

# Suicide-Related Outcomes Among Adolescent Clinical Populations: The Effect of Sex on Preventive Factors

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## ABSTRACT

**Introduction.** Suicide-related outcomes (SROs), such as ideation and attempts, are among the leading causes of mortality in adolescents in clinical settings. Developing culturally and sex-specific strategies to identify high-risk adolescents is crucial for enabling immediate preventive interventions. **Objective.** To compare adolescents' sociodemographic and clinical characteristics with (non)-SROs and (ideation/attempt)-SROs, stratified by sex, and to analyze their relationship with psychopathology factors. **Method.** A cross-sectional, multi-informant study was conducted using consecutive sampling during routine clinical visits and an assessment tool collected sociodemographic, clinical, general severity, and overall functioning data. Differences between groups were analyzed, and exploratory factor analysis was performed to identify latent psychopathology factors. **Results.** Males exhibited significantly more (ideation/attempt)-SROs than females ( $n = 143$ , 58 [40.56 %] vs.  $n = 158$ , 52 [32.91 %],  $U = 7585.5$ ,  $p = .0135$ ). In (ideation)-SROs, males had higher total psychopathology scores, while females scored significantly higher in internalized and neurodevelopmental factors. In (attempt)-SROs, females showed higher scores in psychotic factors. **Discussion and conclusion.** Adolescents with (ideation/attempt)-SROs presented higher psychopathology levels. Whereas males reported more SROs overall, females scored higher in internalized symptoms. Recognizing internalized and neurodevelopmental factors may enhance early detection and prevention efforts, particularly in adolescent females.

**Keywords:** Suicidal behavior, children, adolescents, sex differences, factorial analysis, mental health outcomes.

## RESUMEN

**Introducción.** Los desenlaces relacionados con el suicidio (RRSs), como la ideación e intentos, son una de las principales causas de mortalidad en adolescentes en entornos clínicos. Es crucial desarrollar estrategias basadas en la cultura y el sexo para identificar a quienes presentan mayor riesgo y posibilitar intervenciones preventivas inmediatas. **Objetivo.** Comparar características sociodemográficas y clínicas de adolescentes con (no)-RRSs y con (ideación/intento)-RRSs, estratificados por sexo, y analizar su relación con factores de la psicopatología. **Método.** Se llevó a cabo un estudio transversal, multiinformante, con muestreo consecutivo en visitas clínicas regulares. Se utilizó una herramienta de evaluación con variables sociodemográficas, clínicas, gravedad general y funcionamiento global. Se analizaron diferencias entre grupos y se aplicó análisis factorial exploratorio para identificar factores latentes de psicopatología. **Resultados.** Los hombres presentaron más (ideación/intento)-RRSs que las mujeres ( $n = 143$ , 58 [40.56 %] vs.  $n = 158$ , 52 [32.91 %],  $U = 7585.5$ ,  $p = .0135$ ). En (ideación)-RRSs, los hombres mostraron mayor psicopatología total, mientras que las mujeres obtuvieron puntajes significativamente más altos en factores internalizados y de desarrollo neurológico. En (intento)-RRSs, las mujeres reportaron puntajes más elevados en factores psicóticos. **Discusión y conclusión.** Los adolescentes con (ideación/intento)-RRSs presentan mayor psicopatología. Aunque los hombres reportaron más RRSs, las mujeres mostraron puntajes más altos en síntomas internalizados. Identificar factores internalizados y de desarrollo neurológico podría mejorar la detección temprana y prevención en adolescentes, especialmente mujeres.

**Palabras clave:** Conducta suicida, niños, adolescentes, diferencias por sexo, evaluación factorial, salud mental.

## INTRODUCTION

### Suicide-related outcomes

Suicide-related outcomes (SROs), including ideation and attempts, are the leading cause of mortality among adolescents worldwide (American Psychiatric Association [APA], 2013; Hua et al., 2024). Adolescence is a developmental stage marked by psychological, emotional, and social changes, increasing susceptibility to psychiatric symptoms (Borges et al., 2008). Early detection of and intervention in SROs are essential, as timely recognition provides a unique opportunity for preventive attempts before these behaviors escalate (Wasserman et al., 2021). Evidence has consistently demonstrated the effectiveness of early, targeted interventions in mitigating suicide risk, emphasizing the importance of implementing systematic detection strategies in clinical settings (Ajluni & Amarasinghe, 2024).

In Mexico, epidemiological studies indicate that approximately 12% of adolescents experience suicidal ideation, while 3% attempt suicide (Borges et al., 2007). However, national data on SROs often fail to explain the role of contextual factors, such as family dynamics, social stressors, and cultural influences, which may contribute to risk escalation. It is therefore essential to recognize culturally and sex-specific characteristics to identify adolescents at high risk, particularly in clinical settings where immediate intervention is possible.

Studies have documented the steady increase in SROs. An eight-year follow-up of Mexican adolescents revealed incidence rates of nearly 10% for suicidal ideation and approximately 5% for attempts, highlighting the tendency for these behaviors to develop over time. A study by Benjet et al. (2018) found that risk factors such as adverse childhood experiences, school absenteeism, and substance use were associated with a 30% increase in the likelihood of developing SROs. Furthermore, psychiatric comorbidities, mainly internalized disorders, were correlated with the persistence of SROs, while externalized disorders were associated with the transition from ideation to attempts (Benjet et al., 2018). These findings demonstrate the relationship between psychopathology and psychosocial stressors, emphasizing the need for culturally informed, evidence-based prevention strategies.

### Tools for assessing suicide-related outcomes

Given the multifactorial nature of SROs, tools such as the Brief Psychiatric Rating Scale for Children and Adolescents (BPRS-CA) offer a comprehensive framework for their evaluation. The BPRS-CA assesses key psychopathological domains, internalizing, externalizing,

and neurodevelopmental factors strongly associated with SROs in adolescents (Lachar et al., 2001). Internalizing factors include symptoms such as depression and anxiety, while externalizing factors encompass impulsivity and aggression, and neurodevelopmental domains comprise issues such as cognitive deficits and social communication problems. By providing detailed profiles of these domains, the BPRS-CA improves early risk identification, enabling tailored interventions for high-risk adolescents (Hofmann et al., 2022).

Cultural validation of the BPRS-CA for use in Mexican and other Spanish-speaking populations has been studied in adults (Sánchez et al., 2005). This instrument has also demonstrated strong inter-rater reliability ( $\alpha = .85$ ) and moderate test-retest reliability ( $r = .65$ ) in adolescents, confirming its utility for longitudinal monitoring of changes in psychopathology. Moreover, the BPRS-CA framework aligns with modern psychiatric approaches that conceptualize symptoms along a continuum of factors rather than as discrete categories, facilitating the detection of subtle yet clinically significant shifts in symptom severity (de la Peña et al., 2005). However, while the tool is comprehensive, additional research on its specific application to SROs in adolescent clinical populations could enhance its diagnostic utility. For example, sex differences provide data on risk patterns. Research indicates that females have an increased risk of (attempt)-SROs compared to males ( $OR\ 1.96$ , 95%  $CI\ 1.54-2.50$ ), though data specific to males in Mexican populations remain limited (Miranda-Mendizabal et al., 2019). This study could therefore contribute to understanding sex differences related to SROs status among Mexican adolescents.

The objectives of this study were to compare the sociodemographic and clinical characteristics of Mexican adolescents between non-SROs and SROs and by sex. We also aimed to identify the factor integration and load of the SROs item in the BPRS-CA-29, predict the BPRS-CA-29 SROs items for internalizing, externalizing, neurodevelopmental, and psychosis factors, determine the influence of each BPRS-CA-29 factor within non-SRO and SRO groups, compare these predictions across sexes, and finally, establish the relationship between each BPRS-CA-29 factor and sex.

## METHOD

### Study design and timeframe

This cross-sectional, multi-informant study was conducted between April 2016 and July 2019 at the Adolescence Clinic of the Instituto Nacional de Psiquiatría Ramón de la Fuente Muñiz (INPRFM) in Mexico City, Mexico.

## Sample

Adolescents between the ages of 13 and 17 were enrolled using consecutive sampling during routine clinical visits at the INPRFM Adolescence Clinic.

## Measurement instruments

### Brief Psychiatric Rating Scale for Children and Adolescents—Present and Lifetime Version

Psychopathological symptoms were assessed using the Brief Psychiatric Rating Scale for Children and Adolescents—Present and Lifetime Version (BPRS-CA), a valid instrument with strong inter-rater reliability ( $\alpha = .80$ ) and moderate test-retest reliability ( $r = .65$ ) (Mullins et al., 1986).

The present study used the BPRS-CA-29 adapted for the Mexican population, with 29 items rated on a Likert-type scale. This version expands on the former by incorporating diagnostic categories such as elimination disorders, substance use disorders, and abuse-related symptomatic outcomes. Factor analysis identified six psychopathological dimensions, including internalizing, externalizing, neurodevelopmental, and psychotic diagnostic continuums (de la Peña et al., 2005).

### Suicide-related outcomes

Item 9 of the BPRS-CA-29 asks about suicide-related outcomes (SROs), defined as the adverse healthcare outcomes of both psychopathological and sociocultural determinants. In the previous item, a score of zero (0) denotes the absence of SROs, while scores of 1, 2, and 3 identify the degree of SROs. For example, a score of 1 refers to suicidal ideation, a score of 2 is associated with lifetime suicide intent or attempts, while a score of 3 denotes active suicide risk (de la Peña et al., 2005).

### Clinical Global Impression

The Clinical Global Impression (CGI) Scale, developed by Busner & Targum (2007), is a clinician-administered tool quantifying the presence and severity of psychopathology. It is scored in an ordinal format from zero (0) to six (6), with higher scores indicating worse symptom severity. Its validity has been widely confirmed in multiple samples, including Mexican ones (Busner & Targum, 2007).

### Global Assessment of Functioning

The Global Assessment of Functioning (GAF) Scale is another clinician-administered instrument designed to

measure overall functioning. This construct is defined by biological, psychological, social, cultural, academic, and occupational determinants related to daily living activities. Scores range from 0 to 100 and are divided into five intervals, with higher scores correlating with overall adaptive functioning. Like the CGI, the GAF has been validated for Spanish-speaking populations (Aas et al., 2010; Schorre & Vandvik, 2004).

## Procedure

After initial screening, eligible candidates and their parents/guardians who met the research criteria were invited to participate. The research team then proceeded to explain the study objectives, procedures, potential risks, and benefits. If the candidate agreed to participate, parents/guardians were asked to provide written informed consent and adolescents were asked to provide assent. Sociodemographic and clinical data were subsequently collected via the initial screening module of the BPRS-CA-29. This section of the instrument gathers information on participants' age, sex, years of education, family structure and dynamics, as well as biopsychosocial antecedents such as previous medical care and treatment. Researchers then conducted the standardized, structured interview section of the BPRS-CA-29. This section collects data to identify and weigh psychiatric symptomatology across the previously mentioned diagnostic domains. Finally, symptom severity was measured with the CGI, and global functioning was measured with the GAF scale.

## Statistical analysis

Descriptive statistics, including means and standard deviations, were computed for all sociodemographic and clinical variables across the three SRO categories: absent, ideation, and attempt. Given the non-normal distribution of variables resulting from subgroup stratification by sex and SRO status, Mann-Whitney U tests were used for group comparisons. This nonparametric approach was selected for its suitability for analyzing ordinal and non-normally distributed data. Although the dataset permitted factorial comparisons, non-normality and unequal subgroup sizes led us to prioritize non-parametric pairwise analysis using Mann-Whitney U. We assessed interaction effects between sex and SRO categories (Vermeulen et al., 2015).

An exploratory factor analysis (EFA) was conducted to examine the association between BPRS-CA-29 factors and SRO categories using principal axis factoring, which isolates shared variance while mitigating measurement error. Varimax rotation enhanced interpretability by maximizing variance concentration within each extracted factor. Factor loadings exceeding .30 were retained, consistent with established validation criteria (Tavakol & Wetzel, 2020).

Post-hoc pairwise comparisons of factor scores were conducted to explore intergroup differences, with  $p$ -values adjusted via the Benjamini-Hochberg procedure to control for multiple comparisons and minimize the false discovery rate while maintaining statistical power (Green & Diggle, 2007).

Factor scores for Item 9 of the BPRS-CA-29 (Suicidal Behavior): Thoughts about death, suicidal thoughts (threats or plans), and suicidal attempts were categorized as follows: 0 = Absent: Not at all; 1 = Mild: Only thoughts about death; 2 = Moderate: Recurrent thoughts or plans of suicide or an attempt occurring more than a month ago; 3 = Severe: Suicidal attempt in the past month. Previous scores were analyzed to measure psychopathological symptom clustering across SRO categories. Regression analyses were performed to model the relationships between identified psychopathological actors and SRO risk. A box plot analysis was conducted to visualize the distribution of SRO scores by sex and psychopathological factors, incorporating central tendency and dispersion measures, including the median, interquartile range, and extreme values. The 1.5 interquartile range rule was applied to detect and isolate outliers. All statistical analyses were conducted using R Studio (Version 23; R Studio Team, 2023), with statistical significance at  $p < .05$ .

## Ethical considerations

This study complied with the ethical principles outlined in the Declaration of Helsinki, emphasizing ethical considerations for research involving adolescent populations. Written informed consent was obtained from parents or legal guardians, and adolescents were asked to provide assent to ensure voluntary participation. The study protocol underwent rigorous review and approval by the Institutional Research Ethics Board of INPRFM (CONBIOETICA-09-CEI-010-20170316). Participants diagnosed with active suicide risk during the study procedures were immediately attended to, and after the safe de-escalation of this risk, were asked if they wished to be transferred to the institutional emergency department for further specialized mental healthcare.

## RESULTS

### General sociodemographic and clinical characteristics

The sample comprised 301 adolescents, with a mean age of  $15.26 \pm 1.40$  years (ranging from 13 to 18), while the mean number of completed school years was  $10.19 \pm 2.06$  years (range .8 to 1.12).

### Comparison between non-SRO and (ideation/attempt)-SRO groups and sex

The (ideation/attempt)-SRO group scored higher on the BPRS-CA-29 total scores ( $21.60 \pm 5.15$ ) than the non-SRO group ( $182 \pm 4.23$ ;  $p < .001$ ), adjusting for sex differences. The age difference between the (non-SRO)-SRO and (ideation/attempt)-SRO groups was not statistically significant ( $15.15 \pm 1.35$  as opposed to  $15.22 \pm 1.42$  years;  $p = .570$ ). Participants in the (non-SRO) group had more non-statistically significant differences regarding years of schooling than those in the (ideation/attempt)-SRO group ( $10.24 \pm 2.11$  compared to  $9.75 \pm 2.12$  years;  $p = .120$ ).

The (ideation/attempt)-SRO group had a significantly higher psychopathological burden than the (non)-SRO group as measured with the BPRS-CA-29 total scores ( $21.60 \pm 5.15$  compared to  $10.82 \pm 4.23$ ;  $p < .001$ ). The (ideation/attempt)-SRO group also demonstrated increased symptom severity compared to the (non)-SRO group, measured with the CGI ( $4.59 \pm 1.10$  versus  $3.73 \pm 0.85$ ;  $p < .001$ ). Likewise, the (ideation/attempt)-SRO group reported lower (worse) overall functioning compared with the (non)-SRO group ( $51.44 \pm 12.64$  against  $60.69 \pm 13.80$ ;  $p = .010$ ).

### Comparison between sociodemographic and clinical data by sex

The females in the (non)-SRO group were significantly older than the males. Females and males in both groups reported higher (or worse) total BPRS-CA-29 scores. No significant differences were found in either group regarding SROs, CGI, and GAF scores while controlling for sex differences. Detailed results are shown in Table 1.

### Exploratory factor analysis

The EFA found four factors in the BPRS-CA-29 scores for the total sample: externalized, internalized, neurodevelopmental, and psychotic symptomatic dimensions. The variance in the ninth item of the instrument was loaded into the internalized dimension. Table 2 shows the factor loading of the 29 items.

Table 1  
Descriptive sociodemographic and clinical by sex

| Variable          | <i>U</i> | $n_1$ | $n_2$ | <i>z</i> | <i>r</i> |
|-------------------|----------|-------|-------|----------|----------|
| BPRS-CA-29        | 2765.5   | 101   | 110   | -6.296   | .433     |
| CGI               | 2400.0   | 95    | 100   | -5.966   | .427     |
| GAF               | 2200.0   | 90    | 100   | -6.077   | .441     |
| Age               | 2600.0   | 101   | 110   | -6.670   | .459     |
| Schooling (Years) | 2500.0   | 100   | 100   | -6.108   | .432     |

Note: Effect size  $r$  was calculated as  $r = |z| / \sqrt{(n_1 + n_2)}$ . All comparisons used the Mann-Whitney  $U$  test due to non-normal data distributions and unequal group sizes. Negative  $z$  values reflect rank order differences favoring the comparison group.

**Table 2**  
Exploratory factor analysis of the 29 items validation in the Brief Psychiatric Rating Scale - Children & Adolescents' version

| Item        | Factor 1<br>(External-<br>ized) | Factor 2<br>(Internal-<br>ized) | Factor 3<br>(Neurode-<br>velopmen-<br>tal) | Factor 4<br>(Psychosis) |
|-------------|---------------------------------|---------------------------------|--------------------------------------------|-------------------------|
| 1           | .820                            | —                               | —                                          | —                       |
| 2           | .721                            | —                               | —                                          | —                       |
| 3           | .538                            | —                               | —                                          | —                       |
| 4           | .507                            | —                               | —                                          | —                       |
| 5           | .357                            | —                               | —                                          | —                       |
| 6           | —                               | .690                            | —                                          | —                       |
| 7           | —                               | .713                            | —                                          | —                       |
| 8           | —                               | .411                            | —                                          | —                       |
| 9           | —                               | .536*                           | —                                          | —                       |
| 10          | —                               | —                               | —                                          | —                       |
| 11          | —                               | —                               | —                                          | .328                    |
| 12          | —                               | —                               | —                                          | .595                    |
| 13          | —                               | —                               | —                                          | .583                    |
| 14          | —                               | —                               | .826                                       | —                       |
| 15          | —                               | —                               | .805                                       | —                       |
| 16          | —                               | —                               | .406                                       | —                       |
| 17          | —                               | —                               | —                                          | —                       |
| 18          | —                               | —                               | —                                          | —                       |
| 19          | —                               | —                               | —                                          | .357                    |
| 20          | —                               | .526                            | —                                          | —                       |
| 21          | —                               | .559                            | —                                          | —                       |
| 22          | —                               | .493                            | —                                          | —                       |
| 23          | —                               | —                               | —                                          | —                       |
| 24          | —                               | —                               | —                                          | —                       |
| 25          | —                               | —                               | —                                          | —                       |
| 26          | —                               | —                               | —                                          | —                       |
| 27          | .281                            | —                               | —                                          | —                       |
| 28          | —                               | —                               | —                                          | —                       |
| 29          | .491                            | —                               | —                                          | —                       |
| Eigenvalues | 3.65                            | 2.98                            | 2.46                                       | 1.89                    |

Note: Exploratory factor analysis (principal axis factoring with oblimin rotation) was conducted on the 29 items in the Brief Psychiatric Rating Scale for Children and Adolescents (BPRS-CA-29). *M* = represents median values, while only factor loadings  $\geq .30$  are displayed. Dashes (—) indicate loadings below the inclusion threshold. Eigenvalues are reported below, accounting for approximately 60% of the total variance.

\* Item 9 demonstrated a marginal cross-loading but was retained due to its clinical interpretability within the internalized factor.

### Post hoc factor analysis

The post-hoc factor analysis revealed significant differences in the influence of the internalized dimension between the (non-SRO) and (attempt-SRO) groups. The neurodevelopmental dimension also showed significant differences

**Table 3**  
Post hoc comparisons of factor scores across suicide-related outcomes by sex

| Factor             | Comparison         | U      | <i>n</i> <sub>1</sub> | <i>n</i> <sub>2</sub> | z     | r    |
|--------------------|--------------------|--------|-----------------------|-----------------------|-------|------|
| Internalized       | Absent vs Ideation | 1300.0 | 101                   | 11                    | 7.279 | .688 |
| Internalized       | Absent vs Attempt  | 1250.0 | 101                   | 11                    | 6.790 | .642 |
| Neurodevelopmental | Absent vs Ideation | 1200.0 | 101                   | 11                    | 6.301 | .595 |
| Neurodevelopmental | Absent vs Attempt  | 1100.0 | 101                   | 11                    | 5.323 | .503 |
| Psychotic          | Absent vs Attempt  | 1400.0 | 101                   | 11                    | 8.256 | .780 |

Note: Nonparametric Mann–Whitney U tests were used to compare dimensional factor scores between Suicide-Related Outcomes (SROs) categories. Effect size *r* was calculated using  $r = |z| / \sqrt{(n_1 + n_2)}$ . Moderate to large effects were observed for internalized, neurodevelopmental, and psychotic factors.

between non-SRO and both ideation/attempt-SRO. Detailed results are given in Table 3.

### Factor score analysis by sex

Females in the (ideation)-SRO groups scored significantly higher than males in both the internalized and neurodevelopmental dimensions, while those in the (attempt-SROs) group also scored higher for the psychosis dimension. These results are given in Table 4.

### Relationship between SROs and BPRS-CA-29 by sex

There was a significant difference in total BPRS-CA-29 scores between groups ( $U = 2765.5$ ,  $z = -3.17$ ,  $p = .002$ ,  $r = .22$ ). Females had significantly higher scores than males in the internalized dimension in the regression analysis when all the SROs in the ninth item of the BPRS-CA-29 were considered. The distribution of the previous results is shown in Figure 1.

## DISCUSSION AND CONCLUSION

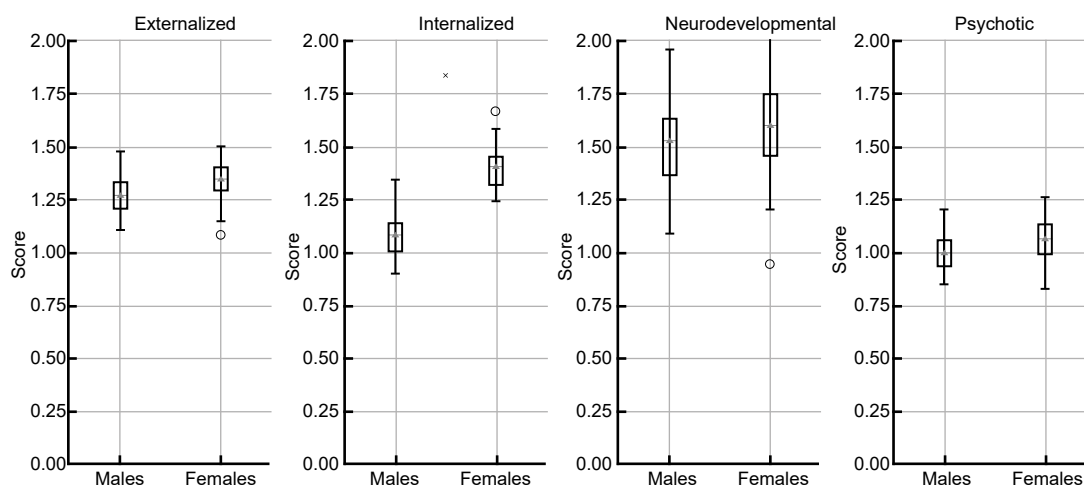
The main finding of the present study was the sex-based differences with respect to SROs. Males had more (ideation/attempt)-SROs than females. Neurodevelopmental and psychotic psychopathological dimensions were prevalent in both groups. Participants with (ideation/attempt)-SROs had higher total BPRS-CA-29 scores, suggesting a higher patient symptom burden. Females in the non-SROs were also older than their male counterparts. Males with (ideation)-SROs scored higher than females. SROs, associated with the ninth item of the BPRS-CA-29, loaded into the internalized psychopathological dimension. The post-hoc analysis showed that internalized dimension traits can

**Table 4**  
**Factor score analysis by suicide-related outcomes categories stratified by sex**

| Dimension          | SROs     | $M \pm SD$      | Female $M \pm SD$ | Male $M \pm SD$  | U     | p     |
|--------------------|----------|-----------------|-------------------|------------------|-------|-------|
| Externalized       | Absent   | 4.14 $\pm$ 3.57 | 4.12 $\pm$ 3.50   | 4.16 $\pm$ 3.58  | 502.5 | .451  |
|                    | Ideation | 4.39 $\pm$ 3.75 | 4.35 $\pm$ 3.70   | 4.42 $\pm$ 3.80  | 510.0 | .390  |
|                    | Attempt  | 4.30 $\pm$ 3.32 | 4.25 $\pm$ 3.30   | 4.35 $\pm$ 3.34  | 495.5 | .504  |
| Internalized       | Absent   | 2.34 $\pm$ 2.16 | 2.32 $\pm$ 2.14   | 2.36 $\pm$ 2.18  | 505.0 | .420  |
|                    | Ideation | 4.05 $\pm$ 3.11 | 4.01 $\pm$ 3.08   | 4.10 $\pm$ 3.14* | 450.0 | .020* |
|                    | Attempt  | 4.63 $\pm$ 3.02 | 4.60 $\pm$ 3.00   | 4.65 $\pm$ 3.04  | 470.0 | .120  |
| Neurodevelopmental | Absent   | 3.45 $\pm$ 2.33 | 3.43 $\pm$ 2.30   | 3.47 $\pm$ 2.36  | 498.0 | .480  |
|                    | Ideation | 4.62 $\pm$ 3.18 | 4.60 $\pm$ 3.15   | 4.65 $\pm$ 3.21* | 430.5 | .010* |
|                    | Attempt  | 5.00 $\pm$ 3.45 | 4.95 $\pm$ 3.40   | 5.05 $\pm$ 3.50  | 488.0 | .330  |
| Psychotic          | Absent   | 1.92 $\pm$ 2.01 | 1.90 $\pm$ 2.00   | 1.94 $\pm$ 2.02  | 499.0 | .470  |
|                    | Ideation | 2.07 $\pm$ 2.18 | 2.05 $\pm$ 2.15   | 2.09 $\pm$ 2.20  | 492.0 | .520  |
|                    | Attempt  | 2.15 $\pm$ 2.25 | 2.12 $\pm$ 2.22   | 2.18 $\pm$ 2.27* | 435.0 | .030* |

Note: Mean scores and standard deviations ( $M \pm SD$ ) are presented for each latent psychopathological factor derived from the BPRS-CA-29, stratified by Suicide-Related Outcomes (SROs) category (Absent, Ideation, Attempt) and sex. Mann–Whitney U tests were used to compare male and female scores within each SROs category.

\* denote statistically significant differences ( $p < .05$ ) with higher female scores.



**Figure 1.** Comparison of Item 9 of the score predictions between each Brief Psychiatric Rating Scale – Children & Adolescents' factor version by sex.

Note: The figure illustrates the mean scores and variability for item 9, categorized by sex and BPRS-CA-29 factors. The boxes represent the interquartile range, the line within the boxes denotes the median, and the red triangles indicate the mean. Whiskers represent the minimum and maximum values, excluding outliers, which are shown as individual points. A significant difference is noted in the internalized factor ( $p < .05$ ), as evaluated by the Mann-Whitney U test.

discriminate between non-SROs and (ideation)-SROs in both sexes. The neurodevelopmental psychopathological dimension differed between the non-SRO group and the ideation/attempt-SROs group. Regression analysis indicated that females scored higher than males on SROs in the internalized psychopathological dimension.

The sample of females in the present study had prevalent internalized dimensional psychopathology in keeping with previous research (Altemus et al., 2014), whereas males presented with behaviors related to externalizing psychopathological dimensions that heightened the risk of

SROs (Miranda-Mendizabal et al., 2019). It can therefore be argued that males who present with neurodevelopmental dimensional psychopathology may be less associated with SROs. This also points to the need for methodological frameworks for not only discriminating between but also stratifying the risk of SROs in Mexican adolescents.

The results suggest that internalized, neurodevelopmental, and psychotic psychopathological dimensions and their traits may could play a role in either modulating or influencing (ideation-attempt)-SROs in Mexican adolescent females. For this reason, sex-based research methodologies



in this sample have been explored in previous research (Wasserman et al., 2021). For example, previous findings have shown that adolescents' psychopathology is associated with adverse outcomes in both clinical severity and overall functioning (Davies et al., 2018). The present study is in line with this evidence, since the findings of the research group demonstrated that, regardless of sex differences, adolescents with (ideation/attempt)-SROs had higher psychopathology in comparison to those with (non)-SROs. Clinical severity and global functioning scores showed no significant differences between SRO categories. The previous non-significant association could plausibly be due to the stratification of the sample, which may have affected the statistical scope of the findings. Nonetheless, the results of the study suggest that understudied biopsychosocial determinants may directly or indirectly influence clinical severity and overall functioning, as noted in previous research (Wasserman et al., 2021). Further studies in this line of research are warranted to either reproduce or contrast the findings of the current study in Mexican adolescents.

The analysis identified four distinct psychopathological factors: externalized, internalized, neurodevelopmental, and psychosis, with neurodevelopmental and internalized factors being associated with SROs. Specifically, other research has shown that neurodevelopmental deficits, such as social withdrawal and cognitive impairment, may be strongly related to SROs (Nestor & Sutherland, 2022). These findings underline the importance of implementing interventions in these populations. Moreover, internalized symptoms were significantly more pronounced in females, confirming the established connection between these symptom domains and suicidal behavior.

On the other hand, the lack of significant associations between externalized and psychosis factors suggests they may play an ancillary role in the risk of developing SROs within this sample. This observation contrasts with previous studies of other populations that have associated externalized behaviors, such as aggression, with impulsive suicide attempts, indicating potential cultural or contextual differences (Brokke & Lando, 2022). Future research should therefore explore whether externalized and psychotic symptoms are more pronounced in specific subgroups, such as individuals with comorbidities or those experiencing unique environmental stressors.

Comparisons revealed significant differences between the categories of SROs with respect to internalized and neurodevelopmental factors. Interestingly, although (attempt)-SROs were linked to the internalized factor, a strong association was found between (ideation/attempt)-SROs and the neurodevelopmental factor. This suggests that (ideation/attempt)-SROs may also be related to neurodevelopmental deficits, indicating that categories of SROs could serve as potential transdiagnostic risk markers associated

with psychopathology (Gagliano et al., 2024). However, the lack of significant findings concerning externalized and psychotic factors may suggest that these domains are less predictive of SROs in adolescents receiving psychiatric care (Smucny et al., 2024).

Sex-stratified analyses of factor scores highlighted the fact that internalized and neurodevelopmental factors play a key role in females with respect to the occurrence of SROs. These findings suggest that internalized and neurodevelopmental manifestations influence females, potentially increasing their risk of (ideation)-SROs. Although internalized manifestations have been linked to SROs, neurodevelopmental deficits have become increasingly associated with (ideation/attempt)-SROs in adolescent clinical populations (Lévy-Bencheton et al., 2024). The mechanisms involved in the manifestations of SROs point to an interplay between emotional dysregulation, adverse childhood experiences, and depression (Gagliano et al., 2024). These results support the development of tailored interventions addressing sex-specific pathways to SROs. In our study, (Attempt)-SROs were linked to psychotic features, which has been associated with a tenfold higher risk of any SRO (Kelleher et al., 2013). Further exploration is required of how environmental factors, such as family dynamics and peer relationships, may modulate the expression of psychopathology and SROs (Alvarez-Subiela et al., 2022).

The regression analysis indicated that females with internalized symptoms scored higher than males on SROs. This finding aligns with the increased prevalence of internalized symptoms among adolescent females (Nowotny et al., 2015). Females experiencing (ideation/attempts)-SROs are more likely to report distress and seek help. Conversely, males appear to exhibit suicidal ideation or attempts through externalized behaviors (Ibrahim et al., 2017). These differences highlight the importance of sex-sensitive clinical assessments to identify and address the specific risk factors associated with SROs by sex.

This cross-sectional design of the study reduces the possibility of drawing causal conclusions about the association between psychopathological factors and SRO categories. Longitudinal studies are therefore required to explore temporal dynamics and potential causal pathways that could increase the risk of developing SROs. Moreover, reliance on convenience sampling may introduce selection bias, as the sample consists mainly of adolescents receiving clinical psychiatric care, thereby reducing the generalizability of the findings to larger or naturalistic populations. Moreover, nonparametric statistical methods were used due to the non-normality of the data within stratified groups. Finally, unmeasured variables, such as socioeconomic status and other psychosocial characteristics, may have affected the results and should be considered in future research.

This study has several strengths. Utilizing a culturally adapted BPRS-CA-29 enhances the relevance of the

findings in the context of Mexican adolescents, addressing the gap in tools designed for this population. The factorial approach of this research enhances our understanding of SROs, highlighting psychopathological categories often overlooked in conventional categorical studies. Additionally, the inclusion of sex-stratified analyses provides valuable data on sex-specific risk factors, which can support the development of tailored prevention and treatment strategies. Moreover, the robust statistical methodology employed, including exploratory factor analysis and post hoc testing with corrections for multiple comparisons, enhances the reliability and validity of the findings.

In conclusion, Mexican adolescents with SROs display high psychopathology. Males have more prevalent (ideation/attempts)-SROs than females and SROs are linked to the internalized psychopathological dimension. Regression analysis showed that females with (ideation-attempts)-SROs scored higher than males in the same psychopathological dimension. The post hoc analysis showed that the characteristics of the internalized psychopathological dimension influence outcomes between (non-SROs) and (ideation-SROs). The psychopathological neurodevelopmental dimension was associated with outcomes between (non)-SROs and (ideation/attempt)-SROs. This suggests that psychopathological dimensions, regardless of sex, may characterize SROs among Mexican adolescents.

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## Conflicts of interest

The authors have no conflicts to disclose.

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