same increment in the risk of suicidal behavior. The higher the number of suicide attempts, the higher was the real intention to die ($P < .05$). Those who really wanted to die reported more emptiness/loneliness (OR = 1.58, 95% CI = 1.35 to 1.85), disconnection (OR = 1.54, 95% CI = 1.30 to 1.81), and hopelessness (OR = 1.74, 95% CI = 1.49 to 2.03), but their methods were not different from the methods of those who did not mean to die.

Conclusions: This large Web survey confirmed results from previous studies on suicidal behavior and pointed out the relevance of the number of previous suicide attempts and of a positive family history, even for a noncompleted suicide, as important risk factors.

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Suicide is a tragic outcome and a serious public health problem with complex biopsychosocial origins.[1–3] According to the World Health Organization (WHO), suicide represented 1.8% of the global burden of diseases in 2002, meaning that approximately 1.53 million people committed suicide and around 10 to 20 times this number of individuals tried to end their own lives at some point.[4]

Some factors strongly related to completed suicides have been identified as key points for risk assessment: previous suicide attempts,[1,4–6] higher suicidal intent,[7–12] being young (15–34 years) or old (over 65 years),[4] male sex,[4,6] psychiatric disorders,[1,4,5,13,14] substance abuse,[1,4,5,14] social isolation,[1] physical illness,[1,4] unemployment,[1,4,15] a family history of suicide,[1] suicidal ideation,[15] hopelessness,[1,15,16] childhood abuse,[1] homelessness,[1] impulsivity,[1] and aggressive temperaments.[17] Among these, the history of suicide attempts is the main risk factor for future completed suicides.[18] It is estimated that about half of the people who die by suicide have a history of at least one previous attempt.[19]

Since up to half of the individuals who die by suicide do it on their first attempt,[20] it is difficult to conduct studies on this important cause of mortality. However, studying suicidal behavior, which is defined as ideations, communications, and behaviors that involve some degree of an intent to die,[1] is more feasible. Prior studies on suicidal behavior have some limitations, such as small samples, being mainly based on clinical populations, and face-to-face interviews, which may embarrass subjects and thus keep them from disclosing intimate information. The aim of this study was to characterize suicidal behavior in a large sample, which may allow a better understanding of the risk factors related to suicidality. To this end, we analyzed the data from a Web-based study conducted in Brazil, which covers several psychological and psychiatric constructs[21] while preserving anonymity and privacy.

METHOD

Participants

All participants gave their electronic informed consent before completing the questionnaires. This form was elaborated to fulfill the requirements of the National Health Council of Brazil (Resolution 196/1996) and the Code of Ethics of the World Medical Association (Declaration of Helsinki). Their participation was voluntary, and they could cancel their participation at any moment without justification. The study was approved by the Institutional Review Board of St Luke's Hospital, Pontifical Catholic University of Rio Grande do Sul.

The data are from the Brazilian Internet Study on Temperament and Psychopathology (BRAINSTEP),[21] a large Web-based survey designed to study temperament, psychiatric disorders, and psychobiological measures. This Web survey was broadcast throughout the national media, such as television news and major newspapers, to recruit volunteers. Their incentive for participation was to receive a report on

Clinical Points

- When assessing suicide risk, a familial history of a suicide attempt may be as important as a familial history of a completed suicide.
- Feelings of hopelessness, emptiness/loneliness, and disconnection are associated with a higher risk for a serious suicide attempt.
- Most suicide attempts are unplanned, but recurrent suicide attempts are associated with a higher intention to die.

their temperament profile and on the likelihood of having a psychiatric disorder based on screening instruments. Volunteers answered the instruments from November 2010 to July 2011 by accessing the Web site www.temperamento.com.br. To ensure reliability of the data, questions checking for attention were inserted within the instruments. Also, at the end of the survey, there were 2 specific questions on the degree of sincerity and seriousness of the volunteer while completing the instruments. Only those who stated that they were being sincere and serious throughout the study and had correct answers in the attention validity items were included in the analyses. Women and well-educated and younger subjects are overrepresented in this BRAINSTEP sample, but the prevalence of any psychiatric diagnosis in our sample was about 30%, similar to that found in epidemiologic studies, suggesting that psychopathology is not overrepresented.[21]

Our initial sample was 71,663 volunteers. After validity checks and exclusion of those < 18 (for ethical reasons) or > 64 years old (because of potential differences between Internet users and nonusers), the final sample consisted of 48,569 volunteers: 12,605 (25.9%) were male (mean ± SD age = 30.9 ± 10.2 years) and 35,964 (74.1%) were female (30.6 ± 10.0 years). Those excluded by the validity checks had similar age (30.5 ± 9.8 years), gender distribution (24.1% male), and prevalence of suicide attempts (7.3%) compared to the final sample.

Instruments

The instrument used to assess suicidal behavior was adapted from the Suicidal Behaviors Questionnaire (SBQ-17).[22,23] The presence of suicidal behavior was evaluated by the following key question: "Have you ever thought about or attempted suicide?" The possible answers were "No," "It was just a passing thought," "I briefly considered it, but not seriously," "I thought about it and was somewhat serious," "I had a plan for killing myself which I thought would work, and seriously considered it," "I attempted to kill myself, but I do not think I really meant to die," and "I attempted to kill myself, and I think I really hoped to die."

For those who had ever attempted suicide, the following was investigated: the number of suicide attempts, the methods of the suicide attempts, the need for emergency medical treatment, if it was a planned or impulsive suicide attempt, and the main feelings just before the suicide attempt.

For the assessment of risk factors, the answers on suicidal behavior were grouped into 2 categories: (a) without a suicide attempt and (b) with a suicide attempt (including: "I attempted to kill myself, but I do not think I really meant to die" and "I attempted to kill myself, and I think I really hoped to die").

Regarding family history, subjects were asked about suicide attempts and completed suicides of the mother, the father, and any siblings separately and were then grouped into 3 categories: (a) no family history of suicide; (b) a family history of a suicide attempt, but with no completed suicide; and (c) a family history of a completed suicide. Those with both a family history of a suicide attempt and a family history of a completed suicide were classified in the last group. Those who did not know these history aspects of any of the investigated relatives were classified as "do not know" and were excluded from these specific analyses.

Statistical Analysis

Differences in the frequencies of suicidal behavior, feelings just before the suicide attempt, and the methods of suicide attempts were analyzed with χ^2. The risk ratios with 95% confidence interval (CI) were calculated using multilogistic regression. When applicable, the analyses were controlled for age and/or gender. Statistical significance was set at $P < .05$. SPSS 18.0 software (IBM Corporation) was used for all analyses.

RESULTS

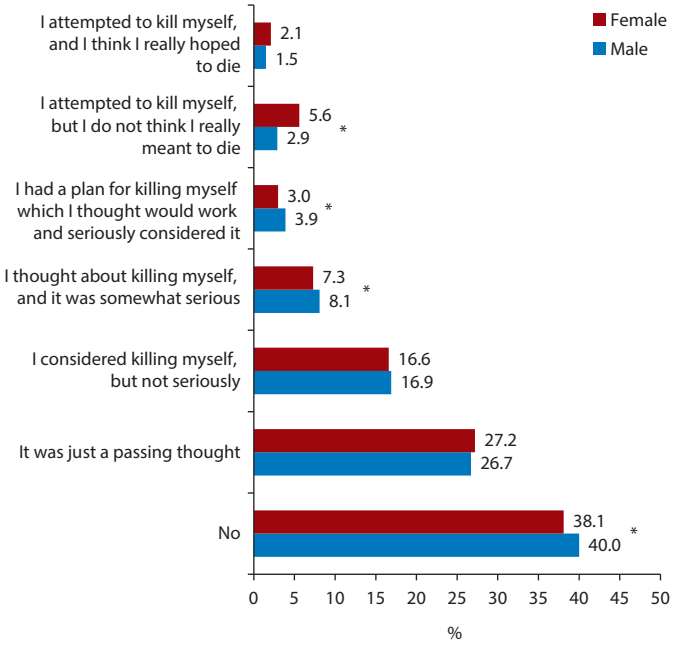
From the total sample, 3,326 subjects (6.8%) reported a suicide attempt. This selected sample consisted of 554 men (mean±SD age = 31.0 ± 10.0 years) and 2,772 women (31.2 ± 9.9 years) and showed no age difference compared to those that had never attempted suicide ($P = .34$).

Most of the sample (60.0% of men and 61.9% of women) reported having had at least a passing thought about killing themselves. Women attempted suicide more often, particularly those not really meaning to die, whereas men more often had a plan or a serious suicidal thought (Figure 1). Most of the suicide attempters (72%) did not have a real intention to die.

As shown in Figure 2, more than half (53.2%) of suicide attempters tried more than once, with no difference between sexes ($P = .76$). A real intention to die increased with the number of suicide attempts ($P < .05$), reaching a plateau after 4 or more attempts to around 50% of the cases.

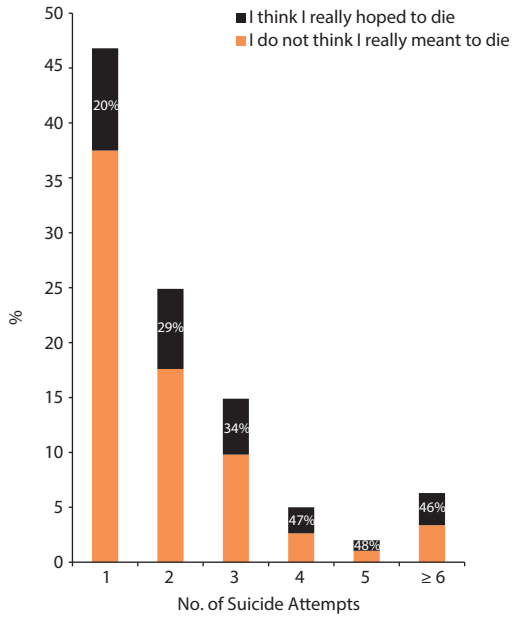
Most of the people who attempted suicide did it impulsively (64.0%); of those, 19.7% really meant to die. In contrast, among those who had a defined plan (13.8%), 41.2% really meant to die (OR = 2.79, 95% CI = 2.25 to 3.46, when compared to impulsive attempters). There were 22.2% with both impulsive and planned attempts in the past. Emergency medical treatment after the suicide attempt was not necessary for 55.7% of participants, whereas 28.4% received an emergency medical treatment for less than 1 day and 15.9% received emergency medical treatment for 1 day or more.

Figure 1. Distribution of Answers to the Survey Question "Have You Ever Thought About or Attempted Suicide?"[a]



[a]Horizontal bars indicate the frequency of suicidal thoughts, or suicide attempts, according to gender. Data are shown as percentages.
*$P < .05$ between sexes.

Figure 2. Relationship Between the Number of Suicide Attempts and the Intent to Die[a]



[a]Frequencies shown refer to the sample with a history of a suicide attempt. Percentages noted in the black portion of the bars are of those who really meant to die, according to the number of suicide attempts.

Demographic data and their risk ratios for a suicide attempt are shown in Table 1. Women attempted suicide more frequently than men (OR = 1.82, 95% CI = 1.65 to 2.00). Having a lower educational attainment and being on disability insurance or disability retirement were associated with a higher risk of a suicide attempt. Except for Judaism, all of the assessed religions presented a higher risk of a suicide attempt than Catholicism. Having a history of a suicide attempt or a completed suicide among parents or siblings increased the risk with very similar effect sizes; this was especially so with those having more than one attempter or completer relative, with no difference according to the type of kinship. These risk factors showed no gender differences.

Men and women had different patterns of risk ratio for a suicide attempt according to marital status (Table 1). Compared to singles, being in a relationship or married was associated with a lower risk of a suicide attempt in men, whereas married women had a higher risk. In women, being divorced significantly increased this risk. Widowhood was not associated with risk differences, but marital status in the "Other" category increased the risk of a suicidal attempt for both men and women.

Sadness was the most frequent feeling among suicide attempters, followed by emptiness/loneliness and hopelessness (Figure 3). Three feelings were more prevalent in those who meant to die compared to those who did not really mean to die: emptiness/loneliness (OR = 1.58, 95% CI = 1.35 to 1.85), hopelessness (OR = 1.74, 95% CI = 1.49 to 2.03), and disconnection (OR = 1.54, 95% CI = 1.30 to 1.81). There were no significant gender differences in this regard.

Medication intake was the most frequent method used in both sexes, followed by wrist cutting/bleeding, hanging/suffocation, and poisoning (Figure 4). Medication intake (OR = 2.34, 95% CI = 2.06 to 2.65) and wrist cutting/bleeding (OR = 1.50, 95% CI = 1.22 to 1.86) were significantly more prevalent in women, whereas hanging/suffocation (OR = 1.69, 95% CI = 1.35 to 2.13) and the use of a firearm (OR = 2.19, 95% CI = 1.42 to 3.36) were more frequent in men. There were no significant differences in methods between those who did and those who did not mean to die.

DISCUSSION

The prevalence of suicide attempts in this sample was 6.8%, which is above those rates reported in most of the studies conducted around the world, which range from 3% to 5%.[24,25] This difference may be explained by the following: (a) the high proportion of women in the sample, but still the prevalence would be 6.05% when correcting for a 1:1 male/female ratio; (b) a possible mild selection bias on our Web site for individuals prone to suicidal behavior, despite the prevalence of psychiatric disorders in our databank being generally consistent with epidemiologic studies[21]; (c) more sincerity due to the anonymous Internet questionnaire, allowing for more privacy, so that subjects may have felt more comfortable and unconcerned about how they would appear to others.

The 24.2% prevalence of suicidal ideation without a plan ("I considered killing myself, but not seriously" *plus* "I thought about killing myself, and it was somewhat serious")

Table 1. Demographic Data and Risk Ratios for Suicide Attempt

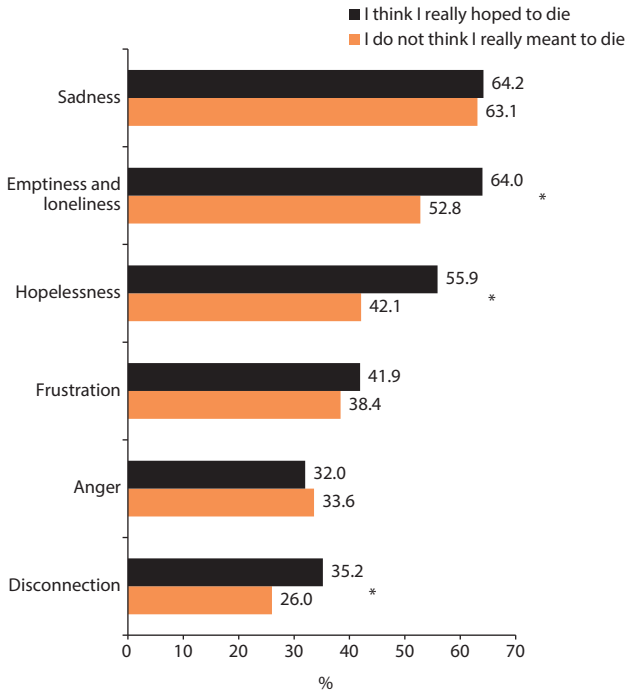
	Total Population		Suicide Attempt			
Variable	n	%	n	%[a]	OR	95% CI
Total	48,569	100	3,326	6.8	NA	NA
Gender						
Male	12,605	25.9	554	4.4	1	
Female	35,964	74.1	2,772	7.7	1.82	(1.65 to 2.00)
Race						
White	35,364	72.8	2,354	6.7	1	
Afro-Brazilian	9,349	19.2	656	7.0	1.05	(0.96 to 1.15)
Mixed	756	1.6	56	7.4	1.12	(0.85 to 1.47)
Asian	2,336	4.8	179	7.7	1.16	(0.99 to 1.36)
Other	764	1.6	81	10.6	1.66	(1.31 to 2.01)
Education level completed						
Elementary school	22,540	46.4	1,170	5.2	2.84	(2.48 to 3.25)
High school	23,741	48.9	1,856	7.8	1.69	(1.56 to 1.83)
Higher education	2,288	4.7	300	13.1	1	
Occupation						
Employee or self-employed	28,802	59.3	1,766	6.1	1	
Student	12,413	25.6	713	5.9	0.94	(0.85 to 1.03)
Without an occupation by choice	1,150	2.4	138	12.0	2.03	(1.68 to 2.44)
Housewife/househusband	1,967	4.0	209	10.6	1.59	(1.36 to 1.85)
Disability insurance	347	0.7	89	25.6	5.32	(4.15 to 6.81)
Disability retirement	201	0.4	44	21.9	4.42	(3.13 to 6.24)
Retired by age or working years	639	1.3	36	5.6	0.89	(0.63 to 1.27)
Unemployed	3,050	6.2	313	10.2	1.69	(1.49 to 1.92)
Religion						
Catholic	20,580	42.4	990	4.8	1	
Jewish	177	0.4	10	5.6	1.23	(0.64 to 2.34)
Evangelical	7,491	15.4	530	7.1	1.49	(1.34 to 1.67)
Spiritist	6,858	14.1	567	8.3	1.75	(1.57 to 1.95)
Other	10,428	21.5	928	8.9	2.24	(1.96 to 2.57)
Without religion	3,035	6.2	301	9.9	2.08	(1.90 to 2.29)
Family history of suicide attempt						
None	29,833	61.4	1,276	4.3	1	
Only the father	707	1.5	68	9.6	2.38	(1.84 to 3.07)
Only the mother	1,298	2.7	148	11.4	2.88	(2.40 to 3.44)
Only a brother or sister	1,380	2.8	128	9.3	2.28	(1.89 to 2.76)
Two nuclear family members	313	0.6	58	18.5	5.09	(3.80 to 6.80)
Three or more nuclear family members	21	0.0	9	42.9	16.78	(7.06 to 39.90)
Do not know	15,017	30.9	1639	10.9	NA	
Family history of completed suicide						
None	41,589	85.6	2,660	6.4	1	
Only the father	232	0.5	26	11.2	1.84	(1.22 to 2.78)
Only the mother	122	0.3	19	15.6	2.70	(1.65 to 4.41)
Only a brother or sister	276	0.6	39	14.1	2.40	(1.71 to 3.38)
Two nuclear family members	16	0.0	6	37.5	8.78	(3.18 to 24.17)
Three or more nuclear family members	0	0.0	0	0.0	NA	NA
Do not know	6,334	13.0	576	9.1	NA	NA
	Male	Female	Male		Female	
Marital status	n (%)	n (%)	n (%[a])	OR (95% CI)	n (%[a])	OR (95% CI)
Single	4,395 (34.8)	10,844 (30.1)	228 (5.2)	1	747 (6.9)	1
In a relationship	3,085 (24.4)	9,037 (25.1)	115 (3.7)	0.70 (0.56 to 0.89)	611 (6.8)	0.98 (0.87 to 1.09)
Married	4,278 (33.9)	12,793 (35.5)	157 (3.7)	0.69 (0.56 to 0.85)	1,042 (8.1)	1.19 (1.08 to 1.32)
Divorced	389 (3.0)	1,821 (5.0)	28 (7.2)	1.41 (0.94 to 2.12)	200 (11.0)	1.66 (1.41 to 1.96)
Divorced and in a new relationship	366 (2.9)	939 (2.6)	17 (4.6)	0.89 (0.53 to 1.47)	111 (11.8)	1.81 (1.46 to 2.23)
Widow(er)	21 (0.1)	267 (0.7)	1 (4.8)	0.91 (0.12 to 6.83)	20 (7.5)	1.09 (0.69 to 1.73)
Other	71 (0.5)	263 (0.7)	8 (11.3)	2.32 (1.09 to 4.90)	41 (11.8)	2.49 (1.77 to 3.51)

[a]Percentage of corresponding n for total population.
Abbreviation: NA = not applicable.

is higher than previously reported in studies conducted with face-to-face interviews, which found rates of 17% in Brazil[25] and ranging from 3.0% to 15.9% in Europe, the United States, and New Zealand.[24] However, the 3.2% prevalence of suicidal plans (3.9% for men and 3.0% for women) did not substantially differ from the 4.8% reported in Brazil[25] and 3.1% in an overall cross-national sample.[24]

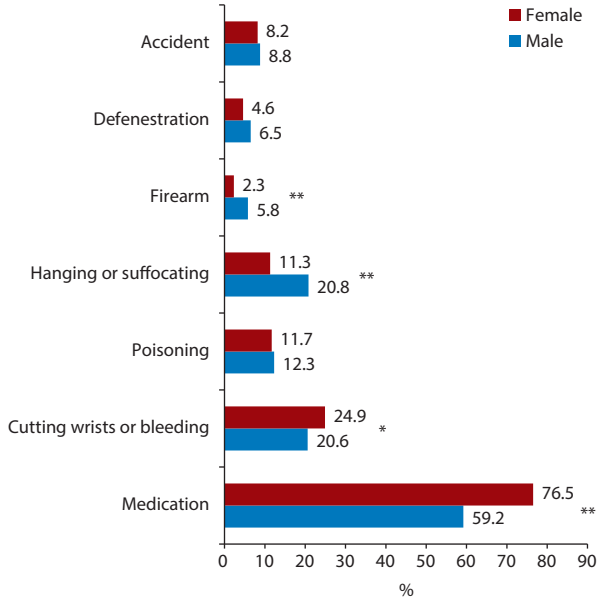
The demographic features with highest risk for attempting suicide in our study were female sex, having an elementary school degree as the highest degree, being unable to work, having no religion, being divorced, and having a family history of a suicide attempt or a completed suicide. These findings are supported by most studies showing these same risk factors for suicide attempts.[4,5,24–29]

Figure 3. Main Feelings Just Before Attempting Suicide[a]



[a]The horizontal bars indicate the frequency of the feelings according to the real hope to die or not. Data are shown as percentages.
*$P < .05$ between those that really did and those that really did not mean to die.

Figure 4. Methods of Suicide Attempt[a]



[a]The horizontal bars indicate the frequency of the methods according to gender. Data are shown as percentages.
*$P < .05$ and **$P < .01$ between sexes.

Among these demographic risk factors, one of the largest effect sizes for suicide attempt was related to being unable to work. This highlights the benefits that having a job and health capability to work confer, such as independence and a purpose in life. In addition, suicide attempt may reflect the burden of diseases that may have caused the impossibility of having a job. It is noteworthy that its effect size is similar to that of having 2 relatives with a history of suicide attempt.

Regarding marital status, a World Health Organization study showed that separated, divorced, or widowed subjects are at a higher risk of suicidality than married people.[4] Our results were consistent with the findings concerning those that were separated or divorced, and they added that separated or divorced men, in a new relationship, did not show an increased risk. However, we were not able to demonstrate a high risk of suicide attempts among widowed people, which can be related to a specific characteristic of the older population who access the Internet, eg, being healthier or more proactive. Our results also showed a different pattern concerning marital status and the risk of a suicide attempt according to gender. For men, being in a relationship, married, or in a stable union demonstrated the lowest risk. For women, being single or in a relationship showed the lowest risk, whereas being married or in a stable union represented a significantly higher risk. Despite sample differences, these findings are in line with a study on older Canadians showing lower levels of depressive symptoms in married men satisfied with marriage (7.3%) compared with unmarried men (20.6%), but similar rates in married women satisfied with marriage (14.4%) compared with unmarried women (11.8%).[30] Another study showed that only in married men could the positive effects of age on happiness be observed, again suggesting that being unmarried is associated with more negative outcomes mostly for men.[31] The cross-sectional design of these studies does not allow establishing causal relationships.

Corroborating previous studies,[28,29] our data showed that having a family history of a completed suicide increases the risk of a suicide attempt. Importantly, having a family history of a suicide *attempt* increased this risk as much as a familial history of a *completed* suicide. Moreover, the number of nuclear family members that had ever attempted or completed a suicide increased suicidal behavior exponentially. Based on these findings, we suggest that the most relevant clinical question to assess a suicidal risk, bearing in mind the family history, would be "How many subjects in your nuclear family have ever attempted or completed a suicide?" Of note, a recent study showed that the SAD PERSONS scale does not accurately predict suicide attempts.[12] Our results suggest that some improvement may be achieved by including the familial history of suicide attempts, but because 64% of subjects attempted suicide impulsively, there is an important circumstantial factor that cannot be addressed by the classical risk factors in order to predict suicidal behavior.

A real death intent is low in most cases of unsuccessful suicide attempts,[32] which was also observed in our sample. According to the Interpersonal Theory of Suicide,[1] it is possible to acquire the capability for suicide. This would probably be secondary to the phenomenon of habituation, which increases physical pain tolerance and reduces the fear of death, finally increasing the suicidal intent. Our

results corroborated this hypothesis and the findings of an increased death intent with repeated episodes of self-harm.[33] However, the real intention to die reached an approximately 50% plateau after 4 or more attempts, which is in line with a previous study with college students,[34] thus raising the hypothesis that about half of the suicide attempters never really develop the will to die or may not habituate and acquire the capability to complete a suicide.

Regarding feelings mostly related to a real intention to die, our data confirmed previous reports showing hopelessness as a robust sensitive predictor of suicidal behavior.[1,15,16] In addition to hopelessness, feelings associated with poor subjective social integration, such as emptiness/loneliness and disconnection, were more prevalent in those who really meant to die. Accordingly, Van Orden et al[1] proposed that thwarted belongingness (poor social integration) is a central construct for suicidal desire. Sadness has also been associated with suicidal ideation and attempt.[35] In our sample, sadness was the most prevalent feeling among those who attempted suicide, but it was not particularly associated with a real intention to die.

The prevalence of suicidal attempt methods in our sample was similar to previous non–Web-based studies.[36,37] However, our findings contradicted the hypothesis that those really intending to die would adopt more violent methods, at least when considering a real intention to die as an index of severity. Thus, the use of a method with a higher probability of being lethal may not necessarily mirror the intention to die, but may also relate to other variables, such as availability, culture, or gender. Considering gender differences in the methods of suicide attempts, women adopted less violent methods than men, in line with the literature.[36]

This was a pioneer research study to evaluate suicidal behavior by engaging the Internet on a large population scale. This approach has advantages, such as obtaining greater validity for sensitive, intimate, moral, and personal issues, when compared to anonymous pen-and-paper methods[38] and to face-to-face[39] or telephone interviews.[40] Furthermore, online data on other measures are remarkably consistent with offline data,[41,42] and Internet users are similar to nonusers on measures of adjustment, social interaction, and personality traits.[39] Also, the Internet provides a means to enhance the motivation of participants and validity of answers by providing automatic personalized feedback and to insert validity checks for attention, which significantly increase response rates. preserving data quality.[43] Finally, respondents either have no preference or usually prefer Web-based versions when compared to mailed questionnaires and telephone interviews.[44,45] On the basis of this evidence, Web-based questionnaires could be considered a valuable method, if not the gold standard, for issues prone to social desirability bias, such as suicidal, sexual, and drug use behavior.

Despite the large sample and the data reliability of anonymous Web surveys, our study has important limitations. First, in this convenience sample there was a clear selection bias toward women, young subjects (those between 16 and 35 years old access the Internet 3 times more often than those >45 years of age),[46] and those of a higher socio-educational level compared to the general Brazilian population,[47] as only about one-third of homes had access to the Internet according to the 2010 national census.[48] Second, this was a cross-sectional study with retrospective questions that could be liable to memory bias. Third, our most severe marker of suicidality was having an attempted suicide with a real death intention, which cannot be considered the same as a completed suicide. Fourth, some potentially relevant feelings (such as burdensomeness) and methods of suicide (such as drowning) were not investigated. Finally, subjects were mostly from Brazil and may not directly apply to Eastern or more developed Western countries.

In conclusion, this was the first large study to evaluate suicidal behavior by using the Internet. Since our results were similar to previous non–Internet-based research, it indicates that this form of data collection is reliable. This study provides significant implications for clinical practice and public health regarding the importance of family history of suicide attempts, number of relatives with suicidal behavior, feelings of emptiness/loneliness and disconnection, and increased intention to die with recurrent suicide attempts. Also, as most suicide attempts may be unplanned, the clinician should not rely on absence of plans as a safe parameter to predict absence of future suicidal behavior. Therefore, a clearer picture of the most relevant suicide risk factors may allow preventive actions when assessing patients.

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