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ACEs and mental health problems as suicidality predictors in Mexican adolescents

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ABSTRACT

Background: Various factors, including mental health comorbidity, family dysfunction, interpersonal violence, and community and social violence, cause suicidal behavior. Adverse Childhood Experiences (ACEs) encompass these risk factors and are correlated with mental health problems and suicidal behavior in Mexican adolescents.
Methods: A survey was conducted among Mexican school-aged adolescents to measure ACEs, MHP symptoms, and suicidal behavior. A binary logistic regression was used to examine the relationship between these variables. The study was conducted with IRB approval, and all participants provided informed consent. Those at risk of suicide were referred for online psychological care.
Results: 7325 adolescents participated; 60 % were women, with an average age of 16 years (SD + 1), 87 % of the participants reported at least one ACE, 13 % symptoms of at least one MHP and 10 % suicidal behavior. MHP predictors of suicidal behavior were: conduct problems (OR = 5.67), symptoms of depression (OR = 3.27), obsessive-compulsive disorder (OR = 2.11), somatic problems (OR = 1.98), and attention deficit (OR = 1.69). EAI predictors were: live sexual violence (OR = 2.53), physical violence (OR = 2.21), negligence (OR = 2.05), bullying (OR = 2.10), and a family member with a mental health diagnosis (OR = 1.35). The cumulative effect of ACEs and MHP significantly increased the risk (OR = 78.08).
Conclusions: 5 ACEs and 4 MHP were associated with suicidal behavior; their cumulative effect increased the risk to 78 times.

1. Introduction

Suicide is a serious public health concern that has a significant impact on people all over the world. The World Health Organization (WHO, 2023) reports that it is the fourth most common cause of death for individuals aged 15–19 globally and the second for those aged 10–24 in America (Curtin & Heron, 2019). The suicide mortality rate in Latin America and the Caribbean's low and middle-income countries was 6.2 per 100,000 populations, as stated by The World Bank (2019). In Mexico, a middle-income country in

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Latin America (The World Bank, 2023), suicide cases have been steadily increasing for the last 30 years (Luna & Dávila, 2020; Martín-del-Campo, González, & Bustamante, 2013; Sánchez-Cervantes, Serrano-González, & Márquez-Caraveo, 2015; Santos et al., 2003), with the estimated suicide rate among youths aged 15 to 29 increasing from 8.1 deaths per 100,000 people in 2015 to 10.4 per 100,000 in 2021, according to the National Institute of Statistics and Geography (INEGI, 2021). The 2021 National Health and Nutrition Survey discovered that 5.3 % of adolescents aged 10–19 had attempted suicide at least once in their lifetime, and 6.3 % had experienced suicidal thoughts (Shamah-Levy et al., 2022).

Although the issue of suicide rates in Mexico is recognized, there is a lack of comprehensive literature on the risk factors involved. Some factors that have been studied include low socioeconomic status, female gender, teenage pregnancy, school difficulties, and substance abuse. However, further research is needed to better understand these factors (Luna & Dávila, 2020). 80 % of suicides occur in low- and middle-income countries, such as Mexico, where limited resources and services make early identification complex. Furthermore, post-incident treatment and support are often insufficient (Nakanishi, Endo, & Ando, 2017; Zulkiply & Rosliza, 2022). Therefore, comprehending the risk and protective factors associated with suicide is critical, as it is a complex and multifaceted issue.

Studies on risk factors for suicidality primarily come from high-income countries (HIC). These factors can be broadly classified into two categories mental health problems and Adverse Childhood Experiences (ACEs), as Becker and Correll (2020) identified. Mental health issues are disturbances of an individual's cognition, emotion regulation, or behavior, such as previous suicide attempts, non-suicidal self-injury, and mental illness (Knipe et al., 2019). Felitti et al. (1992) define adverse childhood experiences as stressful events or circumstances beyond a child's control that severely affect their life, health, and development. ACEs include 1) the experience of violence such as being the victim of physical, sexual, and emotional abuse, being the victim of physical and emotional neglect, bullying, and witnessing domestic, community, or collective violence; 2) situations that cause household dysfunction, such as suicidal behavior or a mental health condition in the family, growing up in a household in which there are adults experiencing alcohol and drug use problems, parental loss or parental abandonment through separation or divorce, a member of the household being in prison; and 3) social adverse conditions such as low socioeconomic status, poor school performance, and discrimination (Casas-Muñoz et al., 2021).

Studies have shown a strong connection between Adverse Childhood Experiences (ACEs) and various health risks in adulthood, such as diabetes, mental health disorders, and hypertension. These experiences can contribute to about 30 % of mental health disorders globally. ACEs are also linked to a greater likelihood of mental health conditions and suicidal thoughts in HIC. This correlation has been observed in numerous studies. For instance, research by Felitti et al. (1998) found a significant correlation between the extent of exposure during childhood and major causes of adult mortality. Similarly, other studies (Basu, McLaughlin, Misra, & Koenen, 2017; Loudermilk, Loudermilk, Obenauer, & Quinn, 2018; Norman et al., 2012; Sahle et al., 2022; Taillieu, Brownridge, Sareen, & Afifi, 2016) have also revealed a similar link between ACEs and adult illnesses in HIC.

Further research is necessary to understand how Adverse Childhood Experiences (ACEs) affect low-income and Middle-Income Countries (LMIC) people. Currently, there is a lack of studies examining the prevalence and consequences of ACEs on both physical and mental health in these regions. This is particularly concerning because people in LMIC may face increased risk factors due to their socioeconomic and security conditions, such as gender discrimination, limited access to mental health services, substance abuse (including tobacco and alcohol consumption), violence, and food insecurity (Benjet, 2010; Kidman, Piccolo, & Kohler, 2020). The limited literature on LMIC has shown a higher occurrence of ACEs than in HIC (Imran, Liqat, Hassan, Zeshan, & Naveed, 2021; Kidman et al., 2020). In Mexico, ACEs have been found in 68 % of adults and 69 % of adolescents. Adult Mexican women have been linked to cardiovascular disease as a result of ACEs, but there is little research on the correlation between ACEs in adolescents and psychiatric disorders or adversities (Benjet, 2010; Benjet et al., 2009; Benjet, Borges, & Medina-Mora, 2010; Benjet, Borges, Méndez, Fleiz, & Medina-Mora, 2011; Medina-Mora et al., 2005; Orozco, Borges, Benjet, Medina-Mora, & López-Carrillo, 2008).

Therefore, research is necessary to better understand ACEs in LMIC and effectively organized to create models that can be used for strategic planning. This planning is crucial for developing public policies that promote preventing and managing suicidal behaviors (Knipe et al., 2019; Zulkiply & Rosliza, 2022). One helpful framework for organizing suicidality risk factors is the socio-ecological model (SEM) proposed by Bronfenbrenner (1994). For this model, the ecological environment is viewed as a system of nested and structured levels (individual, interpersonal, community, and society), each containing the others. According to Bronfenbrenner's theory, natural environments significantly impact human behavior. This concept is familiar, as it is widely accepted that an individual's psychological functioning is greatly influenced by their surroundings. By examining the different levels of the SEM, we can better understand the network of risk factors and how they interact, ranging from the individual to the societal level (Zulkiply & Rosliza, 2022).

Since suicidality risk factors in adolescents and young people have been identified primarily in HIC, these risk factors mainly encompass mental health problems and ACEs, and few studies have reported these issues in LMIC. Therefore, this study aims to determine the relationship between symptoms of mental health problems and ACEs with suicidal behavior in Mexican adolescents.

2. Methods

2.1. Design

A cross-sectional online survey was conducted from April to July 2021.

2.2. Sample

A nonprobability convenience sampling method was used to invite 78 public high schools from 20 of the 32 states of Mexico; the

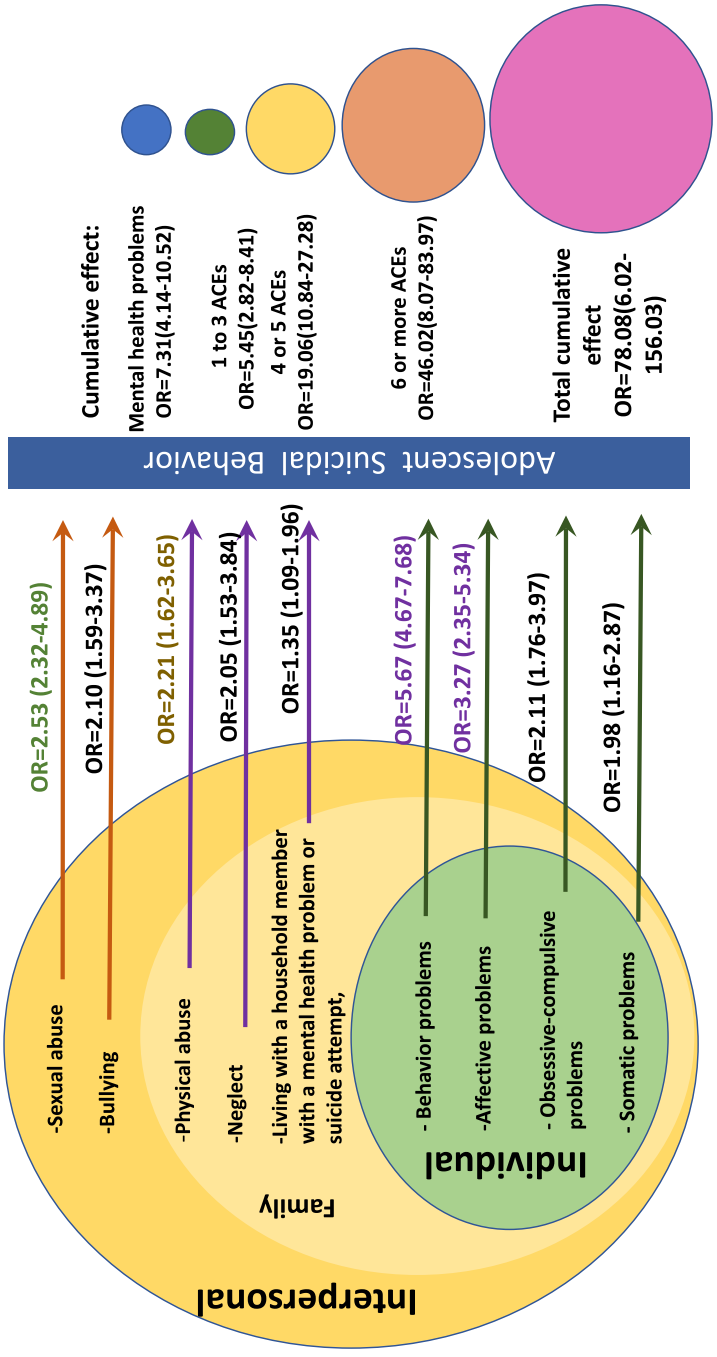

Fig. 1. Cumulative effect on suicidality of ACEs and Mental health problems according to the ecological model.

states were selected randomly to represent the eight geographical, natural, historical, economic, and cultural zones of Mexico (Bassols Batalla, 1992). Students between 11 and 19 years were asked to register and participate through the school's social media. 8894 adolescents registered, 8626 provided individual assent and parental consent, 7329 opened the survey, and 5836 fully completed it.

2.3. Instruments and measures

Through validated questionnaires in Mexican adolescents, the variables of interest were collected. 14 ACEs were measured with the Adverse Childhood Experience International Questionnaire (ACE-IQ; Moraleda et al., 2015): 1) Living with a household member with psychoactive substances consume, 2) Living with a household member with a mental health problem or suicide attempt, 3) Living with a household member that has been incarcerated, 4) One or both parents seriously ill, 5) Parental loss, 6) Exposure to collective violence, 7) Exposure to community violence, 8) Exposure to domestic violence, 9) Exposure to physical violence towards the mother, 10) Physical abuse, 11) Psychological abuse, 12) Neglect, 13) Sexual abuse, and 14) Bullying. Besides these ACEs, parental divorce, separation or loss, and low socioeconomic status were assessed since they have been reported as suicidality risk factors in HIC.

Across the screening instrument Youth Self Report (YSR; Giráldez, Vallejo, & Mena, 2002), the symptoms for eight mental health problems (MHP) based on the Diagnostic and Statistical Manual of Mental Disorders (DSM) were measured: 1) Affective problems, 2) Anxiety problems, 3) Somatic problems, 4) Attention Deficit/Hyperactivity Problems, 5) Oppositional Defiant Problems, 6) Behavior Problems, 7) Obsessive-Compulsive Problems, and 8) Stress Problems—two YSR questions measured suicidality: Y18. I harm myself on purpose or have attempted suicide, Y91. I think about killing myself.

2.4. Statistical analysis

The frequencies of the variables of interest and measures of central tendency for the numerical variables are described.

A logistic regression was performed in binary to find the association between the variables, expressed in OR, as their cumulative effect. The model was tested with the 14 ACEs validated questionnaire for Mexican adolescents and the extended ACEs (parental divorce, separation or loss, and low socioeconomic status).

2.5. Ethical considerations

This study followed ethical standards for researching children, with approval and registration from relevant committees. Parental consent was obtained for minors, and all information was kept confidential. Participants received a small reward and access to psychological care services.

3. Results

3.1. Participants

Participants average age was 16 years (SD + 1), 60 % were women, 10 % reported suicidal behavior, 90 % had at least one ACE, and 13 % had symptoms of at least one MHP. There were no statistically significant differences between the differences reported in females and males.

3.2. Suicidality predictors

Suicidality was present in 7.49 % of the participants without statistically significant differences by sex ($\chi^2 = 3.49$, p = .07), geographic region ($\chi^2 = 2.58$, p = .09), or age group ($\chi^2 = 1.47$, p = .25).

The predictors associated with suicidal behavior were the following:

MHP predictors: behavior problems (OR = 5.67 CI95% 4.67–7.68), affective problems (depressive symptoms) (OR = 3.27 CI95% 2.35–5.34), obsessive-compulsive problems (OR = 2.11 CI95%1.76–3.97), somatic problems (OR = 1.98 CI95%1.16–2.87). The cumulative effect of having mental health problems increased suicidality up to seven times (7.31 CI95%4.14–10.52) (Fig. 1). The more mental health problems were reported, the more the risk increased.

ACEs predictors: sexual abuse (OR = 2.53 CI95%2.32–4.89), physical abuse (OR = 2.21 CI95%1.62–3.65), neglect (OR = 2.05 CI95%1.53–3.84), bullying (OR = 2.10 CI95%1.59–3.37), and a relative with a mental health diagnosis (OR = 1.35 CI95%1.09–1.96). No extended ACEs (parental divorce, separation or loss, and low socioeconomic status) had any effect as suicidality predictors.

Regarding the cumulative effect of having experienced ACEs on increasing suicidality, it grows as the ACEs number increases (Fig. 1).

And as shown in Fig. 1, the cumulative effect of the MHP plus ACEs significantly increases the suicidality risk (OR = 78.08 CI95% 6.02–156.03).

4. Discussion

This study aimed to investigate the link between mental health symptoms, Adverse Childhood Experiences (ACEs), and suicidality in Mexican adolescents. The findings suggest a clear association between these factors.

Regarding suicidality predictors and considering the need to understand the relationships between predictors of suicidal behaviors and not just their identification in contrast to the majority of work (Struck et al., 2021), we can discuss the results in light of the ecological model.

At the individual level the highest risk factors for generating suicidal behavior were found among symptoms of mental health problems. Specifically, Behavior Problems (including impulsivity symptoms) increased the likelihood almost sixfold, while Affective Problems (including depressive symptoms) increased it threefold, and obsessive-compulsive and somatic problems doubled the risk. These same mental health problems have also been observed in HIC (Becker & Correll, 2020; Hawton, Saunders, Topiwala, & Haw, 2013). These findings suggest that we should approach suicidality with a more sensitive and comprehensive understanding that takes into account the broader context of risk factors, such as the personality-based conceptualization of suicide (Lewis, Meehan, Cain, & Wong, 2016). Individuals with mental health conditions may experience reduced capacity to handle mental distress and limited psychological tools to cope with adverse circumstances or stressors (Becker et al., 2019).

Then follows the interpersonal level, where relationships become important (Dahlberg & Krug, 2006). However, on the interpersonal level it came off in the relationships that are closest to the family (family relationships level). Families establish important social and emotional connections. Latin American families create strong support networks through frequent interactions outside the family. Collective support is formed through these networks (Domínguez & Watkins, 2003; Matsumoto & Hwang, 2012) might be protectors to deal with other adversities.

Regarding, we must also consider that many works focus on analyzing them at an individual level in the ecological model (Struck et al., 2021). Adolescents experience a different social environment than children and adults. Transitioning to high school can lead to new surroundings, learning structures, and a lower position in the age hierarchy. This can result in risky decision-making during the transition from childhood to adolescence (Blakemore & Mills, 2014). The number of ACEs predictors of suicidal behavior was lower than those reported in the literature from high-income countries. Probably the characteristics of families in Mexico and other Latin countries (interactions, networks, and collectivity) allow for cushioning the effects of some ACES, such as parental divorce, separation or loss, and low socioeconomic status.

In Mexico, it is necessary to raise awareness among adolescents and families about mental health care since there is still a lot of stigma towards mental health to prevent the progression of this symptomatology that is present from an early age (Lindow et al., 2020). The generation of public policies for mental health care should focus on adolescence because behaviors for mental health care are established at this stage (WHO, 2017). It is also necessary to make the population aware of risk factors, adolescent behaviors, and the search for treatment since, culturally in Mexico, mental health continues to be a taboo topic (Reyes-Foster & Duncan, 2020). Understanding Adverse Childhood Experiences (ACEs) allows for strategic planning to reduce the impact of illness, especially in collaboration with pediatric care (Casas-Muñoz et al., 2021).

ACEs have been studied more in adults, but not as much in younger populations (Struck et al., 2021). These studies are limited analyzing the risk factors that occur with adolescents with suicidal behaviors, since the survivorship bias occurs (Rivera & Beach, 2023). It's important to study Adverse Childhood Experiences in adolescents aged 11–19, as those with suicidal behaviors are at risk of not reaching adulthood after failed attempts (Hawton, Saunders, & O'Connor, 2012).

4.1. Conclusions

Detecting ACEs and MHP can help identify adolescents at risk of suicidal behavior. Addressing the problems from the ecological model allows us to have more chances of identifying adolescents at risk. Early interventions might help to reduce illness burden and costs for individuals, families, communities and society's (Bellis et al., 2019).

4.2. Limitations

The limitations of this study are related to the fact that although the sample includes all the geographical and cultural regions of Mexico, it needs to be more representative. Still, it does provide us with an overview of the situation of adolescents in Mexico since studies of this type have yet to be reported. Therefore, it is recommendable to raise another survey with a representative sample of the 32 states of México.

Submission declaration and verification

The work described has not been previously published. It is not under consideration for publication elsewhere. Its publication is approved by all authors and tacitly or explicitly by the responsible authorities where the work was carried out. If accepted, it will not be published elsewhere in the same form, in English, or any other language, including electronically, without the written consent of the copyright holder.

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CRediT authorship contribution statement

ACM conceptualized the present study. ACM and AEVR managed the data collection, ACM, AEVR, ARC, EPS, and MGA were responsible for conceptualizing and writing the paper, and AEVR led and conducted the analyses. All contributed to the interpretation of the findings and structure of the paper. All authors reviewed and approved the final version.

Declaration of competing interest

None.

Data availability

The data that has been used is confidential.

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