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ORIGINAL ARTICLE

Suicide risk model based on the interpersonal theory of suicide: evidence in three regions of Mexico

Modelo de riesgo suicida basado en la teoría interpersonal del suicidio: evidencia en tres regiones de México

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ABSTRACT

Background: Reports of suicidal behavior have increased in Mexico for years. In order to develop a more adequate suicide prevention strategy, it is necessary to understand its predictive factors, so the purpose of this research was to propose a model of suicidal risk in young people, taking into account one of the most current theories on the subject, Joiner's interpersonal theory. **Method:** A non-probabilistic sample of young people with suicidal ideation from three regions of Mexico was obtained by online survey (N=411), with mean age of 17.89 years (SD. 1.2), 336 women (81.8%), and 75 men (18.2%). **Results:** First, a multiple linear regression model was created to predict suicidal risk based on thwarted belongingness and perceived burden with 17% explained variance; then a second model was generated with the same variables and including other factors associated with suicide such as self-injury desires, impulsivity and suicide attempts, in addition to variables associated with family conflicts, improving the explained variance to 34%. Lastly, two properly adjusted structural equation models were obtained, one focused on suicidal risk ($R^2=.21$; RMSEA=.026; CFI=.99) and the other on ideation ($R^2=.18$; RMSEA=.070; CFI=.98). **Conclusions:** The main factors that explain suicidal risk are depressive symptoms, perceived burden and desires for self-injury. Further research on the effect of painful experiences as factors that could predict suicide attempt is suggested.

Keywords: suicide, interpersonal theory, self-injury, thwarted belongingness, perceived burdensomeness.

RESUMEN

Introducción: Los reportes de conducta suicida en México han aumentado por años. Para desarrollar una estrategia más adecuada de prevención del suicidio es necesario comprender sus factores predictores, por lo que el propósito de la presente investigación fue proponer un modelo del riesgo suicida en jóvenes tomando en cuenta una de las teorías más vigentes en cuanto al tema, la teoría interpersonal de Joiner. **Método:** Se obtuvo por encuesta online una muestra no probabilística de jóvenes con ideación suicida de tres regiones de México (N=411), con una edad media de 17.89 años (DE. 1.2), 336 mujeres (81.8%) y 75 hombres (18.2%). **Resultados:** Primero se conformó un modelo de regresión lineal múltiple para predecir riesgo suicida a partir del sentido de pertenencia frustrado y la carga percibida con 17% de vari-

anza explicada; después se generó un segundo modelo con las mismas variables e incluyendo otros factores asociados al suicidio como los deseos de autolesión, impulsividad e intentos suicidas, además de variables asociadas a conflictos familiares, mejorando la varianza explicada hasta un 34%. Por último, se obtuvieron dos modelos de ecuaciones estructurales con ajuste adecuado, uno enfocado en riesgo suicida ($R^2=.21$; $RMSEA=.026$; $CFI=.99$) y otro en la ideación ($R^2=.18$; $RMSEA=.070$; $CFI=.98$). **Conclusiones:** Los principales factores que explican el riesgo suicida son los síntomas depresivos, la carga percibida y los deseos de autolesión, se sugiere seguir investigando sobre el efecto de experiencias dolorosas como factores que podrían predecir el intento suicida. **Palabras clave:** suicidio, teoría interpersonal, autolesiones, carga percibida, sentido de pertenencia frustrado.

BACKGROUND

The prevalence of suicides in Mexico has been on an upward trend for approximately two decades (Fernández et al., 2016; National Institute of Statistics, Geography and Informatics (2020, 2021), a fact that could be exacerbated when considering the psychosocial effects of the pandemic of COVID-19, the estimates that have been made in other countries such as the United States, China, Bangladesh and the United Kingdom with people in a wide range of ages (15-75 years), point to a prevalence of 11.5% with suicidal ideation in the general population, a higher percentage than is usually reported prior to the pandemic (Farooq et al., 2021).

The previous trend combines with what was recorded by the National Survey of Health and Nutrition (ENSANUT) 2018, in which it refers that 5% of the population over 10 years old has ever thought about committing suicide, more specifically in the adolescent population (10 to 19 years old) 4% in men and 7% in women, and in the young population (20 to 29 years old) 4% in men and 5% in women.

It has been analyzed that the impact of the pandemic on the suicide spectrum can be economic, social and biological (Conejero et al., 2020), with psychological consequences that could impact suicide rates during the pandemic and even after (Sher, 2020), as has been verified in the significant increase in the number of consultations due to suicide ideas and attempts (Jerónimo et al., 2021), or in the increase in mortality due to suicide, even in countries with a relatively small impact of COVID -19 (Watanabe and Tanaka, 2022). With this panorama, it is necessary to test models that explain suicidal risk, which allow guiding prevention and clinical supported on theoretical empirical bases about suicide.

Along this line, some models have already been generated to predict suicide in the Latin American context, such is the case of the contribution of Toro et al. (2021), who created a cross-cultural model with a proven good fit with Mexican and Colombian adult population, giving a special emphasis to the explanation of suicidal risk from depression, despair and suicidal ideation.

On the other hand, a predictive model of suicidal ideation in Mexican adolescents from Jalisco was also recently revealed (Reynoso et al., 2019), which managed to explain 30.7% of the variance, having as predictor variables in depressive symptoms, lack of family support and problems adjusting to school in order of relevance.

After the COVID-19 pandemic, it is necessary to involve aspects such as the case of despair about the future and changes in social reciprocity (Banergee et al., 2021), which is why the high explanatory potential of the interpersonal theory of Joiner (2005), one of the most current theories regarding the explanation of

suicide that has been tested both in clinical samples (Joiner et al., 2009) and in non-clinical ones (Becker et al., 2020).

The theory of Joiner is based on the interaction of three variables, the perceived burden (feeling like a burden to others), the thwarted belongingness (not perceiving oneself as part of any group), and the acquired capacity for suicide (absence of fear of dying and high pain tolerance), according to the theory the first two variables will result in the desire to die (Van Orden et al., 2010), however, the possibility and lethality of the attempt are determined by the acquired capacity for suicide, which is explained by habituation processes and the opposite process (Solomon, 1998), constant painful experiences could make it less intimidating to try to commit suicide.

There are systematic reviews of the studies that test this theory, yielding controversial results, for example Ma et al. (2016) point out that the perceived burden influences suicidal ideation, that the perceived burden in the interaction with the thwarted belongingness with suicidal ideation are modest, while the relationship with suicidal capability has been low. In a more or less similar way, Klonsky et al. (2016) found significant and robust associations between thwarted belongingness and the perceived burden with suicidal ideation, and acquired suicidality related to a greater number of suicide attempts, although points out that the operational definition of suicidal capability could be influencing so that larger effect sizes are not obtained. Similarly, other studies partially support Joiner's (2005) postulates, pointing out that it is necessary to continue exploring the interaction of its main constructs with gender-specific effects and other psychological processes (Cha et al., 2018); just as it has been mentioned that the perceived burden and the thwarted belongingness influence suicidal ideation differently in their interaction with other factors, underlining the importance of studying this theory associated with other aspects of suicidal behavior (Espinosa-Salido et al., 2020).

According to Chu et al., (2017) there is a lack of studies that test the interpersonal theory with validated instruments, in addition to recommending the application with adolescents, understanding that there is a high number of suicidal behaviors and they can last until death. Adulthood, which makes special sense in light of the latest epidemiological reports (INEGI, 2021), in which the age group with the highest suicide rate is the one of people between 18 and 29 years old, 10.7 deaths per 100,000 people.

Just as there are studies that have directly explored the interpersonal theory of suicide, there are also studies that have reported data that could appear to be evidence of Joiner's (2005) statements, such as have suffered health damage due to violence implies a greater risk of suicide attempt compared to

those who have not (Valdéz-Santiago et al., 2018), which could be related to the acquired capacity for suicide due to habituation to painful experiences, in the same way as with research on suicide and its link with behavior.

In another study, those with a mild eating disorder score reported 1.5 times more likely to attempt suicide, while those with moderate scores had 4.2 times more likely to attempt suicide compared to those without eating psychopathology (Valdéz-Santiago et al., 2018). In turn, it has been possible to distinguish between young people with suicidal ideation and behavior based on exposure to self-harm among friends and/or relatives, psychological disorders, and the use of cigarettes and drugs (except cannabis) (Mars et al., 2019), findings that point in the same direction as that postulated regarding the acquired capacity for suicide (Van Orden et al., 2010), assuming that exposure to painful behaviors can facilitate a reduction in fear towards them and therefore, a greater risk of attempting against one's own life.

As a complementary way to what was proposed by Joiner (2005), it has been proposed that in addition to the acquired capacity for suicide, there are more variables that determine the passage from ideation to suicide attempt, as in the case of self-destructive behaviors of others serving as modeling and impulsivity among other variables (O'Connor & Kirtley, 2018).

Taking into account the above, factors associated with relevant suicidal behavior in its prediction have been included in this project, as is the case of self-injury (Serra et al., 2022), or the case of depressive symptomatology (Melhem et al., 2019; Sandoval et al., 2018). The objective was to propose a model of suicidal risk in young people based on Joiner's interpersonal theory, in adolescents with suicidal ideation from different regions of Mexico.

METHODS

Participants

A non-probabilistic sample was obtained from young people with suicidal ideation (non-specific active suicidal thoughts) N=411 with an M=17.89 years (SD. 1.2), in an age range between 13 and 20 years old, 336 women (81.8%) and 75 men (18.2%), the participants came from cities in three regions of Mexico, Mexico City (n=155) and State of Mexico (n=102), "central zone"; Guadalajara (n=86) "western area", and Tijuana (n=68), "northern area". Regarding schooling, 50.6% reported studying high school level, 26.3% university, 5.6% reported secondary level and 17.5% reported not studying at the time of their participation.

Instruments

General data: sociodemographic aspects such as age, schooling, substance use, and relationship with family and school environment.

Plutchik's Suicide Risk Scale (Plutchik & Van Praag, 1989; adapted to Spanish by Rubio et al., 1998). It consists of 15 items with yes/no answers, the sum of 6 affirmative answers implies the presence of suicidal risk (Rubio et al., 1998). The modified version of two items by Suárez-Colorado et al. (2019) was used. Internal consistency in Mexicans has been Cronbach's Alpha of

.74 (Santana-Campas & Santoyo, 2018) and up to .84 (Solis-Espinoza, 2021).

Beck's Depression Inventory (BDI - II) (Beck et al., 1996; adapted for the Mexican population by Jurado et al., 1998). It consists of 21 items that evaluate depressive symptoms with a descriptive scale of four options, it has a high reliability with Cronbach's alpha of .89 (Padrós & Pintor, 2021).

Columbia Scale to Assess the Seriousness of Suicidal Ideation (C-SSRS) (Posner et al., 2011; adapted to Spanish by Al-Halabí et al., 2016). It is a semi-structured interview that evaluates: 1) severity of suicidal ideation with 5 types of ideation with a 5-point ordinal scale (from 1=desire to die to 5=suicidal ideation with a specific plan or intention), 2) intensity of ideation made up of ordinal scales (frequency, duration, controllability, deterrence, and reason for ideation), 3) suicidal behavior with a nominal scale of actual, interrupted, and aborted attempts, preparatory acts, and nonsuicidal self-destructive behavior, and 4) the lethality of suicidal ideation, suicidal behavior, the scale has shown evidence of adequate discriminant validity and sensitivity to change. Sensitivity to change: the reduction of one point in item 3 of the Hamilton Depression Rating Scale implied 5.08 points fewer in the severity of suicidal ideation and 13.51 points fewer in the intensity of suicidal ideation. The intensity of suicidal ideation obtained a Cronbach's alpha of .53, the factors of intensity of suicidal ideation explained 55.66% of the variance (Al-Halabí et al., 2016).

Interpersonal Needs Questionnaire (Van Orden et al., 2008; adapted to Spanish by Ordoñez-Carrasco, et al., 2018). Instrument developed to test Joiner's interpersonal theory of suicide. There are 10 items on a Likert scale with 7 response options, from 1 (not very true for me) to 7 (very true for me). It has two subscales: perceived burden with an alpha of .92 (feeling of being "a burden" for other people) and thwarted belongingness with an alpha of .80 (feeling that one is not part of anything) (Ordoñez-Carrasco, et al., 2018).

Scale of acquired capacity for suicide (lack of fear of dying) (Ribeiro et al., 2014; adapted by Trejo, 2018). 8-item scale that estimates fearlessness to hurt oneself with 5 response options, from 1 (not at all like me) to 5 (very much like me). In the Mexican population, a Cronbach's alpha of .76 has been reported (Trejo, 2018).

Self-harm risk questionnaire (CRA) (Solis & Gómez-Peresmitré, 2020). The self-injury frequency factor and the addictive effect of self-injury/desire for self-injury were used, consisting of 9 dichotomous and polytomous questions, with high internal consistency (alpha and omega = .94) (Solis & Gómez-Peresmitré, 2020).

Plutchik's Impulsivity Scale (Plutchik & Van Praag, 1989; adaptation to Spanish by Rubio et al., 1998). It consists of 15 items that measure impulsive behavior on a Likert-type scale with 4 response options ranging from never to almost always. Adequate reliability has been reported (Cronbach's alpha = .71) (Alcázar-Córcoles et al., 2015).

Procedure

A web page created on GoogleForms was distributed through social networks, in which the different instruments were includ-

ed; at the beginning, an informed consent was presented with the description of the project, stating that participation would be voluntary and the data would be used only for research purposes, later, each section of general questions and the instruments were presented, one week after answering the survey feedback and report of results were sent by email to each participant, suggesting that they receive psychological support in cases where there were indications of psychopathology (for example, high suicidal risk score or active suicidal ideation), they were provided a list of public psychological support centers to receive care and followed up on cases in which they requested support and/or more information. The data collection was non-invasive and the ethical criteria for research in psychology (SMP, 2007) were followed.

Analysis of data

Measures of central tendency of the variables were obtained. Afterwards, the assumptions of variance homogeneity (Levene test) and normality (Kolmogorov-Smirnov) of the sample were tested in order to perform the analysis of variance of one factor (ANOVA), with the aim of looking for differences according to the region of the participants. Although not all the variables obtained a normal distribution, some authors point out that if this assumption is not drastically violated, the ANOVA works adequately (Zar, 2010). Then multiple linear regressions and structural equations were used to create models that explained suicide risk, with the Generalized Least Squares estimator. For the size of the sample, the recommendations of Vargas-Halabí (2016). The cut-off points of the adjustment indices were considered: RMSEA≤.08 (Browne & Cudeck, 1993); GFI≥.90 ; CFI≥.95 (Lai, 2021); IFI≥.90 (Bollen, 1989). SPSS V.21 and AMOS V.21 were used.

Ethics topics

This project had the approval of the Comité de ética de la Universidad Nacional Autónoma de México - Facultad de Estudios Superiores Iztacala (no. 1417).

RESULTS

Table 1 shows the comparisons (simple variance analysis), the average, and the standard deviation of the main variables of the study in the sample according to the entity of origin.

Upon concluding that most of the variables did not differ significantly according to each subsample, and in the cases in which there were differences, the effect size was small, the analyzes were performed as a whole, as a single sample. Two models with multiple linear regression (see Table 2) were hypothesized to test some postulates of the interpersonal theory of suicide, predicting suicidal risk, a first model of the perceived burden and thwarted belongingness was developed with 17% of explained variance. Being one of the key factors within the interpersonal theory of suicide, the absence of fear of dying was included in the regression models, however, it did not have a significant effect. Subsequently, variables that could be associated with the acquired capacity for suicide were added (previous suicide attempts, impulsivity, the desire to self-injury, and family violence), and a variable that could be associated with thwarted belongingness (quality of the family relationship), the second model achieved an explained variance of 34%, with the main predictors being the desire to harm oneself (β=.26), the perceived burden (β=.17) and the number of suicide attempts (β=.19).

After the development of regression models, two models were proposed using structural equations, considering some of the previous results, taking the suicidal risk as the dependent variable in the first, and the intensity of ideation second in the second (see Table 3). Figure 1 shows the models.

DISCUSSION

The objective of the study was to propose a model that explains the suicidal risk in young people based on the principles of the interpersonal theory of Joiner (2005), two multiple linear regression models were carried out, one testing the hypothesis that the perceived burdens and the thwarted belongingness would be associated with suicidal risk with 17% explained variance and one in which the addition of other associated vari-

Table 1. Comparisons of variables related to suicide according to the state of origin.

Variable	Ciudad de México (n= 155)		Estado de México (n=102)		Jalisco (n = 86)		Tijuana (n= 68)		ANOVA	
	M	SD	M	SD	M	SD	M	SD	F	η ²
Suicidal risk	25,67	1,92	25,62	2,06	26,32	1,73	25,76	2,05	2,56	0,010
Depressive symptoms	52,89	11,75	54,46	10,66	55,31	8,01	54,02	10,79	1,05	0,008
Perceived burden	29,83	10,47	30,29	10,86	31,08	10,59	28,55	10,78	0,75	0,005
Thwarted belongingness	17,68	5,89	18,50	6,32	19,10	5,46	18,04	6,25	1,14	0,008
Impulsivity	39,45	5,70	39,73	6,36	41,56	5,63	39,41	6,63	2.64*	0,010
No fear of dying	26,49	7,26	24,99	6,43	25,82	6,98	27,25	7,26	1,66	0,010
Desire to self-injury	11,84	4,16	11,56	4,66	12,12	3,95	11,91	4,58	0,26	0,002
Suicidal attempts	1,83	1,91	1,71	1,92	1,80	2,00	2,21	2,72	0,83	0,006
Intensity of suicidal ideation	14,18	3,65	14,68	3,77	15,62	4,03	15,05	4,36	2.72*	0,020
Family problems	3,00	0,83	3,22	0,91	3,13	0,89	3,35	0,85	2.89*	0,020

Note: sig. * p<.05

ables was tested reaching 34% explained variance. Subsequently, two path analysis models with acceptable adjustable indices were proposed, one taking suicide risk as a variable to predict ($R^2=.21$; $RMSEA=.026$; $CFI=.99$) and another predicting the intensity of suicidal ideation ($R^2=.18$, $RMSEA=.070$, $CFI=.98$).

What was found in the multiple linear regression models is consistent with one of the hypotheses proposed in the work of Van Orden et al., (2010), in which it is pointed out that the variables of perceived burden and thwarted belongingness can have an impact on their own alone in the development of ideas about suicide, however, the effect seems unequal, with the effect of the perceived burdensomeness (.38) being more than the double that the thwarted belongingness (.14) on suicidal risk; this finding could be explained by taking into account what was pointed out by Espinosa-Salido et al., (2020), both factors, despite being interrelated and having proven to be good predictors of suicide attempts, have also contributed to some predictive models independently and in interaction with other variables. Another result that could be associated with the thwarted belongingness is the relationship with the family, a factor added in the second regression model that had a significant impact (Domestic violence $\beta=.11$; Family conflicts $\beta=.11$), from it could be hypothesized that a family relationship considered “good” would serve as a protective factor against suicide, insofar as this would reflect a sense of belonging with family members.

In contrast to the first two elements of the interpersonal theory

of suicide, the effects of the absence of fear of dying did not have a significant impact on the predictive models, similar to what was reported by Becker, Foster and Luebbe (2020), who found moderate to high correlations between suicidal risk with thwarted belongingness (.41), with perceived burdensomeness (.52), with depressive symptomatology (.55), and lower correlations with the absence of fear of dying (.06).

In another study (Schuler et al., 2021), although low levels of suicidal ideation were associated with low suicide capacity, it was emphasized that the acquired capacity for suicide did not show significant variations over 90 days, suggesting that it is of a factor that tends to be stable, so it would not be entirely clear how this aspect would be involved in suicide prevention, even pointing out that genetic aspects and other variables could influence suicidal ability.

Following the same trend, Wolford-Clevenger et al., (2020) confirmed the hypothesis of Van Orden et al., (2010) regarding the association between the perceived burden and thwarted belongingness with suicidal wishes, despite little support for the relationship with the acquired capacity for suicide, from which it is suggested to consider new conceptualizations of that construct in the measurement of the variables, such as the proposal by Klonsky and May (2015) with two other variables that contribute to the capacity to commit suicide: practical (knowledge and access to lethal means to take one’s life) and dispositional (genetic aspects such as sensitivity to pain, fear of blood, fear-

Table 2. Multiple linear regression models for Suicidal risk.

	Non-standardized coefficients		Standardized coefficients		p
	β	Error tip.	β	t	
Model 1 (Constant)	22,84	0,36		62,92	0,001
Perceived burdensomness	0,07	0,01	0,38	8,47	0,001
Thwarted belongingness	0,05	0,02	0,15	3,25	0,001
Model 2 (Constant)	19,61	0,69		28,49	0,001
Perceived burdensomness	0,03	0,01	0,18	3,86	0,001
Thwarted belongingness	0,04	0,01	0,11	2,65	0,008
No fear of dying	-0,01	0,01	-0,05	-1,09	0,275
Domestic violence	0,33	0,14	0,12	2,36	0,019
Impulsivity	0,04	0,01	0,11	2,73	0,007
Desires of self-injury	0,12	0,02	0,26	5,62	0,001
No. of suicide attempts	0,19	0,04	0,20	4,53	0,001
Family problems	0,25	0,11	0,11	2,29	0,022

Table 3. Goodness-of-fit indices of the models (n=411).

	X^2	df	p	RMSEA	AIC	R^2	CFI	GFI	IFI
Model 1. Suicide risk prediction	2,544	2	0,28	0,03	28,5	0,21	0,99	0,99	0,99
Model 2. Prediction of the intensity of suicidal ideation	3,003	1	0,083	0,07	21,0	0,18	0,98	0,99	0,98

Note: X^2 = Chi squared. *df* = Degrees of freedom. CFI = Comparative fit index. TLI = Tucker-Lewis index. RMSEA = Root mean square error of approximation. SRMR = Standardized root mean square residual.

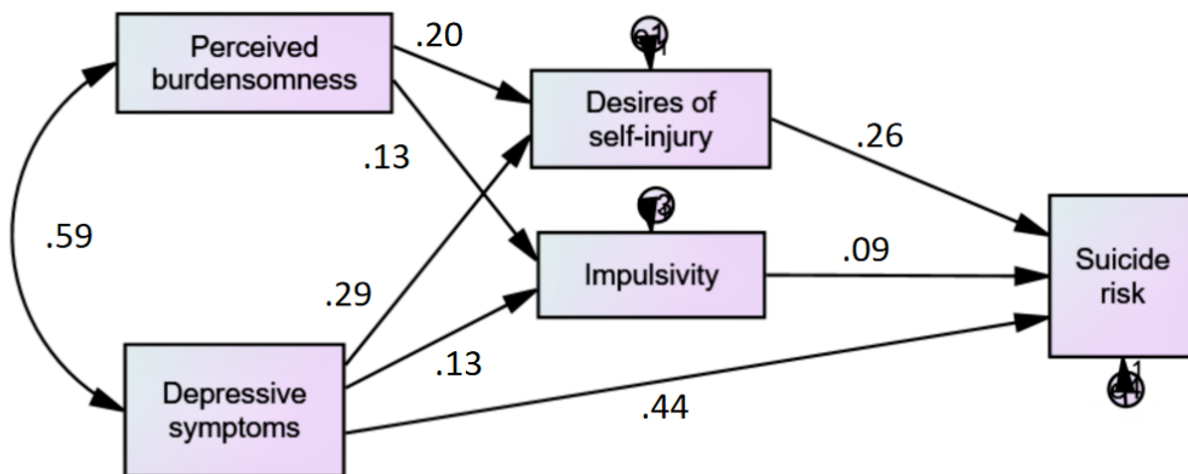
less traits).

On the other hand, the results were consistent with the studies that support the relationship between self-injury and suicidal behavior, according to a review of studies that analyzed this association (Grandclerc et al., 2016), the authors point out that self-injury has been linked to suicide from some theories as a “gateway” in this continuum, it has also been addressed with the theory of a “third variable” in which comorbidity with other relevant factors between self-injury and suicide is assumed, and, Predominantly, it has been associated in recent years with the acquired capacity for suicide, habituation to pain and less

fear of death.

The result obtained regarding self-injury seems to coincide with that found by Burke et al., (2018), in which the frequency of self-injury turned out to be a discriminating variable between groups with suicidal ideation and different degrees of planning and intention to die, similarly, other pain-provoking events such as the experience of childhood emotional abuse, physical abuse and physical neglect, for which the authors suggest considering them as factors to be evaluated when exploring the transition from ideation to suicidal behavior. On the other hand, they did not find a significant difference when comparing the groups with a scale of acquired capacity for suicide, similar to what was

Model 1



Model 2

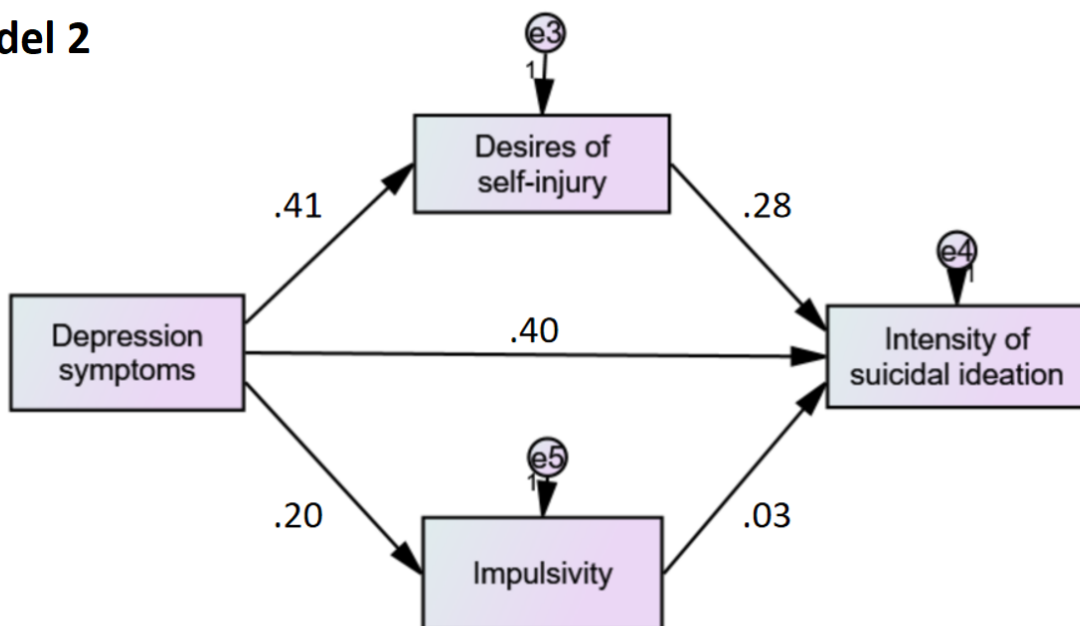


Figure 1. Path analysis.

Note: Model 1 = Suicide risk prediction. Model 2 = Prediction of the intensity of suicidal ideation.

obtained in the present study, considering the number of suicide attempts and family violence as painful experiences that facilitate suicidal capacity independently of the absence of fear of dying.

Based on these results, it could be hypothesized that the evaluation of the acquired capacity for suicide does not contribute as much to the explanation of suicidal risk as the pain-provoking experiences do, however, as a line of research to be developed, the effects of these events regardless of the pain caused and if they generate less/greater fear of death. As an example of this, the frequency of self-injury according to what is postulated in the theories of ideation to action, would represent a means of habituation to pain and therefore to suicide attempt, however, self-injury by concept is associated with the attempt to regulate negative emotions (Gratz & Roemer, 2008; Wolff et al., 2020), from which it could be inferred that perhaps the main effect on suicidal risk is not through pain tolerance, but from coping style, emotional dysregulation and the events that have triggered the negative emotions previously.

The first path model of this study may have similarities with the “three-step” approach of Klonsky and May (2015), in which the presence of pain and hopelessness, the lack of connection and the suicidal capacity are considered determinants so that the attempt is reached. In this study, depressive symptoms and perceived burdensomeness are correlated factors (.59) that would play a role similar to that of pain and hopelessness, with a direct influence on suicidal risk in the case of depressive symptoms ($\beta=.44$) and as well as different effects on the desire for self-injury and impulsivity, which is a variable that triggers suicide attempts (O’Connor & Kirtley, 2018); both factors associated with suicidal capability with direct influence on suicidal risk (desires for self-injury $\beta=.26$; impulsivity $\beta=.09$). The second proposed model takes up some elements and obtains a similar adjustment even without considering aspects associated with the perceived burden or the social belonging of the interpersonal theory of suicide.

Given the role played by the addictive effect of self-injury/desire to self-harm in both models ($\beta = .26$ in the suicide risk model; $\beta = .28$ in the intensity of suicidal ideation model), it is necessary to continue directing more research to this concept, facing the positions that disassociate self-injury from suicide, considering different associated aspects regardless of the habituation of pain (Joiner, 2005). At the same time, it is recommended for future projects to develop different ways of evaluating the acquired capacity for suicide and analyze in greater depth the relevance that the absence of fear of dying might or might not have.

Among the main contributions of this study, in contrast to other projects, is the type of sample used, since it is even a community sample, the indicators obtained represent high levels of depressive psychopathology and suicidal risk, with 65.9% of participants with a record of suicide attempts, which has allowed predictive estimates to be made in a population that actually has suicidal thoughts, and that thanks to the project have received an assessment; although it was not the objective of this study, it is worth mentioning that qualitative information was collected and various questions and problems expressed by the

participants were answered, both specific problems and advice on seeking psychological support. In addition, the models obtained seem to be valid in adolescents from different regions, as it is verified that relevant factors of suicide did not differ significantly beyond the possible cultural differences derived from the different social environments.

Some authors (Chu et al., 2017) have pointed out that smaller effect sizes are usually found when suicide research is not based solely on the web, so it could be deduced that the privacy and anonymity of social networks could be providing more reliable information, less susceptible to effects of social desirability, in such a way those information gathering strategies could be maintained in a virtual format even without the impediment to carrying out face-to-face evaluations; In addition to the fact that some preventive strategies have already been developed within virtuality, an example of this has been focusing on social connectivity as a protection factor, through the creation of safe environments in spaces such as Reddit (McAuliffe et al., 2022). Suicide is complex and multifactorial, so it requires an approach that is not limited only to psychopathology, it is necessary that prevention considers the socioeconomic and cultural context (Gómez-García et al., 2022; Navarrete et al., 2019), in this sense, it is essential to prevent suicide to move towards multidisciplinary approaches that are not only the responsibility of public health instances, it is necessary to promote laws and a legal framework that allows establishing solid strategies against suicide in favor of mental health (Valdéz-Santiago et al., 2021).

Public health implications

Although previous suicide attempts, among other variables, are clearly identified as risk factors (Gómez, et al., 2019; Wilkinson et al., 2011), there are other variables such as desires of self-injury and perceived burdensomeness, which possibly need to be considered more frequently when examining young people in risk. The relevance of this type of study lies in the possibility of refining and promoting early prevention strategies, with the support of current scientific findings, which implies specifying clear action guidelines from mental health institutions.

Limitations

As a main limitation, it would be mentioned that given the nature of a cross-sectional study, aspects related to the temporality and stability of the variables studied could not be evaluated, in addition to the fact that there was no other resource to corroborate or confirm the scores obtained like an interview. In addition to the fact that an exhaustive measurement of pain-provoking experiences or a direct evaluation was not carried out to estimate objective tolerance to pain, which would be essential in this line of research if the acquired capacity for suicide continues to be studied. Finally, it is necessary to point out that the present study was carried out under the conditions imposed by the COVID-19 pandemic, so it could be assumed that there are important changes in terms of the responses given by the participants, it will be up to future research to continue analyzing the possible effects of confinement by the health emergency, as well as to compare the models proposed in this study in other

samples and under different conditions.

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CONFLICT OF INTERESTS

The authors declare that there were no conflicts of interest.

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REVIEW PROCESS

This study has been reviewed by external peers in double-blind mode. The editor in charge was [Jeff Huarcaya-Victoria](#). The review process is included as supplementary material 1.

DATA AVAILABILITY STATEMENT

Not applicable.

DISCLAIMER

The authors are responsible for all statements made in this article.

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