

Predictors of suicidal ideation and depressive symptoms among adolescents in Chiapas, Mexico

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Abstract *The aim of this study was to assess the presence of suicidal ideation and depressive symptoms among adolescents in Chiapas, Mexico based on predictor variables. A cross-sectional study adopting an ex post facto design was conducted with a non-probability sample of 4,759 students of both sexes with an average age of 18.4 years and using the following tools: the Center for Epidemiologic Studies Depression Scale, Roberts' Suicidal Ideation Scale, the Impulsiveness Scale (IS), and the Rosenberg Self-Esteem Scale. The mean score obtained by the suicidal ideation scale was 0.2, which is lower than that reported by other studies, while the mean score for depressive symptoms was similar to those in the literature. The prevalence of suicidal ideation was 7.8%, which is lower than reported in national and international studies. Multivariable logistic regression showed that impulsiveness (OR = 1.907) and depressive symptoms (OR = 9.006) lead to a twofold and ninefold increase in the likelihood of suicidal ideation, respectively. The findings also showed a strong association between suicidal ideation and depressive symptoms, showing that the latter is a predictor of suicidal ideation among adolescents.*

Key words *Suicidal ideation, Depressive symptoms, Adolescents*

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Introduction

There are 11.4 million young people aged between 18 and 24 years¹ living in México, while in the State of Chiapas this number is approximately one million, 29% of whom are concentrated in five municipalities, including Tuxtla Gutiérrez².

Studies show high levels of vulnerability and susceptibility to mental health problems among this group related to risky sexual behaviors, drug use³, depression and self-harm, the latter of which is one of the main causes of death among young people.⁴

The study of suicide, which is the second leading cause of mortality among the female population and the third among males aged between 10 and 24 years, is a complex and dynamic process⁵. This problem accounts for 6% of deaths among this group and thus constitutes one of the most challenging public health problems⁶⁻⁸. Suicidal ideation is one of the stages of this process and ranges from having thoughts about wanting to die to self-destructive fantasies and planning suicide⁹. Mood disorders, impulsivity and despair are factors that influence planning, intention and carrying out a suicide attempt^{10,11}.

A study conducted by Nock *et al.*¹² with adults from 17 countries from five continents showed that the prevalence of suicidal ideation was 9.2%, while a study by Page *et al.*¹³ using information from 266,694 students aged between 13 and 15 years from 49 countries calculated that prevalence was 15.3%. Another study undertaken by McKinnon *et al.*⁶ with 164,770 adolescents from 32 countries reported a prevalence rate of 16.2% and 12.2% for men and women, respectively, showing that the gender difference was more accentuated in the Americas (20.1% and 11.4%) and that African countries showed the highest prevalence of suicidal ideation (22.5% and 20.1%, respectively). Other studies conducted with adolescents have shown similar prevalence rates to those reported above¹⁴⁻²⁰.

In Mexico, a study conducted by Pérez Amezcua *et al.*²¹ using data from a national sample from 2007 involving 12,424 adolescents reported that 47% of adolescents showed at least one symptom of suicidal ideation, while a recent study conducted with 2,386 high school students in the State of Campeche reported a prevalence rate of 13.1%²². Finally, a study developed by Hidalgo-Rasmussen & Hidalgo-San Martín²³ with 899 students aged between 14 and 18 years from urban and rural areas in the State of Jalisco, showed a prevalence rate of 8% among women

and 4.5% in men. The differences in rates obtained by the above studies may be due to the use of different assessment tools and methods and differences in sample characteristics relating to geographical location (urban/rural) and age.

Depressive symptoms can lead to increased vulnerability of adolescents to conduct disorder, social isolation, substance use, and suicidal ideation^{8,24-26}. Symptoms include low mood, lack of appetite, irritability and motor restlessness. The prevalence of these symptoms among adolescents has been shown to range between 10 and 16% and tends to be higher among women²⁷.

Impulsiveness is also considered to be a risk factor for suicidal ideation. It includes conduct that may place the well-being of both the person experiencing the behavior and others at risk, since it comprises a tendency to act without consideration of the consequences. This condition, together with other factors, lead to a fourfold increase in the likelihood of suicidal ideation^{22,28}.

One of the protective factors for psychosocial problems – which include suicidal ideation – , and a strong predictor of general well-being and emotional stability among adolescents, is self-esteem, whereby a person has a positive attitude towards him/herself and a sense of one's own value^{22,29,30}. As such, high self-esteem is associated with low risk of suicidal ideation³¹.

Although a number of studies have explored aspects related to risky sexual behavior and drug use, the literature on other psychosocial problems and mental health, which are particularly relevant given not only their increase and severity, but also their close relationship with the above problems, is scarce. It is therefore necessary to gain a deeper understanding of these aspects in order to inform the development of effective prevention and health promotion efforts.

This study therefore assesses the presence of suicidal ideation among adolescents from Chiapas, México based on predictor variables such as depressive symptoms, impulsivity and self-esteem.

Method and subjects

A cross-sectional study adopting an *ex post facto* nonexperimental design was conducted using a non-probability sample of 4,759 third-year preparatory school students from Chiapas, Mexico seeking admission to higher education courses offered by the Faculty of Humanities and Social Sciences and the Faculty of Nutrition and Food

Sciences, both belonging to the University of Sciences and Arts of Chiapas, México, during the period 2011 to 2015.

The sample was made up of 3,275 women (68.8%) and 1,484 men (31.2%), with an average age of 18.4 years and standard deviation of 1.67 years.

Data collection techniques and tools

Standardized tools validated for use with the Mexican population were used. A pilot study was conducted to test the appropriateness of these tools, proving their semantic adequacy and that they were easily understandable.

The following tools were used:

- The Center for Epidemiologic Studies Depression Scale (CES-D)³², consisting of 20 items designed to measure depressive symptoms during the week prior to its application using a four-point scale with the following options: 0 = 0, 1-2 days = 1, 3-4 days = 2, and 5-7 days = 3. Overall score therefore ranges between 0 and 60. Internal consistency (≥ 0.83) and various types of validity have been shown to be consistently satisfactory by different studies with adolescents attending schools in rural³³ and urban^{26,28} areas in Mexico.

- Roberts' Suicidal Ideation Scale (SIS)³⁴, consisting of four items (three from the Roberts' scale and one from the CES-D - I could not get "going") regarding thoughts about death and taking one's own life over the previous seven days and also using a four-point scale with the following options: 0 = 0, 1-2 days = 1, 3-4 days = 2, and 5-7 days = 3. Overall score therefore ranges between 0 and 12. The scale has been shown to have satisfactory internal consistency using Cronbach's alpha ($\geq .80$) and good construct validity^{28,35}.

- The Impulsiveness Scale (IS)²⁸, consisting of five items with a four-point Likert scale with the following options: 1 = rarely, 2 = sometimes, 3 = often, and 4 = very often, used to assess the frequency of actions taken on impulse and lack of reflection on the consequences. This tool was validated for use with the Mexican population by González et al.³⁶

- The Rosenberg Self-Esteem Scale (RSS)³⁷, consisting of five positively worded items and five negatively worded items with the following options: 1 = Strongly agree, 2 = Agree, 3 = Disagree, and 4 = Strongly disagree. After reverse scoring the negatively worded items, the

overall score ranges between 10 and 40, whereby the higher the score, the higher the self-esteem. Studies have shown that this tool has satisfactory internal consistency for use with Mexican adolescents ($> .74$)²⁹.

Procedure

The project was scientifically assessed by and received ethical approval from the Directorate of Research and Post-graduation at the University of Sciences and Arts of Chiapas.

Informed consent was obtained from the participants, who were informed that their responses would be kept confidential and anonymous. Those who accepted to participate voluntarily in the study authorized the use of information for research purposes. The information was protected in accordance with the principles and requirements laid out in the Declaration of Helsinki.

The scales were conducted by qualified psychologists according to standardized procedures and their application was supervised by a suitably qualified support team.

The overall scores obtained by each participant for each of the four scales were calculated based on the sum of each individual item score. Participants were then categorized according to cut-off scores, based on the mean score plus one standard deviation, resulting in the following scores: SIS = 1.0 (M = 0.2, SD = 0.8); CES-D = 16 (M = 10.3, SD = 5.9); IS = 11 (M = 8.2, SD = 2.4); and RSS = 23 (M = 28.5, SD = 6.4), considering a reference value for the latter scale of the mean minus the standard deviation to indicate normal and high level of self-esteem.

Based on these cut-off values, the predictor variables were categorized in binary form as follows:

- Suicidal ideation (0 - without ideation; 1 - presence of ideation).
- Depressive symptoms (0 - without depressive symptoms; 1 - with depressive symptoms).
- Impulsiveness (0 - low; 1 - normal).
- Self-esteem (0 - low; 1 - normal or high).

To assess the effect of the variables of interest on the likelihood of suicidal ideation, multiple logistic regression was performed using the categorical variables impulsiveness, self-esteem and depressive symptoms. The model was also run incorporating the adjustable variables age and sex. Based upon the results of this process, probability of extreme events were calculated.

Results

The large majority of participants (93.3%) studied in state education institutions, while the rest studied in private institutions. The grade point average in the last year was 8.26, with a standard deviation of .72. A little over half (50.5%) of the participants were from the state capital, Tuxtla Gutiérrez, while the rest were from other towns and areas in the state or from neighboring states such as Oaxaca, Veracruz, Tabasco and Puebla.

The results show that a little over half of the participants (2,437 or 51.2%) had experienced at least one of the problems under study: 369 cases (7.3%) showed evidence of suicidal ideation; 633 (13.3%) a high level of depressive symptoms; 2,020 (42.4%) low self-esteem; and 262 (5.5%) high levels of impulsiveness. The problem with the highest prevalence rate was low self-esteem.

The number of participants that showed evidence of suicidal ideation, depressive symptoms, low self-esteem, and high levels of impulsiveness was 21, revealing a very high level of psychosocial risk; while the number of cases who experienced the same problems, but with a low level of impulsiveness, was 107. The total number of participants who experienced all problems, with or without impulsiveness, was 128, which is equivalent to 2.68% of the total sample.

A preliminary regression analysis was performed to determine the association between the categorical variables and adjustable variables (age and sex) and to estimate their effect on the likelihood of suicidal ideation. The results for the adjustable variables were not significant, showing an odds ratio (OR) of close to 1, which is consistent with the findings of other studies³⁸. The lack of association between age and sex and suicidal ideation was confirmed using Student's t-test and chi-square test², respectively. With respect to gender, this result may be explained by development and improvements in socioeconomic status and working conditions among women over recent years³⁹, particularly among the population group under question, while the age proximity of participants may explain the lack of significance. An analysis was therefore performed to predict the likelihood of suicidal ideation (SI) based solely on the significant variables self-esteem (SE), impulsiveness (IM), and depressive symptoms (DS).

The logistic regression results are shown in Table 1.

This implies that the LOGIT transformation can be expressed as follows:

$$IS = -2.970 - (.353) AU + (.646) IM + (2.198) SD$$

The significance test for the generalized model obtained a p-value of $\leq .000$, indicating that the model was significant. The significance value for each of the predictor variables SE, IM and DS was less than .05, showing that they were relevant. It is interesting to note from the results that normal/high levels of SE inhibit the likelihood of SI, while, conversely, high levels of IM and DS increase the likelihood. The ORs obtained therefore suggest that high levels of IM result in a two-fold increase (OR = 1.907) in the likelihood of SI. Without doubt, however, the result that stands out most is the fact that the presence of DS leads to a ninefold increase in the likelihood of SI (OR = 9.006), corroborating the theory that high levels of depression are conducive to suicidal ideation and, ultimately, attempted suicide.

The results of the analysis of probability of extreme events are shown in Table 2.

The critical probability of SI without normal or high levels of SE, but with high levels of IM and the presence of DS, is close to .500. In contrast, when there are low levels of SE and low levels of IM and absence of SD, the likelihood of suicidal ideation is practically zero. In the context of the present study, the importance of the model lies in the fact that it allows the rapid assessment of warning signs of suicidal ideation in the population in question in cases of high levels of impulsiveness, low self-esteem and depression, all of which warrant intervention.

Discussion and conclusions

The nature of the data obtained by the present study allows for comparison with similar studies. With respect to measures of central tendency, the CES-D obtained a mean score of 10.3, which is similar to that reported by González *et al.*⁴⁰ in a study of preparatory school students in Mexico City (M = 9.5) and lower than that documented by Veytia *et al.*⁴¹ in a study undertaken with adolescents aged between 15 and 19 years in the State of Mexico (M = 16.2 for women and M = 16.02 for men).

The mean score obtained by the suicidal ideation scale was 0.2, which is much lower than the scores reported by other studies conducted in different states⁴²⁻⁴⁴. This may be due to a number of factors, including the influence of the religious prohibition of suicide and suicidal ideation⁴⁵,

cultural and economic diversity⁴⁶, and whether people admit to feeling the symptoms⁴⁷.

The impulsiveness and self-esteem scales obtained mean scores of 8.2 and 28.5, respectively, which are similar to those reported by other studies⁴², though lower than those found by González & Landero⁴⁸ (M = 35.02).

Our findings also show that 7.8% of the participants were shown to have at least one of the symptoms of suicidal ideation, which is lower than the rates reported by international¹³ and national²² studies, in which prevalence rates ranged between 15.3 and 13.1%. Furthermore, 13.3% of the participants of the present study showed signs of depressive symptoms, which is similar to the levels reported by other studies²⁷.

The logistic regression results show that impulsiveness and depressive symptoms lead to a twofold and ninefold increase in the likelihood of suicidal ideation, respectively, while self-esteem was shown to be a protective factor against suicidal ideation and depressive symptoms. These findings are in line with other investigations, including a study undertaken with schoolchildren aged between 12 and 16 years in the United Kingdom⁴⁹ and another conducted by Souza et al.¹⁴ with 1,039 adolescents from the urban area of Pelotas in the south of Brazil, both of which showed a strong association between suicidal ideation and depressive symptoms [OR = 10.23; 8.41 to 12.44; CI 95% and OR = 11.25; 4.82 to 26.22, CI 95%, respectively].

However, other studies involving adolescents have reported weaker associations between both

variables, including an investigation carried out by Kaess et al.¹⁶ in Germany [OR = 1.298; 1.259 to 1.338, CI 95%], another undertaken by Glashouwer¹⁵ in Holland [OR = 1.95; 1.72 to 2.22, CI 95%], and a study conducted by Shilubane et al.²⁰ in South Africa [OR = 1.755]. Two studies in Asia also confirmed this association: a study conducted by Medina et al.¹⁷ in Cambodia [OR of 1.328 and 1.164 for women and men, respectively] and another undertaken by Nguyen et al.¹⁹ in Vietnam [OR = 3.45; 2.63 to 4.54; CI 95%]; while in Central America, Medina et al.¹⁷ obtained an OR of 1.275 and 1.650 for women and men, respectively, in a study with students aged between 15 and 18 years in Nicaragua.

In Mexico, this association was reported by two recent studies, the first of which²¹ reported an OR of 5.36 [4.51 to 6.38, CI 95%] for depressive symptoms and a second²³, which obtained an OR of 1.9 [1.0 to 3.3, CI 95%]. Both studies were carried out with schoolchildren in the central and western regions of the country, where socio-economic status, culture and religion are highly different to those in Chiapas, where religion is a potential protective factor against mental disorders and behavioral problems among adolescents⁵⁰. It is important to note, however, that further research is necessary to corroborate this hypothesis.

With respect to the association between suicidal ideation and impulsiveness, a study conducted by Nock et al.¹² obtained an OR of 3.3 (2.8 to 3.8, CI 95%), which is higher than that found by the present study. These variables, when found

Table 1. Coefficients of the logistic regression model for suicidal ideation (SI) in relation to SE, IM and DS.

Variable	Coefficient	Sig.	OR	CI 95% for OR	
				Lower	Upper
Self-esteem (SE)	-0.353	.005	0.703	.55	.89
Impulsiveness (IM)	0.646	.000	1.907	1.47	2.47
Depressive symptoms (DS)	2.198	.000	9.006	7.14	11.34
Constant	-2.970	.000	0.051	-	-

Sig = P - value, OR = Odds Ratio, VY = Confidence Interval.

Table 2. Probability of the occurrence of SI based on the presence or absence of SE, IM and DS.

SE	IM	DS	Probability of SI event
Low	High	With	.468
Normal or High	Low	Without	.034

SI = Suicidal ideation, SE = Self-esteem, IM = Impulsiveness, SD = depressive symptoms.

together with depression, constitute a high-risk factor and modulator for the development of suicidal ideation and suicide plans or attempts⁵¹.

One of the limitations of this study is that cross-sectional studies are not able to determine cause-and-effect relationships between different variables. Furthermore, non-probability sampling does not allow for the generalization of results to the entire population of this age group. Finally, it would be interesting to explore the variables examined by this study using different tools used by other studies that are able to capture other aspects such as spirituality, culture and the socioeconomic status of women, which deserve further research.

Despite these limitations, this study makes important contributions to the study of suicidal

ideation. In this respect it is important to note that it is the first study on this topic to be conducted in Chiapas and therefore the first to confirm the presence in this region of important risk factors for suicidal ideation highlighted by the literature, such as depressive symptoms and impulsiveness, thus serving as an important input to inform the design of strategies to address this problem.

Adolescents with suicidal ideation require constant monitoring and interventions should pay particular attention to feelings of despair⁵². Given the lack of counselling services provided in the community, such activities could be developed in the university's tutorial department through the provision of guidance in reflection groups or via individualized psychological care.

Collaborations

GA García Lara worked on the conception, delineation, application of instruments, analysis and interpretation of the data and writing of the report, JO Zúñiga worked on the analysis and interpretation of the data and review of the report, OC Pérez and SH Solís worked on the writing of the article, CEP Jiménez and MC Méndez worked on the application of instruments and writing of the article.

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