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## **PREDICTORS OF SUICIDE BEHAVIORS IN ADOLESCENT POPULATION**

Memory presented by **Xavier Alvarez Subiela** for the obtention of the Doctor  
degree

Doctoral Program in Psychiatry

Department of Psychiatry and Forensic Medicine

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“Porque por las noches me despierto angustiado pensando en si la podré salvar, en si habrá algo que pueda hacer para calmar su dolor o su rabia. Porque por las mañanas, aún cansado pienso en qué cosas podían hacer que mi yo de 14 años decidiera no vivir, pero no encuentro respuestas... ¿Tan mal lo hemos hecho? ¿Tan mal lo he hecho? Sólo querría saber por qué y qué tengo que hacer, pero sólo puedo consolarme con la idea de que nadie tiene la solución.”

### TEXTO ORIGINAL

Agradecer a tantas familias y adolescentes que en su sufrimiento nos han transmitido la importancia de ayudarlos y de prevenir que otras personas tengan que sufrir.

A mis padres porque su lucha, siempre a mi lado, y su empuje hacia mi mejor versión de mí, han hecho que esto sea posible. Sin ellos nada lo sería.

A Meri y Marina por estar a mi lado, y por darme más motivos para amar la vida.

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*“You only live once  
but if you do it right,  
once is enough”*

Mae West

## I. THESIS JUSTIFICATION

As declared by the World Health Organization (hereinafter, WHO), suicide prevention should be a priority for the different public health systems (Organization & Others, 2021). In Spain, the approach to the phenomenon of suicide is a primary issue in the field of mental health (García-Martínez et al., 2022) since it is the leading cause of unnatural deaths in the general population and the third cause in adolescence (INE, 2020). It is also the reason for the loss of many potential years of life, resulting in high costs for society both economically and emotionally (Law et al., 2011). Regarding suicidal behavior in adolescents, suicide attempts are much more frequent than suicide. In this sense, Drapeau and McIntosh affirm that there are 100 to 200 attempts for each adolescent suicide (Drapeau and McIntosh 2021). Although some groups of young people are more vulnerable than others, it has been shown that between 20% and 47% of the adolescent psychiatry population attempt suicide before age 18 (Apter & Bursztein, 2009).

Within the preventive model, selective prevention must be considered very important, while universal prevention does not offer the expected results. In this line, the proper evaluation of people who come to hospital emergency services after a suicide behavior is essential to broaden the knowledge and clarify the real magnitude of this problem (Turecki & Brent, 2016). In this sense, identifying risk factors for repetition must be a priority to prevent suicide in a group of people who, due to previous suicidal behaviors, can be considered people at high risk of re-attempting (Stone & Crosby, 2014).

The present research focused on identifying individual and socio-family factors related to suicide behaviors in a clinical sample of adolescents. In existing scientific literature in this field, the most commonly reported individual risk factors for suicide and suicide re-attempts include: psychiatric diagnoses, substance abuse, impulsivity, sexual and/or physical abuse, bullying, conflicts with a romantic relationship, and, most importantly, a personal history of

suicide attempt and active suicidal ideation (Abrial et al., 2022). Environmental and family factors also play an important role in suicidal behavior among adolescents (Zygo et al., 2019). It has been reported that a family history of suicide and/or the presence of a psychiatric illness, as well as certain types of parenting are associated to suicide-related behaviors in adolescents (Cero & Sifers, 2013).

Despite a broad range of factors that have been pointed out, evidence is still not conclusive, and some studies indicate that more research is needed to further clarify and identify which of them are the strongest predictors of suicide-related behaviors in adolescence (S. H. Kim et al., 2020) and also, which of them could be addressed in preventive strategies and therapeutic interventions (Y. Liu et al., 2017).

Taking these considerations into account and following the line of research initiated by our research group (Villar et al., 2018a), the first objective of this research was to identify predictive factors, easily recognizable during screening and evaluations in the emergency department, which allow differentiating suicide attempts according to prognosis. The second objective was to recognize which risk and protective socio-family variables could be addressed to prevent and/or avoid suicide behaviors in adolescents, with the final aim of designing and prioritizing interventions in patients at high risk of relapse of suicidal behavior.



## II. SUICIDE BEHAVIOR

### 2.1 Definition of suicide behavior

The word “suicide” in English did not emerge before the 1650s, and in the Romance languages not before the second half of the eighteenth century (“suicide” in French, “suicidio” in Italian and Spanish). It is important to understand that the Latinization of the term reflected a less severe trial process than the previously used "self-murder" since the 16th century (Bahr, 2013). The evolution of the definition of suicidal behavior began with terms that included a series of excessively broad concepts related to suicidal behavior. Representative of this trend is the proposal by O'Carroll et al. (1996), in which they extend the concepts to “risky thoughts and behaviors” -such as skydiving, bungee jumping, smoking, or sexual promiscuity- and thoughts and behaviors related to suicide -from self-harm without suicidal intentions to suicide attempts- (O'Carroll et al., 1996). A decade later, Silverman, Berman, Sanddal, O'Carroll and Joiner (2007), put forward an updated classification that has received vast consensus over the years. They posit that behaviors related to suicide encompass suicidal ideation, communication and behavior, but do not explicitly include the intention to kill oneself. Although these authors speak of “suicide-related behaviors”, this concept still includes behaviors that involve the presence of physical harm, regardless of the suicidal intention of this behavior (Silverman et al., 2007). Finally, as the definition of this term evolves, the presence of physical damage has ended up being rejected as a requirement for a behavior to be considered as a behavior related to suicide. Therefore, the core concept to define suicidal behavior is the "presence of a certain degree of intention to die", regardless of the presence or absence of physical damage (American Psychiatric Association, 2022).

As long as an unique and standardized definition does not exist, each investigator and/or research group proposes their taxonomy or adapts some of the already existing definitions and proposals. Thus, our research group adopted the classification proposed by Arie et al.

and that of Al-Halabí et al. (2021) for different reasons. First, both of them have been studied with good results in clinical samples of adolescents (Al-Halabí & Fonseca-Pedrero, 2021); Arie et al., 2005), and moreover, Al-Halabí et al. (2021) have carried out research with Spanish clinical samples, also proving its applicability (Al-Halabí & Fonseca-Pedrero, 2021). The Al-Halabí group proposes considering suicidal behavior as the set of thoughts and behaviors related to intentional suicide. While attempts are proposed as all behaviors engaging in potentially self-destructive behavior in which there is at least some intention to die as a result. This makes a difference with the non-suicidal self-injuries where the final intention has nothing to do with death (Al-Halabí & Fonseca-Pedrero, 2021). Considering all these, the taxonomy adopted for the present research considers that suicidal behavior encompasses: suicidal ideation, suicidal threats, preparatory acts suicide attempts and completed suicide. Table 1 below summarizes each term.

**Table 1.**

*Definition of suicide behaviors\**

<b>Concept</b>	<b>Definition</b>
Suicidal ideation	This idea ranges from passive ideas about the desire to die to active thoughts of killing oneself, reaching the extreme planning of the attempt. There is broad consensus in considering that suicide planning identifies the person at high risk of suicide. Joiner (Joiner, 2005) differentiates two types of people in his approaches: 1) people with passive ideas of death and 2) people with a desire to die or active ideas of suicide.
Suicidal threats	Understood as the verbalization of these thoughts and, therefore, as indicators of high risk, even though they are not taken into account by certain classifications like the <i>Columbia Classification Algorithm of Suicide Assessment (C-CASA)</i> by Posner et al. (Posner et al., 2007).

Preparatory acts	These encompass all the preparatory acts before the start of the suicide attempt, without starting it. Occurs when it is happening without the need for the person to verbally inform us of what they are doing.
Attempted suicide	A self-initiated sequence of behaviors by an individual who, at the time of initiation, expected that the set of actions would lead to his or her own death (American Psychiatric Association, 2022).
Completed suicide	This is a consummate attempt that ends the person's life. Thus, from the beginning of the sequence, the person expects that, to some extent, the result will end his life.

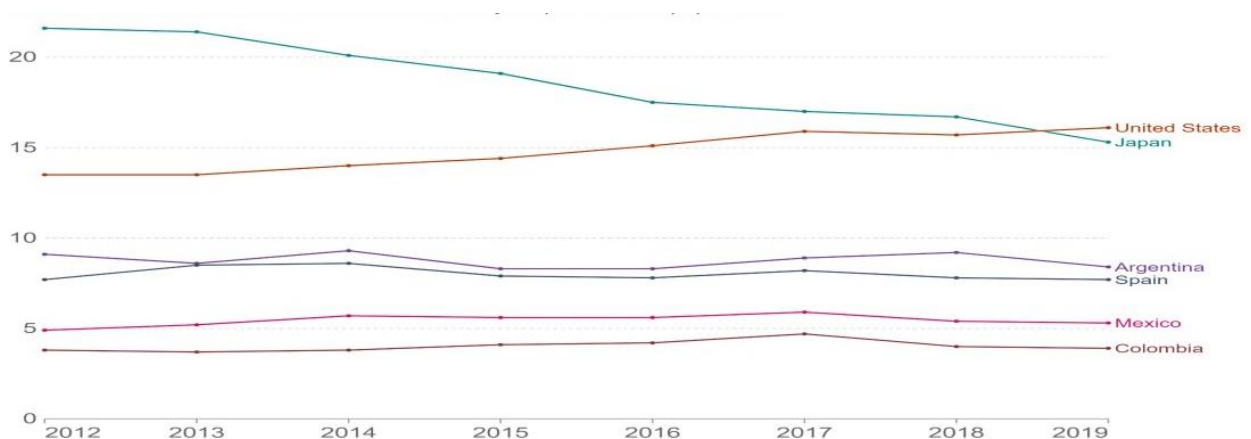
\* Note: original definition of our research group (Villar, F; 2022)

## 2.2 Epidemiology of suicide behavior

Suicide is the leading cause of death in people aged 15-34 years, and rates generally increase with age (Knipe et al., 2022). From 2012 to 2019 the total suicide rate has remained in Spain at similar levels (see Figure 1).

**Figure 1.**

*Suicide Rate from 2012 to 2019*



Source: World Health Organization (via World Bank)

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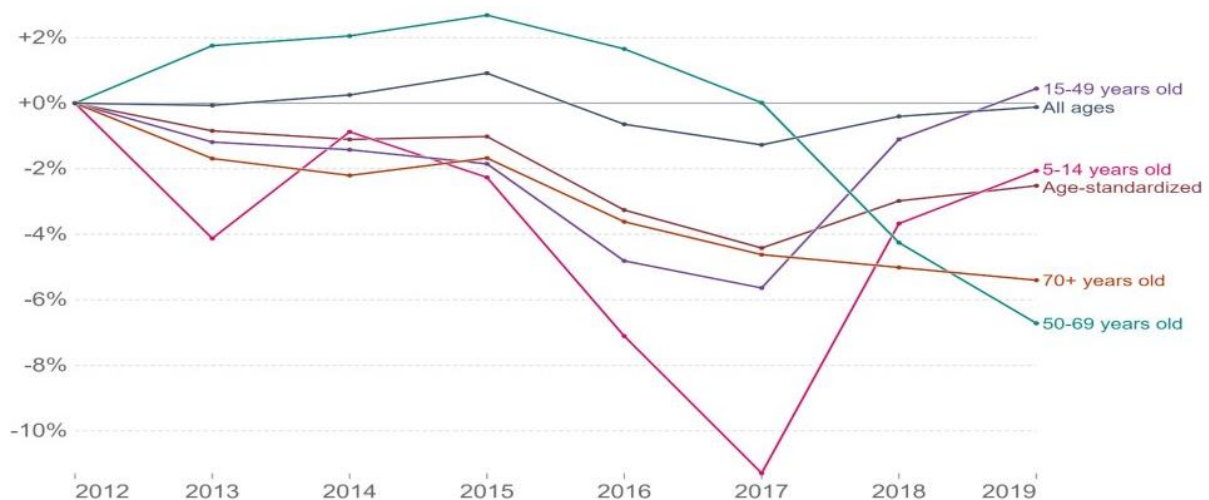
World Health Organization (Organization & Others, 2021)

The Global Burden of Disease Study has modelled self-harm rates using various data sources and estimates approximately 20 self-harm episodes for each suicide death each year (Knipe et al., 2022), and 100 to 200 occurring in adolescents (Drapeau and McIntosh 2021). The age-standardized incidence rate of self-harm is 62.5 per 100.000 (95% CI 53.2–73.9), with higher rates in women (74.0 per 100.000; 62.6–87.6) than in men (51.0 per 100.000; 43.6–60.0) (Knipe et al., 2022).

In a Spanish sample, 6.9% of adolescents reported a level of suicidal ideation that could be considered high (Fonseca-Pedrero et al., 2018). Increasing the rate of suicide in adolescents during de last years (see Figure 2). The rate of the prevalence of suicidal ideation in Europe was found to stand at 32.3%, while the prevalence of attempted suicide stood at 4.2%; while in Spain, the rate of suicidal ideation prevalence was found to stand at 7.5% while attempted suicide was 3% (Fonseca-Pedrero et al., 2018). Hernandez-Bello et al. reported a prevalence of suicide behaviors in adolescents between 9.7 and 77.2%, depending on the study and the assessment tools employed (Hernández-Bello et al., 2020).

**Figure 2.**

*Change in suicide death rate in Spain between 2012 and 2019*



Source: IHME, Global Burden of Disease (2019)

OurWorldInData.org/suicide/ • CC BY

Source IHME, Global Burden of Disease (2019)

### **2.3 Risk factors for suicide behavior**

Regarding risk factors, there are groups of young people more vulnerable than others. Recent systematic reviews identify three main factors that seem to increase the risk of suicide. These are psychological factors -such as depression, anxiety, use of toxic substances and alcohol, other psychiatric comorbidities-, stressful life events -family and peer conflict-, and personality traits -being the most reported, neuroticism and impulsiveness- (Carballo et al., 2020). However, although the study of risk factors generates, and has generated, a great deal of interest in recent years, prevention efforts have proven difficult to develop, possibly because no risk factor predicts suicide with high accuracy (Fehling & Selby, 2020).

One of the risk factors with the greatest predictive power is having made a previous attempt (Abrial et al., 2022; "World Health Organization," 2014), and this risk increases as the number of attempts increases, with adolescents who make more attempts being more vulnerable to re-attempts (Bostwick et al., 2016). Other factors commonly described and associated with suicidal behavior are impulsiveness, the pessimism of the introverted adolescent, the onset of psychiatric disorders and the start of drug use (Amitai & Apter, 2012; Nock et al., 2013). Concerning the effects of a psychopathological background, it has been shown that between 20% and 47% of the adolescent psychiatric population will attempt suicide before 18 (Bursztein & Apter, 2009). Also, gender differences have been described in the study of risk factors pointing out a greater association between death by suicide, mental health disorders and the male gender compared to women (Bachmann, 2018). A situation that some researchers have justified by the lower tendency of men to seek medical help or social support in the face of depressive states (Call & Shafer, 2018). Some other studies have identified risk factors for suicide attempts such as female gender, being younger than 14 years old, previous psychiatric hospitalizations, previous self-injury

behaviors, family history of psychopathology, stressful life events, and previous history of psychopathology (Geoffroy et al., 2020; Janiri et al., 2020; Pérez et al., 2020; Villar et al., 2018b) those risk factors with the most empirical support in existing research on suicidal behavior in adolescents are previous suicide attempts, social isolation, family conflicts, family history of suicide and direct exposition to suicide (Van Orden et al., 2010).

Currently, more complex analyzes are being used with Machine learning, with huge samples in which predictive algorithms are generated. The objective is to find out the dynamic nature of potential risk factors, instead of presenting them static and unalterable factors over time. This study has used very advanced statistical tools, with large samples, consulting medical records to detect predictors or risk factors. Far from offering a defined profile, they have found extensive lists of risk factors, even more so by observing the dynamic nature of said risk factors. This complicates much more the aspiration to predict suicidal behavior in a given individual. Thus, it has been described how and when they might have their maximum influence (Walsh et al., 2018). Pieces of evidence so far point out that a higher number of risk factors seems to operate in the first days around a suicide-related behavior, while others remain latent, with a later effect (Walsh et al., 2018). This indicates a lack of individual risk factors that predict suicidal behavior in adolescents, as well as temporal variability, including interpersonal risk factors, requiring more complex studies and analyzes to obtain more accurate results.

#### **2.4 Predictors of re-attempt suicide**

An interesting study line is the predictors of repetition. Undoubtedly, the aspiration in the study of suicide is to be able to identify the risk of a person carrying out an attempted suicide with the ultimate goal of avoiding it. But as long as this line of research does not achieve the expected results, and as long as we continue to treat people who have made a suicide attempt in hospitals when life is at stake, or there are already severe consequences, the study of relapse predictive factors becomes essential. Especially considering that the main

objective of all our interventions as healthcare professionals from that moment on is that the patient does not make a new attempt. The problem is not minor since it is estimated that up to 36-42% of adolescents relapse in the following two years (Bridge et al., 2006; Lewinsohn et al., 2001) and multiple relapsers have the highest number of diagnoses and the highest risk of suicide (Miranda et al., 2008).

Regarding risk factors for suicide re-attempts, studies exclusively based on adolescent samples are scarce. Thus, most of them combine population samples of adults and adolescents. The most reported risk factors from these studies are chronic medical conditions, mental disorders, non-affective psychotic disorder, drug abuse -primarily alcohol-, stressful life events -especially sexual abuse-, family history of suicide, young age -below 20 years old- and mental disorders characterized by hopelessness, subjective distress and impaired general level of functioning (Esmaeili et al., 2022; Y. Liu et al., 2017; Parra-Urbe et al., 2017; Skarbø et al., 2006; Vajda & Steinbeck, 2000).

Therefore, studying predictors of repetition should allow us to identify and plan preventive actions, allocating more resources to those who need them most.

## **2.5 Adolescence and suicide behavior**

Suicide prevention has to be adjusted for different aspects, such as diagnosis, gender and age (Qin, 2011). Of these elements, the most differential is age due to the evolutionary characteristics of each of the stages. Developmental differences between adolescents and adults have been described regarding intentionality, impulsivity and lethality, describing the attempts of adolescents as more impulsive, less lethal and that they are hospitalized more frequently than adults (Parellada et al., 2008).

The specific study of the adolescent who presents suicidal behavior entails taking into account the particularities of this vital stage, for which the International Association for

Suicide Prevention (IASP) has promoted a specific interest group for the study of the "suicidal adolescent" (Goldney et al., 2013).

Adolescence is a stage of special vulnerability in which a decrease in life satisfaction and an increase in stress have been described for both genders (Goldbeck et al., 2007). Some studies suggest that this dissatisfaction with life predicts suicidal ideation in adolescence (Amer & Hamdan-Mansour, 2014; Morales-Vives & Dueñas, 2018). The evolutionary changes characteristic of this stage, such as the propensity for impulsiveness, the need to belong to the group or the undervaluation of risks, may be related to the increased probability of presenting suicidal behaviors (Bursztein & Apter, 2009). In addition, some studies have pointed out as specific to this stage the importance of relational aspects, both family and peers, concerning suicidal behavior (King & Merchant, 2008).

On the other hand, it is also necessary to consider the characteristics of the intervention with adolescents, in which it is essential to reckon the differential characteristics of their cognitive profile and reasoning (R. Barzilay et al., 2019). For example, preadolescents and young adolescents, both in therapeutic approaches and in the focus of the intervention, should be oriented to present situations instead of distant futures. Another differential aspect of adolescence is the risk factors or predictors of suicidal behavior since they act differently depending on the life stage. For example, as a predictor, self-harm in adolescence presents a lower risk of suicide than when it appears in adulthood, especially for males (Hawton et al., 2015).

About the identified triggers, Hawton, Saunders and O'Connor (2012) pointed out that psychosocial stressors, especially relational problems, appear as a precipitating factor more frequently in the case of children under 14 years of age, in whom suicide usually happens after a brief period of stress and not so much because of a psychiatric disorder. Also, in the data analyzed in our hospital (Villar et al., 2018a), the more evident identified triggers were, for both genders, relational conflicts. For this reason, in adolescence in line with the WHO



2021 recommendations, interventions based on the acquisition of skills aimed at improving the different aspects related to the resolution of interpersonal conflicts, such as emotional management or the social skills of Linehan's Dialectical Behavioral Therapy (DBT); (Linehan et al., 2015; Mehlum et al., 2016) and problem-solving theory (PST); (Rudd et al., 1996) could improve suicide behaviors.

## **2.6 Family and suicide behavior**

Despite controversial results, a big corpus of research exists on individual factors (Carballo et al., 2019a; Howarth et al., 2020; Turecki et al., 2019). However, more empirical evidence regarding family factors is needed to understand better how these variables might modulate suicidal behavior in adolescents since family is the immediate social environment in which adolescents grow up. So far, several studies have shown evidence of an increase in the number of suicide attempts in adolescents with a family history of suicide attempts or completed suicide (Castellví et al., 2017; Thompson & Swartout, 2018). Also, low socioeconomic status and dysfunctional family patterns have been pointed out as risk factors for attempting suicide (Clark et al., 2016; Gniwa et al., 2019; Orri et al., 2019). Despite this preliminary evidence, it is still necessary to further study other family-related factors such as attachment style, parental bonding and family functioning patterns that might influence the risk of suicidal behavior among adolescents.

Attachment theory postulates that early care experiences are internalized as inner functional models that guide individuals at the relational level (Bowlby, 1973). Thus, attachment styles are systematic patterns of expectations, needs, emotional regulation strategies, and social behavior, resulting from the interaction between the person's innate attachment system and its particular history of attachment experiences, which normally begin in the relationship with the parents or the main caregivers (Mikulincer & Shaver, 2007). The first classification of attachment styles distinguished between secure, insecure-ambivalent, and insecure-avoidant attachment (Salter Ainsworth, 1978). Secure attachment is produced when the

caretakers demonstrate physical and emotional warmth, trust, and availability. When placed in a strange situation where the attachment figure is not present, the child tends to feel anxious upon being separated from the caretaker and then calm when the caretaker returns. Children with this style of attachment experience comfort with privacy and closeness, tend to search for support, present low anxiety and evasiveness and confront stress well. Insecure ambivalent attachment occurs when the caretaker is available only on certain occasions. During the strange situation, the child suffers great anguish when the caretaker disappears, followed by difficulty calming down when the attachment figure reappears, with fluctuations between anger and worry. Children with insecure ambivalent attachment develop high anxiety, the need for closeness, worry about establishing relationships, and fear of rejection. Lastly, in insecure-avoidant attachment, the caretaker does not attend to the baby's cues that signal the need for protection. In the strange situation, under this type of attachment, this child experiences indifference, anguish and anger in some cases upon becoming separated from their mother and later demonstrates disregard upon reuniting with her. It has been described how children with insecure-avoidant attachment develop self-sufficiency and a preference for emotional distancing from others (Delgado et al., 2022).

Several researchers have established a direct relationship between insecure attachment and a higher risk for suicidal behavior among adolescents (Sheftall et al., 2014; Wright et al., 2005). The main explanations for this association have pointed out the additive effects of higher self-criticism and dependency among adolescents showing this specific family pattern. However, the specific mechanisms of such relationships are still unclear (Campos et al., 2013). Other research has found no direct relationship between attachment style and suicidal behavior (Venta & Sharp, 2014), suggesting that the relationship between these two factors is mediated by others, among which personality points out. In this sense, Falgares and colleagues also found that self-criticism and dependence mediated between an anxious/ambivalent attachment style and suicidal behavior. However, in the denial/avoidance attachment style, only self-criticism was found to be a mediating factor,

according to some research (Falgares et al., 2017). On the other hand, Zisk and colleagues found that, concerning attachment, negative expectations from caregivers mediated suicidal behavior and insecurity (Zisk et al., 2017). Still, specific mechanisms leading to these behaviors have proved challenging to study (S. Barzilay et al., 2013).

Although there is some consensus regarding the relationship between insecure attachment and suicidal behavior in the adolescent population, there is little knowledge about the association between them. By identifying these processes, relevant conclusions could be obtained to improve treatment options, including treatment planning and family work, to help patients with high suicide risk (Diamond et al., 2016; LeCloux et al., 2017; Li et al., 2017; Ng & Weisz, 2016).

The early parent-child relationship has been associated with numerous aspects of behavior and development. An estimation of these early relationships in adults can be very useful; this may inform diagnostic and therapeutic interventions, whereas in psychological research, it can contribute to a more precise understanding of the role of the early environment in the etiology of psychopathology (Cassidy & Shaver, 2018). Empirical evidence shows that parental bonding has an important role in developing psychopathology during adolescence and young adulthood (Dale et al., 2010; Rikhye et al., 2008). It has been shown that low parental concern or less care is related to a more significant number of suicide attempts in adolescents with mental health problems (Saffer et al., 2015), showing the importance of positive parentality. Authoritarian and neglect/rejection profiles have also been related to an increase in suicide attempts (Donath et al., 2014a), and evidence of the Affectionless Control model's influence on adolescents' suicidal behavior is increasing (Adam et al., 1994; Goschin et al., 2013a; Martin & Waite, 1994). However, more studies are needed to clarify these influences.

Other family models are based on the Circumplex Model of Family System, which relates to the family's cohesion and adaptability (Butler & Spencer, 2019; Olson et al., 1979a). These

two dimensions evaluate four different subdimensions each -from rigid to chaotic and from enmeshed to disengaged systems-, placed into a circumplex model used to identify 16 types of family systems. The model proposes that a balanced level of cohesion and adaptability is the most functional family development (Olson et al., 1979b). Some studies relate these unbalanced family functional models to mental health problems (Birmes et al., 2009; Joh et al., 2013; Kashani et al., 1995; Wallin & Kronvall, 2002), but few have provided empirical data related to suicidal behavior (Sheftall et al., 2013). It is important to study further the relationship between family function and suicidal behavior in adolescents to improve family interventions and suicide prevention.

## **2.7 Stressful life events and suicide behavior**

It is imperative to consider research on stressful life events (hereinafter, SLEs) related to suicidal behavior. SLEs increase suicidal tendencies in adolescents due to increased psychological distress and fatigue from the social support they receive, requiring an emphasis on support programs and stress management as a method of preventing suicide, and more studies are needed to determine which SLEs entail higher risk (Yıldız, 2020a). Some studies have identified three SLEs' main categories related to suicide behavior, based on their increased prevalence: family conflicts, academic stressors and trauma. Concerning family conflicts, the most important ones are stress related to parents, lack of adult support outside of the home, physical harm by a parent, running away from home, living apart from both parents and other family situations associated with risk for suicidality (i.e., parental suicidal behavior, early death, mental illness in a relative, unemployment, low income, neglect, parental divorce, other parent loss, and family violence); (Steinhoff et al., 2020). As an important life event in adolescence, academic stressors also mediate suicide behavior (Steinhoff et al., 2020). Trauma, bullying and childhood sexual abuse are the most important SLEs, while there are also other very commonly reported stressful circumstances that may precede suicidal behavior, such as peer conflict, legal problems, physical abuse, worries about sexual orientation, romantic breakup and exposure to suicide or suicide attempts

(Carballo et al., 2019). Finally, childhood trauma has been identified as an important variable in the aetiology of suicide risk. Research has begun to focus on the links between childhood trauma and altered dynamics of the hypothalamic-pituitary–adrenal axis (HPA axis); (O'Connor et al., 2020). Research in this field suggests that the experience of childhood trauma may predispose individuals to vulnerability to suicide in adulthood by leading to diminished HPA axis activity during awakening (and possibly a tendency towards a flatter diurnal profile across the day) as well as during stress (O'Connor et al., 2020). SLEs cause modifications in front-limbic brain function, which may then lead directly to: 1) reduced stress reactivity, 2) altered cognition (characterized by a shift in focus to more short-term goals and impulsive response selection), and 3) unstable affect regulation, suggesting that these three negative consequences influence the development of a more impulsive behavioral style that may increase risk of addiction and the engagement in poor health behaviors (O'Connor et al., 2020). The association between stress and suicide has been described in the models of suicide risk, and the role of the HPA axis in this relationship has been outlined above; however, there are likely to be multiple interrelated mechanisms that link stress and suicide (O'Connor et al., 2020). These findings provide a possible moderation mechanism for the stress diathesis hypothesis, where “at risk” individuals respond to stress with cognitions increasing their risk of suicidal behavior (O'Connor et al., 2020).

## **2.8 Intervention in suicide behavior**

### *2.8.1 Pharmacological treatments*

Suicidal behavior is a complex phenomenon mediated by biological, psychological and social factors. An accurate assessment, diagnosis and mental health treatment (mainly psychological treatments but also adjuvant pharmacological treatment) of the patient's underlying pathology is the most effective mechanism to combat suicidal behavior. The pharmacological treatment must include the underlying pathology and those symptoms that may act as additional risk factors (e.g., anxiety, insomnia, impulsivity, etc.). There are

several specific studies on the treatment of suicidal behavior, since most of them analyze drugs that are used to treat the underlying pathologies of this behavior (De Berardis et al., 2018; Orsolini et al., 2020).

- *Antidepressants:*

Suicidal ideation or suicidal acts (collectively referred to as suicidality) are not changed or reduced in a large number of patients that receive antidepressants. Reduction in suicidality is greatest among patients with major depression disorder (MDD), with minimal evidence for an effect on suicidality in patients with anxiety disorders or non-psychiatric indications. The antisuicide effect is greatest earlier in the course of treatment. Age is one of the major determinants of changes in suicidal risk with antidepressants. Older age is associated with a statistically significant reduction in suicidality, whereas younger age is associated with increased suicidality. The mechanism of this effect is not known, but it may be related, at least in part, to a serotonin effect because independent evaluations of non-serotonergic agents, bupropion and atomoxetine, do not appear to have any effect on suicidality (although this may be due to inadequate power because the independent evaluation of single agents significantly reduces the sample size); (Hawkins et al., 2021).

- *Mood stabilizers:*

Research on anticonvulsants and suicidal risk remains limited, inconsistent, and inconclusive, although lithium appears superior in preventing suicidal behavior, based on direct comparisons (Tondo & Baldessarini, 2018). In contrast to the strong evidence for lithium compared to placebo, the evidence comparing lithium to other medications is mixed. Among populations that are at high risk for suicide, the evidence clearly recommends that we consider lithium therapy, particularly in patients with a mood disorder, although it has also been recommended for other mental health conditions. Limitations to its wider use include concerns about toxicity, the need for close monitoring, concerns regarding thyroid and renal function, and possible interactions with other medications (Hawkins et al., 2021).

- *Antipsychotics:*

In the past several years, several epidemiological studies have added to the conclusions that long-term antipsychotic treatment is associated with reduced all-cause mortality rates and risk of suicide in particular and that clozapine is probably more effective against suicidal risk than other older or newer antipsychotic agents. However, almost all of this work involves adults diagnosed with schizophrenia rather than adolescents with mood disorders (Tondo & Baldessarini, 2018).

- *Esketamine:*

The Food and Drug Administration (FDA) and the European Medicines Agency (EMA) have recently approved (in 2019 and 2020, respectively) the use of the new intranasal drug esketamine (trade name Spravato) for the treatment of resistant depression in the adult population, in combination with another oral antidepressant treatment. Esketamine is the S-enantiomer of the ketamine molecule, which acts as an antagonist of the NMDA glutamate receptor and its effect is that of a fast-acting antidepressant. In 2021, the EMA also authorized the use of intranasal esketamine for the treatment of patients with moderate-mild major depressive disorder with imminent risk of suicide, in combination with usual treatment, since studies in the adult population have shown that this drug produces rapid and significant relief of depressive symptoms during the first 24 hours after its administration (Fu et al., 2020; Ionescu et al., 2021). There are currently international multicenter phase III studies for the use of intranasal esketamine in the adolescent population with a diagnosis of major depressive disorder and imminent risk of suicide, the results of which are still unknown. All of these studies are also looking at the effect of this drug on suicidal behavior in patients. This treatment is only approved for treatment-resistant major depression in adults, it is not approved for single use, always in combination with an SSRI, it is not approved for children or adolescents, and in Spain, it is not financed by the National Health

System (Ministerio de Sanidad, Consumo y Bienestar; Agencia Española de Medicamentos y Productos Sanitarios; 2022).

### *2.8.2 Psychological treatments*

Different studies have examined dialectical behavior therapy (DBT) adapted for adolescents (DBT-A) for the prevention of suicide and self-harm with good results, showing a significant reduction in suicidal ideation in the intervention group with DBT-A (Vargas-Medrano et al., 2020). DBT-A is aimed at the adolescent and the family, staying in the environments in which they acquire dysfunctional patterns, so it is necessary to integrate the family to correct their own mistakes and help them face other environmental contexts (Kothgassner et al., 2021). This holistic approach helps reinforce skills and decrease dysfunctional behaviors. A longer duration of DBT-A may be crucial for greater efficacy, particularly for suicidal ideation, since the therapeutic relationship can be considered as a critical reinforcement, a longer duration may mean a more effective use of the therapeutic relationship in terms of contingency management (Kothgassner et al., 2021).

Other evidence-based effective psychotherapies to prevent suicidal behaviors are those based on cognitive-behavioral therapy (CBT), directly addressing suicidal thoughts and behaviors during treatment (Calati et al., 2018; Witt et al., 2021).

The involvement of the family in the treatment of adolescents at risk of suicide is essential. Attachment-based family therapy (ABFT) appears to have promising results for adolescents with depressive symptoms and suicidal behaviors. ABFT is a manual-based treatment with parts of both attachment theory and emotion-focused therapy, based on the strength of the parent-adolescent relationship as a source of support for depression and suicidal behavior. To this end, ABFT comprises five tasks: (1) relational reframing, (2) adolescent alliance, (3) alliance with parents, (4) attachment repair, and (5) autonomy promotion. Their hypothetical mechanisms of change, which should be investigated in the future, are the following:



changes in attachment, better regulation of emotions, better interpersonal skills and conflict resolution skills (Calati et al., 2018).

Combined individual and family therapy are effective in treating suicidal youth, such as Integrated Cognitive Behavioral Therapy (I-CBT) which incorporates individual and family CBT techniques, as well as a parent training component. It also happens with attachment-based family therapy (ABFT) explained above. Positive immediate and short-term post-intervention effects are evident for CBT-I and ABFT compared to a control sample. Adolescents who received six months of I-CBT had significantly fewer suicide attempts over an 18-month study period. ABFT was also superior in reducing suicidal ideation, and the differences were maintained at a 6-month follow-up (Cha et al., 2018).

Motivational interviewing (MI) has been shown as a way to encourage behavior change while planning for safety. In this sense, after applying MI techniques combined with other psychotherapeutical approaches, results showed a higher probability of using coping and a higher self-efficacy to refrain from suicide attempts (Vargas-Medrano et al., 2020).

Interventions delivered after discharge from emergency departments (ED) or acute care settings are another important part of suicide treatment efforts that gain empirical support. Some of the interventions include components that address crisis management (e.g., safety planning), psychoeducation and skills training for youth and parents, as well as linkage and adherence to follow-up care. There is evidence of the utility of safety planning as a stand-alone intervention to help patients identify effective coping strategies for suicidal crises. Also, multi-component post-ED interventions are superior to routine care in improving adherence to outpatient treatment and are effective in reducing suicide attempts (Cha et al., 2018).

Cognitive and affective markers of increased risk of suicidal behavior have recently begun to be identified, which may serve as new treatment targets. As just one example, previous studies have shown that people who engage in suicidal or non-suicidal self-injurious behavior have implicit positive associations with the concepts of death, suicide, or self-harm

and can work from an induced aversion. These results are promising but preliminary as the effects of the intervention do not generalize to suicidal ideation and do not persist one month later. Despite this, continued development and improvement of such interventions is encouraged, given the low-cost and easily disseminated intervention format (Cha et al., 2018).

### *2.8.3 Prevention*

It is important to develop prevention strategies, given the increased prevalence of suicidal thoughts and behaviors during adolescence, along with the lack of ability to predict suicidal behavior. Suicide prevention strategies include three formats: 1) universal prevention programs targeting entire populations of youth to educate about risk and identify cases, 2) selective prevention strategies that counteract a shared risk factor within a specific subgroup, and 3) indicated prevention interventions targeting symptomatic individuals who have not been formally diagnosed or are not on treatment (Cha et al., 2018).

Universal interventions aim to favorably change risk and protective factors in the entire population rather than in specific groups of individuals. Universal interventions affect the social environment or promote resilience within people and target risk factors without having to identify people with these risk factors (Turecki et al., 2019). Many suicide prevention efforts focus on education and school-based screening to educate about the signs and symptoms of suicide and to identify those at risk in the general population. An example is a multicenter study conducted in European countries where schools assigned to the Mental Health Aware Youth Program showed reductions in self-reported suicide ideation and attempts compared to those assigned only to poster versions of suicide education materials (Cha et al., 2018).

Selective interventions target those groups that have risk factors that predispose them to suicidal behavior but do not currently exhibit these behaviors, with many of these selective interventions targeting people with psychiatric disorders (Turecki et al., 2019). Interventions

aiming to improve GPs' ability to detect, diagnose, and manage depression -usually involving the provision of education and guidelines- have also been introduced, because many people with depression will first receive GP care (Turecki et al., 2019). Other selective interventions target people with socioeconomic, environmental, or suicide-related risk factors, such as those experiencing bullying or social isolation. Targeted interventions designed to reduce bullying and social isolation are often school-based and tailored to particular subgroups, such as LGBT+ youth (Turecki et al., 2019).

The indicated interventions are designed for people who are already beginning to exhibit suicidal thoughts or behaviors, identified through screening programs or by clinical presentation. Taking into account that these interventions target people who already have suicidal ideation or behavior, some have argued that, unlike the universal and selective intervention strategies that constitute true prevention, the indicated intervention strategies fall within the realm of early intervention. Indicated prevention strategies, such as suicide hotlines, respond to the immediate needs of suicidal persons during a crisis. Crisis support services, such as post-intervention school programs, address the needs of the community after a suicide-related event (Cha et al., 2018).

Universal, selective and indicated interventions are often delivered in combination through what is often termed a 'systems-based' approach, sometimes delivered in local regions or communities (Turecki et al., 2019).

### III. HIPOTESIS AND OBJECTIVES

The general aim of this research is to study personal and family-related main risk factors associated with suicidal behavior in adolescents in our territory. Specific objectives for this research and its corresponding hypothesis are the following:

O1. To identify and describe which personal factors are associated at mid-term with the repetition of suicidal behavior in adolescents in our territory.

- H1. There are clinical and epidemiological risk factors that can help us predict relapses in suicide behavior in the adolescent population.
- H2. These risk factors according to the literature would be age, gender, family history of mental health, family history of suicide, personal history of mental health, personal history of suicidal behavior, and diagnosis of personality disorder or maladaptive personality traits.

O2. To identify and describe which environmental, specifically, stressful life events and family-related factors (specifically, family profiles, attachment and bonding) are associated with the onset of suicidal behaviors in adolescents in our territory.

- H3. Families with a history of mental health and suicide attempts are at increased risk of their children making suicide attempts and families with insecure attachment and negative or neglectful parenting styles are at greater risk of their children making suicide attempts.
- H4. Bullying, cyberbullying and school difficulties could contribute to the trigger and repetition of suicide behaviors.
- H5. A large number of stressful life events or more severe situations are related with suicidal behaviors in adolescents.
- H6. Adolescents with personal risk factors, stressful life events and lack of family support will have a worse prognosis of suicidal behaviors than their peers.

O3. To identify and describe potential protective factors reducing the risk of committing suicidal behaviors in adolescents in our territory.

- H7. Care, optimal parenting, compensated functional families or secure attachment are possible protective factors that reduce the risk for suicidal behaviors in adolescents.

#### IV. METHODOLOGY

The aim of this study was to identify risk factors suicide behavior in adolescents, especially during emergency room assessment, to better comprehend suicide risk with the final aim of planning clinical interventions. With this objective, we made a longitudinal retrospective study and case control research (see below specifically for first article and second article) assessing individuals who attended the emergency department due to suicide behaviors. The study was first carried out in the mental health area of the pediatric emergency service of the pediatric hospital Sant Joan de Déu, attending to approximately 400 new mental health cases per year, of which about 200 are due to suicidal behavior in children and adolescents. This reference hospital has a catchment area of 1,300,000 inhabitants and receives 100,000 annual visits from pediatric cases sent to the emergency service.

Inclusion criteria were: (1) age from 12 to 17 years old (inclusive), and (2) admission to the psychiatric emergency service due to suicide attempt. The exclusion criteria were: (1) legal adulthood (>18 years), (2) cognitive or other neuropsychological deficits that could hinder clinical assessment and/or understanding of the concept of death, (3) denial of the suicidal intentionality of the behavior, presenting non-suicidal self-harm, intoxication, or other similar behaviors with anxiolytic, playful, or other non-suicidal intention, and refusal to participate in the study.

Demographics (sex, age), clinical data (diagnoses, psychiatric comorbidity, and past personal and familial psychiatric diagnoses, treatment, and evolution), family relation and function, social and past history variables (bullying, cyberbullying and stressful life events), and variables related to suicide attempts (previous, characteristics, type, method, and re-attempt) were collected by clinical interview and specific tests with the adolescent and the family. An expert professional (psychiatrist or psychologist) established the psychiatric diagnosis through a clinical interview using DSM-IV TR criteria.

We consider suicidal behavior, as Al-Halabí et al. and Arie et al. suggest, as being the set of thoughts and behaviors related to intentional suicide, and attempts as engagement in potentially self-destructive behavior in which there is at least some intention to die as a result of the behavior, differentiating this from non-suicidal self-injuries where the final intention has

nothing to do with death. Furthermore, re-attempt is considered as being a new attempt during the research period.

The collection and coding of the data were carried out on the same day as the individual's emergency admission and following hospital admission. All data were collected by a clinical professional (psychologist or psychiatrist) belonging to the psychiatry service of the Sant Joan de Déu Hospital, with a complete first mental health exploration being coded in the clinical background program used for hospitalizations.

The study complies with the internal regulations of the ethics committee of Sant Joan de Déu Hospital and those of the World Medical Association and the Declaration of Helsinki of 1995, with its successive amendments. Since no additional data were collected and no other invasive procedures were performed on subjects, no additional informed consent was required other than the standard consent provided at the time of emergency admission. After receiving information regarding the study, its objectives, and the agreement of confidentiality and protection of personal data, all participants and families gave their written consent. Participation in this study was not remunerated.

The project was accepted by the CEIm (Ethics Committee) Sant Joan de Déu Foundation with the internal code PIC-158-18.

All statistical calculations were performed using the Statistical Package for the Social Sciences (SPSS) version 25. Descriptive statistics and frequency distribution analyses of all variables considered in the present study were calculated. Differences between the groups were analyzed with a Student's t-test and one-way variance analysis (ANOVA) for independent samples (for quantitative variables) or with a chi-squared test (or the Fisher's exact test when no application criteria were met for the chi-squared) calculated from 2 × 2 contingency tables (for categorical variables). To analyze predictors of the main variable of the study (repetition of suicidal behavior at 12-months' follow-up), a binary logistic regression analysis was carried out (stepwise method), using those variables that showed a statistically significant relationship with the main variable of this study. The Bonferroni multiple-comparison post-hoc correction was employed. The significance of all tests was considered at a probability level of 5% or less, always indicating the exact significance and confidence interval of 95% offered by the SPSS.

## **V. RESULTS**

### **5.1 First article**

This study aimed to identify the main predictive factors that allow for recognition of young subjects with a higher risk of suicide re-attempt, showing the importance of good management of these cases in the emergency room, evaluating self-harm, family history of suicide, comorbidities or previous attempts and the importance of gender and age.

The full publish manuscript is presented below.





Article

# Predictors of Suicide Re-Attempt in a Spanish Adolescent Population after 12 Months' Follow-Up

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**Abstract:** Background: This study aims to identify the main predictive factors that allow for the recognition of adolescents with a higher risk of re-attempting suicide. Method: A longitudinal 12-month follow-up design was carried out in a sample of 533 Spanish adolescents between 12 and 17 years old. The data collection period comprised September 2013 to November 2016, including a one-year follow-up after hospital discharge. Results: A statistically significant regression model was obtained to predict suicide re-attempt at 12-months' follow-up ( $\chi^2 = 34.843$ ;  $p < 0.001$ ; Nagelkerke  $R^2 = 0.105$ ), including personal history of self-injury (OR = 2.721,  $p < 0.001$ , 95% CI [1.706, 4.340]) and age (OR = 0.541,  $p = 0.009$ , 95% CI [0.340, 0.860]), correctly classifying 82.6% of the sample. Our results show that having a personal history of self-injury and being younger than 14 years old were predictors of suicide re-attempt during the first year after an adolescent's first admission to emergency services. Conclusions: Considering these factors could contribute to the design of more tailored and effective interventions to prevent suicidal behavior in adolescents at high risk of re-attempting suicide.

**Keywords:** adolescent; suicide behavior; risk factors; prevention

## 1. Introduction

The prevention of suicide should be a priority for public health systems [1] There are 20 attempts for every completed suicide [1], and although some individuals are more vulnerable than others, one in nine young people have attempted suicide at least once during life [2].

Suicidal ideation and self-injurious behaviors are well-established predictors of new suicide attempts in the future and substantial problems with the social and emotional development of a young person beyond adolescence [3], and between 30 and 50% of re-attempts finish with completed suicide [4].

There is some controversy in the literature about poor adjustment in adulthood being related to adolescent suicidal behavior. Some studies have pointed out psychopathology

and psychosocial functioning as clear signs that adolescent suicide attempters have protracted and wide-ranging difficulties that persist into adulthood; however, there is a need for more research to better differentiate if these impairments are strictly related to suicide behaviors during adolescence or premorbid own-risk factors [5].

There are also different genetic (gene modulation), neurobiological (hypothalamic-pituitary-adrenal axis, serotonergic system, neuroplasticity, neuroimmunological markers, metabolic pattern, and differences in neuroimaging), environmental (stress and life events), and psychological aspects (temperament, character and personality traits, and neuropsychological and neurocognitive factors) that could trigger suicidal behavior [6]. However, the joint study of the interaction of all these factors is challenging; thus, so too is the prediction of who will commit suicidal behavior and when. Therefore, there is still the need for a greater understanding of these associations to unravel these joint interactions, which would facilitate better interpretation of suicide risk with a more careful assessment of suicide risk stratification and planning of clinical and treatment interventions [6,7].

Some other studies have identified risk factors for suicide attempts, such as female sex, being younger than 14 years old, previous psychiatric hospitalizations, previous self-injury behaviors, previous suicidal behavior, family history of psychopathology and family difficulties, stressful life events, and previous history of psychopathology [8–11]). As can be seen, a broad range of factors have been pointed out, but more research is needed to clarify and identify which predictive factors are the strongest.

Regarding risk factors for suicide re-attempts, studies exclusively based on adolescent samples are scarce. Thus, most of them combine population samples of adults and adolescents. Most referred risk factors from these studies are chronic medical conditions, non-affective psychotic disorder, drug abuse (primarily alcohol abuse), stressful life events (especially sexual abuse), family history of suicide, mental disorders, hopelessness, young age (younger than 20 years old), subjective distress, and impaired general level of functioning [12–16]. These data reveal a direct association between the time elapsed from the first suicide attempt and the risk of re-attempt and increased risk of completed suicide.

The Catalonia Suicide Risk Code Programme (CSRC Programme) [10] is a protocol-based program consisting of suicidal behavior healthcare and preventive interventions launched by the Department of Health of the Catalan regional government, consisting of three phases: (1) early detection and an initial screening of suicide risk, (2) specialized care, and (3) a clinical assessment and preventive follow-up. This secondary suicide prevention program provides a systematic approach to follow-up care for at-risk subjects to ensure patient engagement with the healthcare system. The CSRC combines immediate face-to-face specialized care with telephone management. The program includes a clear action pathway designed to shorten the time between the participant's first contact with the health care system and the delivery of specialized mental care [10]. The CSRC reported 465 episodes of suicidal behavior between the ages of 12 and 17 in 2019, with 15.7% becoming re-attempts and 2.7% of these re-attempts dying from suicide. Repetition of self-harm is common, with 15–25% of adolescents treated at a hospital for an episode of self-harm returning for treatment within 12 months [17]; this shows the importance of identifying risk factors, and of paying special attention in emergency departments, for re-attempt to be addressed. In this sense, the proper assessment of people attending hospital emergency services after a suicide attempt is fundamental to adding to our knowledge and clarifying the true magnitude of suicidal behavior and its potential repetition. Thus, the identification of risk factors for re-attempt should be a priority to prevent suicide in a group of people who, due to previous attempts at suicidal behavior, may be considered as people at high risk of suicide.

Taking these considerations into account, the objective of this study is to identify predictive factors during screening and assessments in a pediatric emergency service setting. This will allow for the differentiation of suicide attempts with an increased risk of re-attempt from those that do not carry this risk, with the ultimate goal of designing and prioritizing tailored interventions for these individuals, understanding that suicide is

rarely due to a single cause and requires a range of prevention initiatives and evaluation methods [18].

## 2. Method

### 2.1. Participants

The aim of this study was to identify risk factors for re-attempt, especially during emergency room assessment, to better comprehend suicide risk with the final aim of planning clinical interventions as Orsolini et al., 2020, strongly recommend [6]. With this objective, we made a longitudinal retrospective study assessing individuals who attended the emergency department due to suicide attempts. The study was first carried out in the mental health area of the pediatric emergency service of the pediatric hospital Sant Joan de Déu, attending to approximately 400 new mental health cases per year, of which about 200 are due to suicidal behavior in children and adolescents. This reference hospital has a catchment area of 1,300,000 inhabitants and receives 100,000 annual visits from pediatric cases sent to the emergency service, being between 10 and 19 years old, a population of 855,157 out of the 7,758,615 total population of our region.

Inclusion criteria were: (1) age from 12 to 17 years old (inclusive), and (2) admission to the psychiatric emergency service due to suicide attempt. The exclusion criteria were: (1) legal adulthood (>18 years), (2) cognitive or other neuropsychological deficits that could hinder clinical assessment and/or understanding of the concept of death, (3) denial of the suicidal intentionality of the behavior, presenting non-suicidal self-harm, intoxication, or other similar behaviors with anxiolytic, playful, or other non-suicidal intention, and (4) refusal to participate in the study.

Finally, a total sample of 533 Spanish adolescents aged between 12 and 17 years old was recruited in a period of three years.

The age distribution was as follows: 12 years old 5.3% ( $n = 28$ ), 13 years old 13.5% ( $n = 72$ ), 14 years old 23.8% ( $n = 127$ ), 15 years old 20.3% ( $n = 108$ ), 16 years old 18.9% ( $n = 101$ ), and 17 years old 18.2% ( $n = 97$ ). We chose to dichotomize between 14 and younger and older than 14 because scientific research indicates that 34.6% of mental disorders have their onset before 14 years of age [19]. Globally, suicide is the second leading cause of death in 15–29 year-olds [1], so we point out the importance of suicide attempts in younger ages. Age was dichotomized (aged 14 years old or younger vs. older than 14) in the regression analyses ( $\chi^2 = 8.181$ ,  $df = 1$ ,  $p = 0.004$ ,  $Eta = 0.124$ ).

The patients' genders were not considered in the sample data collection. Instead, biological sex (male or female) was registered, since this is how it appeared in the computerized patients' history at the time of the study.

### 2.2. Instruments

The main outcome variable of the study was the repetition of a suicide attempt.

This variable was evaluated at 12 months of follow-up from the first admission of the subject to the psychiatric emergency service of the referral hospital, requiring a hospital admission where the subject entered the investigation. During the evaluation period, all the subjects seen in the emergency room of our hospital required a minimum pediatric hospital stay of 72 h due to standard protocol requirements.

Demographics (sex, age), clinical data (diagnoses, psychiatric comorbidity, and past personal and familial psychiatric diagnoses, treatment, and evolution), social and past history variables (bullying and sexual abuse), and variables related to suicide attempts (previous, characteristics, type, method, and re-attempt) were collected by clinical interview with the adolescent and the family and by reviewing the computerized medical records. An expert professional (psychiatrist or psychologist) established the psychiatric diagnosis through a clinical interview using DSM-IV TR criteria [20].

We consider suicidal behavior, as Al-Halabí et al. [18] suggest, as being the set of thoughts and behaviors related to intentional suicide, and attempts as engagement in potentially self-destructive behavior in which there is at least some intention to die as a

result of the behavior, differentiating this from non-suicidal self-injuries where the final intention has nothing to do with death. Furthermore, re-attempt is considered as being a new attempt during the research period.

No assessment instruments were used beyond those commonly used in clinical practice because of the naturalistic essence of the research in hospitalization and the emergency room.

### 2.3. Procedure

Data collection was from September 2013 to November 2016 to include subjects at 12-months' follow-up.

The collection and coding of the data were carried out on the same day as the individual's emergency admission and following hospital admission. All data were collected by a clinical professional (psychologist or psychiatrist) belonging to the psychiatry service of the Sant Joan de Déu Hospital, with a complete first mental health exploration being coded in the clinical background program used for hospitalizations.

During the study period, after a year of attention in the emergency room, we reviewed the electronic health records and evaluated the variables of those who re-attempt noted by professional therapists (psychologists or psychiatrists), introducing these variables in a database.

### 2.4. Ethical Considerations

The study complies with the internal regulations of the ethics committee of Sant Joan de Déu Hospital and those of the World Medical Association and the Declaration of Helsinki of 1995 [21], with its successive amendments. Since no additional data were collected and no other invasive procedures were performed on subjects, no additional informed consent was required other than the standard consent provided at the time of emergency admission. After receiving information regarding the study, its objectives, and the agreement of confidentiality and protection of personal data, all participants and families gave their written consent. Participation in this study was not remunerated.

The project was accepted by the CEIm (Ethics Committee) Sant Joan de Déu Foundation with the internal code PIC-158-18.

### 2.5. Data Analysis

All statistical calculations were performed using the Statistical Package for the Social Sciences (SPSS) version 25. Descriptive statistics and frequency distribution analyses of all variables considered in the present study were calculated. Differences between the groups were analyzed with a Student's t-test and one-way variance analysis (ANOVA) for independent samples (for quantitative variables) or with a chi-squared test (or the Fisher's exact test when no application criteria were met for the chi-squared) calculated from  $2 \times 2$  contingency tables (for categorical variables). To analyze predictors of the main variable of the study (repetition of suicidal behavior at 12-months' follow-up), a binary logistic regression analysis was carried out (stepwise method), using those variables that showed a statistically significant relationship with the main variable of this study. The Bonferroni multiple-comparison post-hoc correction was employed. The significance of all tests was considered at a probability level of 5% or less, always indicating the exact significance and confidence interval of 95% offered by the SPSS.

## 3. Results

### 3.1. Description of the Sample

Data from 533 participants were collected over three years (see Table 1), including a one-year follow-up after hospital discharge. The sample was predominantly female ( $n = 446, 83.7\%$ ) with an average age of 14.89 years ( $SD = 1.47$ , range 12–17).

**Table 1.** Variables of the sample.

Variables	(n, %)
Demographics and clinical data	
Sex (female)	(n = 446, 83.7%)
Age (older than 14 years old)	(n = 306, 57.4%)
Attempt method	Medication overdose (n = 336, 63%)
Current diagnosis	
Any psychiatric diagnosis	(n = 497, 93.2%)
Psychiatric comorbidity	(n = 165, 31%)
Substance use	(n = 32, 6%)
Schizophrenia and psychotic symptoms	(n = 12, 2.3%)
Affective disorders	(n = 131, 24.5%)
Anxiety disorders	(n = 31, 5.8%)
Eating disorders	(n = 57, 10.7%)
Impulse control disorders	(n = 2, 0.4%)
Adjustment disorders	(n = 233, 43.7%)
Personality disorders or traits	(n = 116, 21.8%)
Behavioral disorders	(n = 36, 6.8%)
Autism spectrum disorders	(n = 12, 2.3%)
Attention deficit and hyperactivity disorders	(n = 12, 2.3%)
Other diagnosis	(n = 24, 4.5%)
Personal background of mental disorder	
Existence of personal background	(n = 380, 71.3%)
Substance use	(n = 28, 5.3%)
Schizophrenia and psychotic symptoms	(n = 6, 1.1%)
Affective disorders	(n = 81, 15.2%)
Anxiety disorders	(n = 67, 12.6%)
Eating disorders	(n = 69, 12.9%)
Impulse control disorders	(n = 0, 0%)
Adjustment disorders	(n = 42, 7.9%)
Personality disorders or traits	(n = 27, 5.1%)
Behavioral disorders	(n = 57, 10.7%)
Autism spectrum disorders	(n = 7, 1.3%)
Attention deficit and hyperactivity disorders	(n = 33, 6.2%)
Self-harm	(n = 210, 39.4%)
Abuse during childhood	(n = 31, 5.8%)
Bullying	(n = 75, 14.1%)
Mental health hospitalization	(n = 78, 14.6%)
Previous suicide behavior	(n = 196, 36.8%)
Other personal background	(n = 70, 13.1%)
Family background of mental disorder	
Family background of psychopathology	(n = 299, 56.1%)
Substance use disorders	(n = 83, 15.6%)
Schizophrenia and psychotic symptoms	(n = 44, 8.3%)
Affective disorders	(n = 172, 32.3%)
Anxiety disorders	(n = 69, 12.9%)
Eating disorders	(n = 16, 3%)
Impulse control disorders	(n = 0, 0%)
Adjustment disorders	(n = 16, 3%)
Personality disorders or traits	(n = 20, 3.8%)
Behavioral disorders	(n = 18, 3.4%)
Family history of suicidal behavior	(n = 68, 12.8%)
Other family background of psychopathology	(n = 59, 11.1%)

Focusing on those adolescents with a suicide re-attempt (n = 93, 17.4%), 92.5% were females (n = 86), with a mean age of 14.54 years old (SD = 1.29, range 12–17; 44.1% > 14 years old).

Significant differences were found between groups (re-attempt vs. no re-attempt) with regard to sex distribution ( $\chi^2 = 6.381$ , df = 1,  $p = 0.012$ , Eta = 0.109), with females displaying higher rates of re-attempt compared to males. Similarly, significant differences were

found between groups (re-attempt vs. no re-attempt) with regard to age ( $t_{149.193} = 2.795$ ,  $p = 0.006$ , CI 95% 0.723–0.124), with younger adolescents showing higher rates of re-attempt ( $M = 14.14$ ,  $SD = 1.3$  vs.  $M = 14.96$ ,  $SD = 1.5$ ).

### 3.2. Clinical Data

Table 2 displays clinical data related to diagnosed psychopathology of the sample at the time of the interview. Considering the whole sample, 93.2% of participants ( $n = 497$ ) had some psychiatric diagnosis, with this percentage being significantly higher in cases of re-attempted suicide ( $\chi^2 = 5.769$ ,  $df = 1$ ,  $p = 0.016$ ,  $Eta = 0.104$ ). Comorbidities occurred in 31% of cases ( $n = 165$ ), increasing up to 40.9% in adolescents presenting a re-attempt ( $n = 38$ ); this was statistically significant ( $\chi^2 = 5.169$ ,  $df = 1$ ,  $p = 0.023$ ,  $Eta = 0.098$ ).

**Table 2.** Diagnosed psychopathology of the sample.

Variables	Relapse ( $n = 93$ ) $n$ (%)	No Relapse ( $n = 440$ ) $n$ (%)	$p$
Substance use disorders	5 (5.4%)	27 (6.1%)	n.s.
Schizophrenia & psychotic symptoms	1 (1.1%)	11 (2.5%)	n.s.
Affective disorders	25 (26.9%)	106 (24.1%)	n.s.
Anxiety disorders	4 (4.3%)	27 (6.1%)	n.s.
Eating disorders	12 (12.9%)	45 (10.2%)	n.s.
Impulse control disorders	0 (0%)	2 (0.5%)	n.s.
Adjustment disorders	42 (45.2%)	191 (43.4%)	n.s.
Personality disorders or traits	31 (33.3%)	85 (19.3%)	0.003
Behavioral disorders	6 (6.5%)	30 (6.8%)	n.s.
Autism spectrum disorders	4 (4.3%)	8 (1.8%)	n.s.
Attention deficit & hyperactivity disorders	2 (2.2%)	10 (2.3%)	n.s.

Note. n.s.: non-significant differences between groups according to the chi-square test.

The most frequently observed diagnoses in the whole sample considering both groups were adjustment disorders ( $n = 233$ , 43.7%), affective disorders ( $n = 131$ , 24.6%), and personality disorders ( $n = 116$ , 21.8%). Significant differences between groups were observed only for personality disorders ( $\chi^2 = 8.857$ ,  $df = 1$ ,  $p = 0.003$ ,  $Eta = 0.129$ ) with higher rates in the suicide re-attempt sample of adolescents.

Table 3 displays clinical data related to personal background, considering personal background as all the clinical circumstances related to psychopathology and other relevant clinical situations that precise evaluation but were not happening during the emergency evaluation. Considering the whole sample, 71.3% of studied adolescents ( $n = 380$ ) revealed personal background related to mental health problems, reaching 81.7% within the re-attempt subgroup ( $n = 76$ ), which is significantly higher ( $\chi^2 = 5.984$ ,  $df = 1$ ,  $p = 0.014$ ,  $Eta = 0.106$ ), therefore, demonstrating that this might be a relevant risk factor for repeated attempts.

**Table 3.** Clinical background of the sample.

Variables	Relapse ( $n = 93$ ) $n$ (%)	No Relapse ( $n = 440$ ) $n$ (%)	$p$
Substance use disorders	3 (3.2%)	25 (5.7%)	n.s.
Schizophrenia & psychotic symptoms	1 (1.1%)	5 (1.1%)	n.s.
Affective disorders	17 (18.3%)	64 (14.5%)	n.s.
Anxiety disorders	15 (16.1%)	52 (11.8%)	n.s.
Eating disorders	17 (18.3%)	52 (11.8%)	n.s.
Impulse control disorders	0 (0%)	0 (0%)	n.s.
Adjustment disorders	8 (8.6%)	34 (7.7%)	n.s.
Personality disorders or traits	3 (3.2%)	24 (5.5%)	n.s.
Behavioral disorders	9 (9.7%)	48 (10.9%)	n.s.
Autism spectrum disorders	2 (2.2%)	5 (1.1%)	n.s.
Attention deficit & hyperactivity disorders	4 (4.3%)	29 (6.6%)	n.s.
Non suicidal self-harm	57 (61.3%)	153 (34.8%)	<.001
Sexual abuse during childhood	4 (4.3%)	27 (6.1%)	n.s.
Bullying	21 (22.6%)	54 (12.3%)	0.009
Mental health hospitalization	16 (17.2%)	62 (14.1%)	n.s.
Previous suicidal behavior	44 (47.3%)	152 (34.5%)	0.020

Note. n.s.: non-significant differences between groups according to the chi-square test.



The most frequent clinical backgrounds of the overall sample, considering both re-attempt and non-re-attempt subgroups, were non-suicidal self-harm ( $n = 210$ , 39.4%), previous suicidal behavior ( $n = 196$ , 36.8%), affective disorders ( $n = 81$ , 15.2%), and bullying ( $n = 75$ , 14.1%). Significant differences were found between groups in personal background of self-harm behaviors ( $\chi^2 = 22.610$ ,  $df = 1$ ,  $p < 0.001$ ,  $Eta = 0.206$ ), previous suicidal behavior ( $\chi^2 = 5.382$ ,  $df = 1$ ,  $p = 0.020$ ,  $Eta = 0.1$ ), and bullying ( $\chi^2 = 6.746$ ,  $df = 1$ ,  $p = 0.009$ ,  $Eta = 0.113$ ).

Table 4 displays family background and clinically-related data. For the sample as a whole, 56.1% of studied adolescents ( $n = 299$ ) revealed family backgrounds in terms of mental health problems; for the re-attempt group, the figure was 63.4% ( $n = 59$ ).

**Table 4.** Family background of the sample.

Variables	Relapse ( $n = 93$ ) $n$ (%)	No Relapse ( $n = 440$ ) $n$ (%)	$p$
Substance use disorders	20 (21.5%)	63 (14.3%)	n.s.
Schizophrenia & psychotic symptoms	10 (10.8%)	34 (7.7%)	n.s.
Affective disorders	38 (40.9%)	134 (30.5%)	n.s.
Anxiety disorders	14 (15.1%)	55 (12.5%)	n.s.
Eating disorders	2 (2.2%)	14 (3.2%)	n.s.
Impulse control disorders	0 (0%)	0 (0%)	n.s.
Adjustment disorders	4 (4.3%)	12 (2.7%)	n.s.
Personality disorders or traits	4 (4.3%)	16 (3.6%)	n.s.
Behavioral disorders	5 (5.3%)	13 (3%)	n.s.
Autism spectrum disorders	0 (0%)	0 (0%)	n.s.
Attention deficit & hyperactivity disorders	0 (0%)	0 (0%)	n.s.
Family suicidal behavior	16 (17.2%)	52 (11.8%)	n.s.

Note. n.s.: non-significant differences between groups according to the chi-square test.

For the overall sample, the most frequently observed family complications were affective disorders ( $n = 172$ , 32.3%), substance use ( $n = 83$ , 15.6%), and family suicidal behavior ( $n = 68$ , 12.8%). When comparing family background between groups, no significant differences were found.

When the factors that showed statistically significant relationships with suicide attempt and re-attempt at 12-months' follow-up were introduced into a binary logistic regression model (stepwise), a statistically significant model was obtained  $\chi^2(3, n = 533) = 34.843$ ;  $p < 0.001$ ; Nagelkerke  $R^2 = 0.105$ , including personal history of non-suicidal self-harm (OR = 2.721,  $p < 0.001$ , 95% CI [1.706, 4.340]) and age (OR = 0.541,  $p = 0.009$ , 95% CI [0.340, 0.860]) (see Table 5). This model correctly classified 82.6% of the sample. Therefore, having a personal history of self-injury and being 14 years old or younger were revealed as predictors of suicide re-attempt during the first year after the adolescent's first admission to emergency services.

**Table 5.** Statistical significant model for binary logistic regression ( $\chi^2(3, n = 533) = 34.843$ ;  $p < 0.001$ ; Nagelkerke  $R^2 = 0.105$ ).

Variables	OR	$p$	CI
Non-suicidal self-harm	2.721	<0.001	95% [1.706, 4.340]
Age	0.541	0.009	95% [0.340, 0.860]

#### 4. Discussion

The rate of suicide re-attempts in our sample with a 12-months' follow-up was around 17%, coinciding with 15–20% of rates on average revealed in similar studies [22]. However, studies with larger follow-ups in which re-attempt was defined as any type of suicidal behavior found rates of around 30–40% [23].

Most research on suicide carried out with adolescent populations has shown that higher rates of suicidal behavior are observed at around 14–15 years of age [24,25]. Age has been repeatedly described as a risk factor for repeated suicide attempts [26]. In this sense, a higher probability of suicide attempt repetition is associated with lower age (usually described as under 15 years old) when the first episode has occurred [26]. In our sample,

despite higher rates of re-attempt in adolescents aged 14 or younger (55.91%), the mean age for re-attempt was 14.54 years old.

Adolescents who have a history of non-suicidal self-harm have a substantially increased risk of adverse non-fatal and fatal outcomes, including suicide, compared with those who do not self-harm [3]. It is important to note that in our study, when performing stepwise analysis, previous suicidal behavior did not appear as a significant predictor of re-attempt, but non-suicidal self-harm did. This probably has to do with the fact that, in most of our sample, individuals with a history of prior attempts were the same as those who had previously inflicted self-harm; as self-harm was more frequent, this might have masked the statistical result of the previous suicidal behavior.

Sex did emerge as a factor related to higher rates of re-attempt. However, it did not emerge as a significant predictor when entered into a stepwise binary logistic regression model. The same is true for other variables, such as comorbidity, mental health diagnosis, previous suicidal behavior, and bullying. A few variables, such as sexual abuse and family history of suicide behavior, did not appear as significant in the preliminary statistics. Although it did not emerge as a statistically significant factor related to suicide re-attempt, another important variable of our study was sex. Our sample was predominantly female, and this distribution is consistent with those found in other studies in which most attempts were carried out by young women [27]. Women attempt suicide three times more than men, but men die by suicide three times more than women, with some exceptions, as the article from Al-Halabi and Fonseca-Pedrero (2021) explains. Despite being one of the significant factors in the comparison between subjects with and without re-attempts, it did not turn out to be statistically significant in the regression; we take it that these differences may be due to the studied relationship between non-suicidal self-harm and female sex, as indicated by the meta-analysis conducted by Bresin and Schoenleber in 2015 in which the chances of non-suicidal self-harm were described as significantly higher among females [28].

Jakobsen and collaborators [29] explained that mental health disorders are strong predictors of suicide re-attempts in adolescents and those with comorbid diagnoses are at higher risk. Comorbidity was not revealed as a statistically significant predictive factor for re-attempt in our research despite this evidence.

Several diagnoses have been associated with suicidal behavior, and depressive symptoms are among the most common. However, anxiety, affective disorders, disruptive behavior, and substance disorders were also important variables for suicide behaviors in adolescents [30]. Concerning predisposing factors among mental health disorders, the only ones that showed significant differences between those who re-attempted and those who did not were personality disorders and maladaptive personality traits. This has been described in other studies, both in adolescent and adult sample populations, and it is accepted by the scientific community, especially regarding borderline personality disorder. It is also supposed to be the case with maladaptive personality traits, although there are no compelling data on these symptoms [31].

As stated in previous research, involvement in bullying as a victim and/or perpetrator in both traditional and electronic contexts is associated with increased suicide risk [32]. In our study, even though it seemed to be significant as a single variable, it did not seem to be relevant when we applied a regression analysis. In future studies, we will control for this variable more carefully to be able to reach better conclusions in the near future. We will also attend more carefully to the association between cyberbullying and suicidal behavior seen in other studies [33,34].

Because many investigations of sexual abuse in childhood relate these traumatic experiences to suicidal behavior [35], we have considered it essential to include this factor in this research. Sexual abuse in childhood is common in all societies; the findings from studies to date suggests that approximately 4% of girls and 2% of boys experience childhood sexual assault each year, with the majority occurring in the teenage years [36], with an average prevalence of around 20% in women and 8% in men. In Spain, the prevalence described is



between 7 and 20% [37], and in our sample, it reaches 5% (lower than the Spanish average), so this may be why this factor is not revealed as significant in our research.

With regard to a familial history of psychopathology, multiple studies have described its relationship to suicidal behavior in the offspring, involving difficulties in adaptability and family cohesion, difficulties in problem-solving, and negative parental relationships as predictors of suicidal behavior [38,39]. Mental health problems and suicidal behavior in close relatives are commonly related and frequently identified as risk factors for suicide attempts and re-attempts in adolescents [39]. These relationships were not found in our research, which leads us to hypothesize that pain, shame, or the underestimation of its relevance could have inhibited relatives from disclosing such information during data collection in emergency care.

#### 4.1. Limitations

A retrospective study design has poor scientific value in comparison with other studies, but it helps us to evidence the need for more studies with adolescents, and to elaborate on more specific projects to properly evaluate the risk factors of suicidal behavior.

Despite the wide and diverse population belonging to our care region, the data of this research came from a single hospital. Therefore, the results cannot be generalized to the general population in other countries and outside our follow-up nucleus. Neither the financial status of the families nor the ethnicity of the subjects was collected in our database, which also makes it difficult to attribute these results to the general population.

Most of the variables were obtained through clinical interviews or from electronic health records, not using instruments, questionnaires, or psychometric measures, so biases could appear in relevant data to our investigation, such as a history of sexual abuse, bullying, or family background. This is a regular procedure in the hospital where the study was carried out to avoid overloading a population that arrives in a delicate moment and state, and for this reason, only these clinical history data are collected. The aim is to improve decision-making with variables that can be extracted in an emergency visit.

Another limitation is the difficulty in carrying out a follow-up with subjects older than 18, including a possible bias in the relationships found between suicide re-attempt and age, although our data do coincide with previous research of a similar nature.

It is also important to note the lack of information from private clinical practices, even though with our national health system there are not many subjects receiving private care.

Other risk data missing are deaths by suicide during this period. In the Catalonia Suicide Risk Code (CSRC), only two male adolescents appear as exitus during the study period, and therefore are not statistically significant for our study.

The over-represented female sex in our sample could be another limitation to consider related to statistical power, despite its similarity to other study samples of similar research in this field.

Lastly, we did not take into account the specific dates of the attempts, which could draw seasonal profiles affecting behavior including suicidal behavior, especially for the female sex as suggested in a study by Tonetti in 2007 [40].

#### 4.2. Strengths

As already mentioned in the introduction, only a few studies have been carried out on the risk factors of re-attempt exclusively based on the adolescent population. This confers a particular value on the present research. However, we still need to delve more deeply into the data and risk factors, evaluating those not identified in this research but usually described in other studies.

Finally, prospective studies are needed and could lend value to our results, as our research was intended to generate new questions to answer, such as the importance of family relationships and family mental pathology in adolescents with suicidal behavior, the impact of bullying on suicide attempts, the relationship between suicidal behavior and new

technologies, and the question of whether treatment therapies for subjects with self-harm also decrease suicidal behavior in these subjects. These are projects for future study.

## 5. Conclusions

Our study traces the characterization and evolution of suicidal behavior and re-attempts in a sample of adolescents, making us aware of the importance of prevention and highlighting two key aspects. The first aspect is the importance of non-suicidal self-harm behavior since it is an easily identifiable indicator of a poor prognosis of subjects with suicidal behavior. We may conclude that as long as self-injurious behavior is present in subjects with suicidal ideation, the risk of a re-attempt is very high. Moreover, this is a clear target on which to focus our efforts for prevention, both in outpatient units with specific treatments, frequent assessments, and group therapies, and in emergency units where we can prioritize a hospital admission or communicate to outpatients' units to manage these situations. This is most likely because the presence of self-harmful behavior as a strategy to cope with the demands of daily life is an indicator of the lack of the adaptive resources of the individual. The second highlighted aspect is that early onset of suicidal behavior, specifically before the age of 14, was identified as a potential predictor of a worse evolution than in late onset, which may be explained by a continuous increase in interpersonal problems, differences in family care, academic and work-related problems, and social demands that adolescents have to face in their transition to adulthood, being important factors to focus on for prevention in adolescents. This knowledge will allow us to design specific individualized and group therapies to work with higher-risk subjects, taking into account these profiles when they go to the emergency room with suicidal behavior. We may even approach prevention by treating specific groups, such as women with a history of non-suicidal self-harm and those with family mental pathology. Finally, we need to have clear risk factors in order to establish elaborate, good prevention programs and to reduce the frequency of suicidal behavior, even suicide deaths, and more studies are required to reach this goal.

**Author Contributions:** F.V.-C., C.C.-T. and X.A.-S. conceptualized and designed this research. M.V.-M. and K.E.-L. collected the data. X.A.-S. and C.C.-T. performed the statistical data analysis. X.A.-S., C.C.-T., F.V.-C. and D.P.-V. wrote and interpreted the results. X.A.-S., C.C.-T. and F.V.-C. drafted the first version of the article. X.A.-S., C.C.-T., D.P.-V. and F.V.-C. critically revised the first version of the article and added important intellectual content. X.A.-S. and F.V.-C. supervised the research. All authors have read and agreed to the published version of the manuscript.

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## **5.2 Second article**

This research aimed to investigate what type of family patterns (specifically attachment, bonding and family functioning) and stressful life events can trigger or protect adolescents from developing suicidal behavior, showing the importance of care provide by family and the environment, to avoid suicidal behavior in adolescents, and showing the importance of protection and prevention of negligent and authoritarian behavior by family members, harassment by fellow students, and/or childhood traumas.

The full publish manuscript is presented below.



Article

# Family Factors Related to Suicidal Behavior in Adolescents

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**Abstract:** Objective: This research aims to investigate what type of family patterns (specifically attachment, bonding and family functioning) and stressful life events can trigger or protect adolescents from developing suicidal behavior. Methods: For these purposes, a case-control study (adolescents with suicidal behavior vs. paired adolescents with no suicidal behavior) was conducted with one hundred 12 to 17-year-old adolescents (50 controls, 50 cases, 74% females), assessed between 2018 and 2020. Results: Negligent ( $p < 0.001$ ) or affection-less control bonding ( $p < 0.001$ ), insecure attachment ( $p = 0.001$ ) and stressful life events ( $p < 0.001$ ) revealed to be significant risk factors for suicidal behavior. On the contrary, parents' care ( $p < 0.001$ ) and security ( $p < 0.001$ ) were revealed as protective factors for suicidal behavior. Conclusions: Considering these results, family interventions and improving coping skills seem to be two essential targets for any suicide prevention intervention in adolescents.

**Keywords:** suicidal behavior; adolescent; family factors; stressful life events; suicide prevention



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## 1. Introduction

Worldwide, suicide was the fourth cause of death among 15 to 29-year-olds in 2019, after road injury, tuberculosis, and interpersonal violence [1]. Empirical evidence establishes a few commonly accepted risk factors for suicidal behavior in this age group that can be divided into (1) social factors (i.e., suicidal behavior in the community, media influence, availability of health resources and professional support); (2) individual factors (i.e., psycho-emotional problems, transition and challenges in puberty, religious beliefs, stress management strategies, affective relationships, education); and (3) family factors (i.e., family relationships and bounds, socio-economic status, security, and health conditions) [2].

A significant corpus of research exists on individual factors [3–5]. However, more empirical evidence regarding family factors is needed to better understand how these variables might modulate suicidal behavior in adolescents, since family is the immediate social environment in which adolescents grow up. So far, several studies have shown evidence of an increase in the number of suicide attempts in adolescents that have a family history of suicide attempts or completed suicide [6,7]. Additionally, having a low socioeconomic status and having dysfunctional family patterns (e.g., having serious conflicts with the family, or serious family mental health problems) have been pointed out



as risk factors for attempting suicide [8–10]. Despite this preliminary evidence, it is still necessary to further study other family-related factors such as attachment style, parental bonding, and family functioning patterns that might influence the risk of suicidal behavior among adolescents.

The early parent–child relationship has been associated with numerous aspects of behavior and development. An estimation of these early relationships in adults can be very useful; this may inform diagnostic and therapeutic interventions, whereas in psychological research, it can contribute to a more precise understanding of the role of the early environment in the etiology of psychopathology [11]. Empirical evidence shows that parental bonding has an important role in developing psychopathology during adolescence and young adulthood [12,13]. It has been shown that low parental concern or less care are related to a greater number of suicide attempts in adolescents with mental health problems [14], showing the importance of positive parenting. Authoritarian and neglect/rejection profiles have also been related to an increase in suicide attempts [15], and evidence of the Affectionless Control model's influence on adolescents' suicidal behavior is increasing [16–18]. However, more studies are needed to clarify these influences.

Attachment theory postulates that early care experiences are internalized as inner functional models that guide individuals at the relational level [19]. That is to say, attachment styles are always the result of the interaction between the person's innate attachment style and the history of experiences with parents and caregivers in relation to attachment [20]. The first classification of attachment styles distinguished between secure, insecure-ambivalent, and insecure-avoidant attachment [21]. Secure attachment is produced when the caretakers demonstrate physical and emotional warmth, trust, and availability. It has been described how children with insecure-avoidant attachment develop self-sufficiency and a preference for emotional distancing from others [22].

Several researchers have established a direct relationship between insecure attachment and a higher risk for suicidal behavior among adolescents [23,24]. Main explanations for this association have pointed out the additive effects of higher self-criticism and dependency among adolescents showing this specific family pattern. However, specific mechanisms of such relationships are still unclear [25]. Other research has found no direct relationship between attachment style and suicidal behavior [26], suggesting that the relationship between these two factors is mediated by other variables, like social information processing that can mediate in personality traits as behavioral patterns and impulsivity [27,28]. In this sense, Falgares and colleagues also found that self-criticism and dependence mediated between an anxious/ambivalent attachment style and suicidal behavior; however, in the denial/avoidance attachment style, only self-criticism was found to be a mediating factor [29]. On the other hand, Zisk and colleagues found that, concerning attachment, negative expectations from caregivers mediated suicidal behavior and insecurity [30]. Similarly, having a family background of mental health problems has been systematically related to a higher risk of suicide in adolescents. Still, again, specific mechanisms leading to these behaviors have proved difficult to study [31].

Although there is some consensus regarding the relationship between insecure attachment and suicidal behavior in the adolescent population, there is little knowledge about the association between them. By identifying these processes, relevant conclusions could be obtained to improve treatment options, including treatment planning and family work, to help patients with high suicide risk [32–35].

Other family models are based on the Circumplex Model of Family System, which relates to the family's cohesion and adaptability [36,37]. This model proposes that a balanced level of both cohesion and adaptability is the most functional family development [37]. Some studies relate these unbalanced family functional models to mental health problems [38–41], but few have provided empirical data related to suicidal behavior [42]. It is important to further study the relationship between family function and suicidal behavior in adolescents to improve family interventions and suicide prevention.

Finally, it is also imperative to consider research on stressful life events (SLE). SLE increase suicidal tendencies in adolescents due to increased psychological distress and fatigue from the social support they receive, requiring an emphasis on support programs and stress management as a method of preventing suicide, and more studies to determine which SLE have more risk are necessary [43]. Some studies show three SLE categories as being more frequent in adolescents with suicidal behavior: family conflicts, academic stressors, and trauma. Related to family conflicts, the most important are stress related to parents, lack of adult support outside of the home, physical harm by a parent, running away from home, living apart from both parents, and other family situations associated with risk for suicidality (i.e., parental suicidal behavior, early death, mental illness in a relative, unemployment, low income, neglect, parental divorce, other parent loss, and family violence). As an important life event in adolescence, academic stressors also mediate suicide behavior [44]. Trauma, bullying, and childhood sexual abuse are the most important SLE. Still, there are also other very commonly described stressful circumstances that may precede suicidal behavior, such as peer conflict, legal problems, physical abuse, worries about sexual orientation, romantic breakup, and exposure to suicide or suicide attempts [3].

Considering all this evidence, the main goal of this research is to investigate what type of family patterns—specifically, attachment, bonding, and family functioning—and stressful life events—specifically, bullying, cyberbullying, and others—can trigger or protect adolescents from developing suicidal behavior. We hypothesized that negligent and authoritarian parenting, insecure attachment, decompensated family functioning, and stressful life events are risk factors for suicide behaviors in adolescents, while optimal bonding, secure attachment, and compensated family functioning are protective factors for suicide behavior in adolescents. To investigate this further would help to design more accurate preventive interventions considering families and main caregivers of this sample population.

## 2. Methods

### 2.1. Participants

This is a case-control study of one hundred 12 to 17-year-old adolescents (50 controls and 50 cases) recruited over a period of two years (2018–2020). The clinical sample was recruited from a Psychiatric Inpatient Unit of the Hospital Sant Joan de Déu after patients were admitted because of suicidal behavior (this includes: suicide ideation, suicide planning, or suicide attempt) [45]. The clinical sample was compared to a convenience sample of controls recruited from schools and recreational associations of the same area of influence of our hospital, to reduce bias and to homogenize the sample in terms of socio-economic and environmental characteristics.

Inclusion criteria for the clinical sample were: (1) patients from 12 to 17 years of age, (2) patients admitted to a psychiatric inpatient unit due to suicidal behavior, (3) agreeing to participate in the study. The exclusion criteria were (1) subjects of legal age ( $\geq 18$  years) or under 12 years of age, (2) patients with cognitive or other neuropsychological deficits that could hinder the clinical assessment and/or the understanding of the concept of death, (3) subjects denying suicide intentionality for the behavior (self-harm, intoxication, or other similar behaviors with anxiolytic, playful, or other non-suicidal intention), and (4) not living with the family or being institutionalized at the time of the study.

Inclusion criteria for the control sample were: (1) adolescents from 12 to 17 years of age, both included, (2) living in the same area of influence of the clinical sample, and (3) agreeing to participate in the study. The exclusion criteria were: (1) adolescents not living with the family or being institutionalized at the time of the study and (2) families who have other children with present or past suicidal behavior.

### 2.2. Instruments

Data collection was gathered by a mental health professional (psychologist or psychiatrist) through a semi-structured interview and the administration of different questionnaires (self-administered) providing general information and instructions on how to fulfill them.



All cases and their parents were assessed in the inpatient unit (same room, but independent assessments). In the case of the control sample and their parents, the assessments were carried out independently in meeting rooms of different associations, or they were given the questionnaires to be filled out at home and collected once fulfilled at a later appointment.

The clinical assessment for the whole sample included:

- Socio-demographic data: gender, age, and self-perceived socio-economic status based on the Hollingshead and Redlich scale [46] were collected by means of a semi-structured interview for parents and adolescents.
- Past clinical history of medical and mental health problems (patient's symptoms, illnesses, conditions, developmental problems, and other significant life events) and mental health diagnosis (based on DSM-V diagnosis) from both adolescents and their family were collected by means of a semi-structured interview.
- The Columbia-Suicide Severity Rating Scale (C-SSRS) [47] on its Spanish validation by Al-Halabi et al. [48] was administered. The C-SSRS is a semi-structured interview containing six items, including the presence, severity, and frequency of suicidal behavior during the evaluation period, for adolescents.

The adolescent self-reported questionnaires included:

- The European Bullying Intervention Project Questionnaire (EBIP-Q) [49] on its Spanish validation by Ortega, del Rey and Casas [50]. The EBIP-Q is a 14-item questionnaire that assesses bullying in high school students: seven items describe the aspects related to victimization and seven items related to aggression, with three dimensions: victim, victimized-aggressor, and aggressor.
- The European Cyberbullying Intervention Project Questionnaire (ECIP-Q) [51] on its Spanish validation by Ortega, del Rey and Casas [50]. The ECIP-Q is a 22-item questionnaire assessing cyberbullying in high school students with three dimensions: cyber-victimization, cyber-victimized-aggressor and cyber-aggression.
- The CaMir-R [52] measures attachment and representations of affection and the conception of family functioning in adolescence and early adulthood. The questionnaire consists of 32 items that evaluate three different attachment styles: secure, insecure-ambivalent, and insecure-avoidant.
- The Parental Bonding Instrument (PBI) [53] by Gómez-Beneyto et al. [54] assesses two components of the parent-child relationship: (1) demonstrations of care (by the parent) and (2) parental overprotection. Optimal bonding is thought to be characterized by high levels of caring and low levels of overprotection. Through its 25 items, we can evaluate four family models: optimal, affectionate-constraint, affectionless-control, and neglectful.
- The Family Adaptability and Cohesion Evaluation Scale (FACES III) [55] on its Spanish Translation and validation of the FACES p20 version by Martínez-Pampliega, Iraurgi, Galindez, and Sanz [56]. It is a 20-item scale that informs about the degree of cohesion and flexibility within the family system perceived by the adolescent within the Olson Circumplex Model framework. The FACES III evaluate 16 types of family functioning specified in three subgroups: compensated family functioning, decompensated family functioning, and very decompensated family functioning.
- The Stress Life Events Scale (SLES) [57], adolescent version, adapted and validated into Spanish by Rivera y Revuelta and Fumero [58]. The SLES evaluates the stressful life events of the participants through 43 items corresponding to 43 different life events.
- The Child Behavior Check-List (CBCL) [59]; adapted and validated into Spanish by Sardinero, Pedreira, and Muñiz [60]. The CBCL evaluates emotional and behavioral problems in children and adolescents (6–18 years of age), providing ratings for 20 competence and 120 problem items.

The parents' self-reported questionnaires included:

- The Parental Bonding Instrument (PBI) [53], validated in Spanish by Gómez-Beneyto et al. [54]. The PBI assesses two components of the parent-child relationship:

demonstrations of caring (by the parent) and parental overprotection. Optimal bonding is characterized by high levels of caring and low levels of overprotection. Through their 25 items, it is possible to evaluate four family models: optimal, affectionate-constraint, affectionless-control, and neglectful.

- The Family Adaptability and Cohesion Evaluation Scale (FACES III) [55] validated in a Spanish population by Polaino-Lorente and Martínez-Cano [61]. It is a 40-item scale that informs about the degree of cohesion and flexibility of the family system perceived by the parent within the framework of the Olson Circumplex Model. The FACES III evaluate 16 types of family functioning specified in three subgroups: compensated family functioning, decompensated family functioning, and very decompensated family functioning.
- The Stress Life Events Scale (SLES) [57] parents' version adapted and validated into the Spanish version by Rivera y Revuelta and Fumero [58]. The SLES evaluates the stressful life events of the participants through 43 items corresponding to 43 different life events, giving information on the number of traumatic events for parents and adolescents and the interference of the events for parents and adolescents.
- The Child Behavior Check-List (CBCL) [59] adapted and validated into Spanish by Sardinero, Pedreira, and Muñiz [60]. The CBCL evaluates emotional and behavioral problems in children and adolescents, providing ratings for 20 competence and 120 problem items, giving information for three dimensions: internalizing, externalizing, and total problems.

Suicidal behavior in our study is considered as per Al-Halabí et al. 2021 [62], suggesting that suicidal behavior comprises a set of thoughts and behaviors with suicide intention, and suicide attempts as engaging in potentially self-destructive behavior in which there is at least some intention to die as a result of the behavior. This conceptualization differs from the non-suicidal self-injuries in which the final intention has nothing to do with death.

### 2.3. Procedure

Data collection and coding for the clinical sample occurred between May 2018 and May 2020 and were performed by clinical psychologists and psychiatrists during the patient's hospital admission to the mental health inpatient service of Hospital Sant Joan de Déu. Data collection and coding for the control sample were carried out in different schools and recreational institutions during the same period. Clinical psychologists and psychiatrists assessed both samples in a 2-h session with the adolescents and their parents. All participants (parents and adolescents) gave their written consent after receiving the information regarding the study, its objectives, and the agreement of confidentiality and protection of personal data. Participation in the study was not remunerated.

### 2.4. Ethical Aspects

The study complies with the internal regulations of the Hospital Ethics and Research Committee of Hospital Sant Joan de Déu and has its approval (with the internal code PIC-158-18) as well as that of the World Medical Association and the Declaration of Helsinki of 1995 [63] with its successive amendments. Since no additional measures were collected or any other invasive procedures were performed on patients, no additional informed consents were required rather than the standard one provided during the hospital admission stay in the hospital or their school/recreational affiliations. All participants (parents and adolescents) gave their written consent after receiving the information regarding the study, its objectives, and the agreement of confidentiality and protection of personal data. Participation in the study was not remunerated.

### 2.5. Data Analyses

The data were analyzed with the IBM SPSS statistics version 25. Descriptive statistics of all variables were performed. Paired controls by sex and age were performed between case and control samples. Descriptive statistics and frequency distribution analyses of all variables

considered in the present study were calculated. Differences between the groups were analyzed with the Student's t-test and one-way variance analysis (ANOVA) for independent samples (for quantitative variables) or a chi-squared test (or the Fisher's exact test, when no application criteria were met for the chi-squared), calculated from  $2 \times 2$  contingency tables (for categorical variables). Cohen's d was calculated to analyze size effects. The significance of all tests was set at a probability level of 5% or less, with a 95% confidence interval and a high effect size (d greater than or equal to 0.8, Eta value where appropriate), always indicating the exact value offered by the statistical package SPSS.

### 3. Results

#### 3.1. Sample Description

Data from 100 participants (74% females  $n = 74$ ; age  $M \pm S.d. = 15.01 \pm 1.54$ ) were collected during two years. The sample consists of 50 controls (females:  $n = 34$ , 68%; age  $M \pm S.d. = 14.80 \pm 1.73$ ) and 50 cases (females:  $n = 40$ , 80%; age  $M \pm S.d. = 15.22 \pm 1.31$ ).

There is no significant difference in age ( $t_{7,497} = 1.369$ ,  $p = 0.174$ ,  $CI\ 95\% -0.189-1.029$ ) (cases =  $15.22 \pm 1.31$  vs. controls  $14.80 \pm 1.73$ ) or gender between groups, despite a higher percentage of females (80%) in the case group ( $\chi^2 = 1.871$ ,  $df = 1$ ,  $p = 0.171$ ,  $Eta = 0.137$ ).

Other clinical characteristics of the studied sample are summarized in Table 1.

**Table 1.** Clinical characteristics of the sample ( $N = 100$ ).

		Cases (%) ( <i>n</i> )	Controls (%) ( <i>n</i> )
Suicidal behavior	Suicide thoughts	34% (17)	0 (0)
	Self-destructive behavior	8% (4)	0 (0)
	Suicide attempt	54% (27)	0 (0)
	Previous suicidal behavior	36% (18)	0 (0)
Family demography	Single parents	16% (8)	12% (6)
	Original family with both parents	48% (24)	50% (25)
	Divorced parents living with both	12% (6)	26% (13)
	Other types of family	24% (12)	12% (6)
Family studies	Low	32% (16)	32% (16)
	Medium	46% (23)	24% (12)
	High	22% (11)	44% (22)
Professional situation	Housewives/husbands	8% (4)	0 (0)
	Active workers	80% (40)	84% (42)
	Retired	0 (0)	8% (4)
	Unemployed	12% (6)	8% (4)
Skilled employment done	Low	34% (17)	22% (11)
	Medium	34% (17)	28% (14)
	High	32% (16)	50% (25)
Repeated course	Yes	28% (14)	10% (5)
	No	72% (36)	90% (45)
Number of repeated courses	0	72% (36)	90% (45)
	1	24% (12)	10% (5)
	2	4% (2)	0 (0)
Clinical data	Previous mental health diagnosis	100% (50)	0 (0)
	Comorbid diagnosis	36% (18)	0 (0)
	Family background of mental health diagnosis	66% (33)	0 (0)
	Family history of suicide behaviors	16% (8)	0 (0)

Concerning academic performance, adolescents from the case group tend to repeat, more frequently, an academic year ( $\chi^2 = 5.263, df = 1, p = 0.022, Eta = 0.229$ ). In this sense, the number of repeated academic years differs significantly between groups ( $t_{27,004} = 2.474, p = 0.016, CI\ 95\% 0.043-0.397$ ), with cases repeating more times than controls a mean of  $0.32 \pm 0.55$  academic years and controls  $0.1 \pm 0.30$ .

### 3.2. Family Relationship Differences between Cases and Controls

Table 2 Displays bonding and attachment characteristics of the studied sample according to each group (cases vs. controls).

**Table 2.** Comparison of the family relationship variables (attachment, parental bonding, and family functioning) between cases and controls ( $n$  cases = 50,  $n$  controls = 50).

Test	Sub-Sample	Median	S.d.	S.e.	Cohen's d	t	df	p Value (Bilateral)	95% Confidence Interval of the Difference	
									Inferior	Superior
PBI parents care	Case	26.34	6.73	0.95	0.94	−4.69	98	<0.001	−7.57	−3.07
	Control	31.66	4.36	0.62						
PBI overprotection parents	Case	11.34	4.79	0.67	0.94	−4.69	98	<0.001	−7.57	−3.07
	Control	9.70	3.05	0.43						
PBI adolescent care	Case	21.40	8.36	1.18	1.26	−6.28	87.68	<0.001	−11.93	−6.19
	Control	30.46	5.85	0.83						
CamiR Security	Case	33–90	18.00	2.55	1.04	−5.20	98	<0.001	−20.80	−9.31
	Control	48.96	9.75	1.38						
CamiR Family Concern	Case	53.35	11.78	1.67	0.67	3.33	98	0.001	2.64	10.45
	Control	46.80	7.39	1–05						
CamiR Parental interference	Case	58.07	12.80	1.81	0.65	3.27	82.07	0.002	2.73	11.21
	Control	51.10	7.97	1.13						
CamiR Self-sufficiency and resentment towards parents	Case	66.51	9.05	1.28	2.38	11.92	98	<0.001	17.59	24.62
	Control	45.40	8.65	1.22						
Camir Childhood trauma	Case	84.08	90.84	12.85	0.47	2.66	50.27	0.011	8.38	60.32
	Control	49.73	10.34	1.46						
Cohesion FACESp20	Case	27.82	9.70	1.37	1.11	−5.57	98	<0.001	−13.24	−6.28
	Control	37.58	7.71	1.09						

S.d.: Standard deviation. S.e.: Standard error mean.

Concerning attachment styles (CaMir), significant differences were observed between groups, with a higher prevalence of insecure-avoidant attachment style in cases (58%) compared to controls ( $\chi^2 = 14.760, df = 2, p = 0.001, Eta = 0.384$ ). Security revealed to be a protective factor for suicide behavior ( $p < 0.001, Cohen's d = 1.04$  large size effect), while the following variables were identified as risk factors: Family concern ( $p = 0.001, Cohen's d = 0.67$  medium-size effect), Parental interference ( $p = 0.002, Cohen's d = 0.65$  medium-size effect), Self-sufficiency and resentment towards parents ( $p < 0.001, Cohen's d = 2.38$  large size effect), and Childhood trauma ( $p = 0.011, Cohen's d = 0.47$  medium-size effect). There were not significant differences between groups concerning authority or parental permissivity dimensions of the CamiR.

Parental bonding (PBI) provides different profiles with significant differences between adolescents and parents in the clinical group. When analyzing the adolescent self-reported results, affectionless-control parents (42%) were associated with suicidal behavior ( $\chi^2 = 21.940, df = 3, p < 0.001, Eta = 0.468$ ), therefore, appearing as a risk factor. Similarly, when analyzing the parents' responses to the PBI, negligent parents (38%) appeared also as risk factors since this profile was significantly related to suicidal behavior in adolescents ( $\chi^2 = 22.054, df = 3, p < 0.001, Eta = 0.470$ ). On the other hand, and as expected, both parents' and adolescents' responses to the PBI coincided to point out optimal parenting as a clear protective factor for suicidal behavior. Other protective factors were

care assessed by parents ( $p < 0.001$ , *Cohen's d* = 0.94 large size effect) and care assessed by adolescents ( $p < 0.001$ , *Cohen's d* = 1.26 large size effect). Additionally, overprotection assessed by parents ( $p < 0.001$ , *Cohen's d* = 0.94 large size effect) became a protection factor for suicide behaviors. There were no significant differences between cases and controls in overprotection observed by adolescents from the PBI.

Finally, results from the FACES III showed that compensated family functioning (54%) is considered a protective factor for suicidal behavior ( $\chi^2 = 7.162$ ,  $df = 2$ ,  $p = 0.028$ , *Eta* = 0.268). There were not significant differences in cohesion and adaptability between cases and controls evaluated by parents with the FACES III. The functioning assessed by the FACESp20 shows Cohesion in the family as a protective factor ( $p < 0.001$ ).

### 3.3. Comparison between Cases and Controls of the Traumatic Events Variables of the Assessment

Table 3 Displays the significant differences concerning traumatic life events between groups (cases vs. controls).

**Table 3.** Comparison of traumatic events (SLES, Bullying, and Cyberbullying) between cases and controls ( $n$  cases = 50,  $n$  controls = 50).

Test	Case Control	Median	S.d.	S.e.	Cohen's d	t	df	p Value (Bilateral)	95% Confidence Interval of the Difference	
									Inferior	Superior
Number of events SLES adolescents	Case	28.78	18.03	2.55	1.73	8.63	56.61	<0.001	17.54	28.14
	Control	5.94	5.04	0.71						
Interference SLES adolescents	Case	68.46	38.21	5.40	2.12	10.60	54.23	<0.001	47.63	69.85
	Control	9.72	8.76	1.24						
Number of events SLES parents	Case	21.44	18.35	2.60	1.20	6.01	54.86	<0.001	10.70	21.42
	Control	5.38	4.49	0.64						
Interference SLES parents	Case	45.42	31.94	4.52	1.54	7.68	56.21	<0.001	26.58	45.34
	Control	9.46	8.69	1.23						
EBIP-Q Victimization Bullying	Case	8.44	7.51	1.06	1.45	7.25	51.61	<0.001	5.64	9.96
	Control	0.64	1.23	0.17						
EBIP-Q Aggression Bullying	Case	2.36	2.99	0.42	1.04	5.22	50.35	<0.001	1.37	3.08
	Control	0.14	0.35	0.05						
EBIP-Q Victimization Cyberbullying	Case	4.76	5.92	0.84	0.98	4.91	51.17	<0.001	2.06	7.36
	Control	0.60	0.88	0.13						
EBIP-Q Aggression Cyberbullying	Case	1.94	3.35	0.47	0.66	3.29	51.40	0.002	0.62	2.54
	Control	0.36	0.53	0.07						

S.d.: Standard deviation. S.e.: Standard error mean.

Bullying (EBIP-Q) is considered a risk factor for suicidal behavior. In our study, we found that victimization-bullying ( $p < 0.001$ , *Cohen's d* = 1.45 large size effect) and aggression-bullying ( $p < 0.001$ , *Cohen's d* = 1.04 large size effect) were risk factors for suicide behaviors in the comparison between cases and controls.

Similarly, being a cybervictim (ECIP-Q) appeared to be a suicidal behavior risk factor, with significant differences between cases and controls in victimization-cyberbullying ( $p < 0.001$ , *Cohen's d* = 0.98 large size effect) and aggression-cyberbullying ( $p = 0.002$ , *Cohen's d* = 0.66 medium-size effect).

Other risk factors for suicide behavior were the total number of stressful live events (SLEs) reported by the adolescents ( $p < 0.001$ , *Cohen's d* = 1.73 large size effect) and their parents ( $p < 0.001$ , *Cohen's d* = 1.20 large size effect), and the interference of the SLEs responded by adolescents ( $p < 0.001$ , *Cohen's d* = 2.12 large size effect), and by their parents ( $p < 0.001$ , *Cohen's d* = 1.54 large size effect).

### 3.4. Comparison between Cases and Controls of the Mental Health Problems Variables of the Assessment

Table 4 shows the significant differences in the CBCL between groups. As it can be observed, Internalizing problems ( $p < 0.001$ , *Cohen's d* = 4.25 large size effect), Externalizing problems ( $p < 0.001$ , *Cohen's d* = 3.49 large size effect), and Total problems ( $p < 0.001$ , *Cohen's d* = 3.97 large size effect) were higher in the cases group.

**Table 4.** Comparison of mental health problems (CBCL) between cases and controls ( $n$  cases = 50,  $n$  controls = 50).

Test	Case Control	Median	S.d.	S.e.	Cohen's d	t	df	Sig. (Bilateral)	95% Confidence Interval of the Difference	
									Inferior	Superior
CBCL Internalizing	Case	85.12	28.21	3.99	4.25	21.24	98	<0.001	76.86	92.70
	Control	0.34	0.82	0.12						
CBCL Externalizing	Case	77.34	31.25	4.42	3.49	17.44	98	<0.001	68.31	85.85
	Control	0.26	0.85	0.12						
CBCL Total	Case	77.70	27.05	3.83	3.97	19.85	98	<0.001	68.58	83.82
	Control	1.5	2.24	0.32						

S.d.: Standard deviation. S.e.: Standard error mean.

## 4. Discussion

The general aim of this research was to analyze the association between family relationship variables and the occurrence of stressful life events to suicide behavior in adolescents.

Overall, the clinical sample of the present study was similar to other studies in terms of age and gender, showing a higher percentage of females and mean age around 14–15 years old [64,65]. Concerning suicidal behavior, it was observed that 36% of the studied sample repeated the attempt, revealing higher rates compared to similar studies in this field with this specific population sample, which is around 18–20% [45,66,67]. These differences could be explained due to different inclusion/exclusion criteria and the recruitment strategy. In this sense, the present research invited adolescents from an inpatient unit in a tertiary hospital, during the first hours after being hospitalized due to the risk of repetition or the medical consequences after the first attempt. Therefore, it can be inferred that this is a very vulnerable population with very specific clinical characteristics. In our sample, academic performance was also related to suicidal behavior as in other studies [68,69], both showing school failure by repeating a course, and the fact that the greater the number of repeated courses, the greater the risk of repeating the suicide attempt. This could be explained by the stress that might involve repeating a course that could cause a certain sense of failure, low self-esteem and could also trigger new stressful situations like meeting new classmates or being older than the rest of the new classmates [70]. In this sense, the study of McBee-Strayer and colleagues explained that old-for-grade students were also more likely to report a suicide attempt with increased suicidal ideation and planning, suggesting that common risk factors for suicide repetition seem to be anxiety, substance use, depression symptoms, and others [71].

When focusing on attachment and family-related variables explored in this research, a significant difference with the insecure-avoidant attachment style was found, with higher prevalence observed in the clinical sample of adolescents, in line with previous research [72]. This is evidence of the needed confidence between parents and adolescents shown in other studies of the literature [73,74]. Similarly, secure attachment (assessed by means of the CamiR) was revealed as a protective factor for suicide. This was also found in the study by McLaughlin and colleagues, which showed that a greater secure attachment predicted lower rates of internalizing disorders in both genders [75], from which we can infer that this would reduce suicidal behavior, as internalizing disorders are a risk factor for suicidal behavior [76,77]. Additionally, childhood trauma appears repeatedly as a risk



factor in different studies of suicide behaviors in adolescents [78,79] and can be related to the stressful life events as observed in the present research.

In regard with the parental bonding variables, a relationship between negligent and affection-less parenting and suicidal behavior was found, as previously shown in the literature [15,17]. In this sense, the variable care expressed by parents and adolescents, and the overprotection assessed by parents, are considered as a protective factor for suicide. Previous studies have found that low family care [80], and living in dysfunctional households [81] are risk factors for suicide behaviors, while an increased ability to care as an element that could reduce the number of suicides behaviors [82].

When focusing on family functioning variables and their association with suicidal behavior, a positive relationship between compensated family functioning (as in the Circumplex Model) and controls was found. Previous scientific literature has already pointed out that having a decompensated family functioning is a risk factor for suicidal behavior [83]. Some research has also found that families with adaptability problems are at higher risk of suicidal behaviors [83]. On the contrary, higher cohesion in the family is a protective factor for depressive symptoms in adolescents [84] and this has served as a basis for research studying family cohesion as a protective factor for suicidal behavior in young people [85]. However, more studies are still required in this field to deepen these associations.

When focusing on stressful life events, a significant relationship between past trauma events and suicidal behavior, and between bullying and cyberbullying with suicidal behaviors, was found in the present research. This is in line with most research in this field, pointing out this clear relationship between different forms of bullying and suicidal behavior [86]. In our sample, there is a significant relationship between the group of cases and the victimized aggressors, which is in line with previous studies that portray the victims-aggressive young people as being more maladjusted than their peers in terms of their social and emotional functioning [87]. Additionally, concerning cyberbullying, a significant relationship between cyber victims and cases was identified, as stressed out in previous studies, which strongly relates them to suicidal behaviors [88,89]. We can also find similar results regarding bullying and cyberbullying in the quantitative items, having positive results for victimization and aggression as risk factors for suicidal behavior in adolescents, as shown in previous studies, like the one by Hinduja and Patchin in 2010 in which both factors, aggression and victimization, are more likely to trigger suicidal thoughts and suicide attempts [90]. On the other hand, the accumulation of different stressful life events (not only bullying in its different forms) has also been revealed as a risk predictor of suicidal behavior (the higher the number of stressful life events, the higher the risk of having suicide behaviors), and also it happens with the affectation caused by this stressful life events (the higher affectation, the higher risk of having suicide behaviors). This has been reported in previous theoretical and research studies about suicide in adolescents. For example, Yildiz reported that stressful life events increase suicidality in adolescents, partly by increasing psychological distress and eroding perceived social support, giving some valuable clues to some possible preventive strategies [43].

Finally, our study found a significant relationship between mental health problems (internalizing, externalizing, and total symptoms) and suicide behavior. Specifically, several diagnoses have been associated with suicidal behavior. Depressive symptoms are most common, but also anxiety, affective disorders, disruptive behavior, and substance disorders were important variables for suicide behaviors in adolescents [91].

It is important to note that this research is not exempt from limitations. First, the clinical sample (cases) was recruited from a unique center and, therefore, results cannot be generalized to other clinical samples from different settings and/or even countries or outside our influence area. However, it is true that the hospital from which the sample was recruited is a reference center in our country for mental health problems in children and adolescents. It is also important to note that the evaluation of cases and their parents is done during the inpatient hospital stay, so the situation can generate a bias in the answers, although all the evaluations were administered when the patient and the family had

overcome the first moment of acute crisis, being the time of evaluation closer to discharge than to admission, once the intervention, and the patient's own evolution, allowed it. In addition, being a study with a relatively small sample, there is focus on a proper description and characterization of the two samples, rather than conducting complex statistical analyses, believing that the strong point of this research is to compare not only a sample of adolescents with their peers, but also that of their parents. Despite this, studies with a larger sample size are required to be able to carry out more complex predictive statistical models, and continue to provide knowledge in this relevant field of research.

We also believe this study has some strength. This is a case-control study and the assessment of suicidal behavior in adolescents in our area has been scarce so far. It is also important to note that family factors in suicidal behavior in adolescents have been little studied.

Considering main results, it can be concluded that insecure attachment and rigid or negligent relationships between parents and their offspring, bullying and cyberbullying, and stressful life events are clear and significant risk factors for suicidal behavior in adolescents, whereas having a good family functioning with care, security, and flexibility have been revealed as key protective factors. In regards to stressful life events, we think this is a serious matter as we not only observe higher rates of stressful life events in cases but also family relational patterns with less capacity for containment, such as a higher prevalence of an insecure-avoidant attachment style, in addition to unbalanced family functions, with the parent-child relationship being more neglectful and less affectionate. These situations make adolescents even more vulnerable both to their peers and the environment. This, in addition to lack of family support, seems to be sufficient elements that can explain the poor prognosis of these cases, with such high levels of relapse.

Clinical implications of this research are multiple. First of all, the importance of helping improve socio-emotional skills becomes evident in assisting adolescents in facing bullying and cyberbullying situations, which unfortunately have appeared quite common in this age range, and this is applicable not only from the victims but also from their peers. In the same way, there is a clear need to incorporate a family approach to the treatment of adolescents with suicidal behavior, since our research has found out that there are relationship models that might play a protective function. Family-based therapies have great potential to prevent suicidal behaviors in adolescents [92]. For this reason, more research is needed to address the relevance of family interventions in this population, improving knowledge about family-related risk and protective factors, and facilitating family treatments to address suicidal behaviors.

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**Data Availability Statement:** The data that support the findings of this study are available from the corresponding author upon reasonable request.

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## VI. GENERAL DISCUSSION

As we can see in both articles, the need to clarify and prevent risk factors for suicide behaviors in adolescents is paramount.

In the first article, we focus on describing the prevalence and characteristics of suicide re-attempts and their associated risk factors in an adolescent population sample. The rate of suicide behavior re-attempt in our sample with a 12-month' follow-up was around 17%, coinciding with 15-18% rates on average revealed in similar adolescent studies in the USA and Europe (Bridge et al., 2014; Giraud et al., 2013). However, research with larger follow-ups and studies in which re-attempt was defined as any type of suicidal behavior found significantly higher rates of re-attempt, around 30-40% (Giraud et al., 2013; Hayashi et al., 2012).

As the main result of our investigation, young age is an important variable for re-attempt suicide, finding that suicide in adolescent populations has shown that higher rates of suicidal behaviors are observed at around 14-15 years of age (Borschmann et al., 2018; Paschall & Bersamin, 2018). Age has been repeatedly described as a risk factor for repeated suicide attempts (Rahman et al., 2021a). In this sense, a higher probability of suicide repetition is associated with lower age (usually described as under 15 years old) when the first episode is shown (Rahman et al., 2021b). In our sample, despite higher rates of re-attempt in adolescents aged 14 or younger (55.91%), the mean age for re-attempt was 14.54 years old.

Another important variable to evaluate as a risk factor in repeated suicide behaviors is self-harm. Young people with non-suicidal self-harm substantially increased the risk of adverse non-fatal and fatal outcomes, including suicide, compared with those who do not self-harm (Borschmann & Kinner, 2019) being more important in the female gender, where the chances of non-suicidal self-harm were described as significantly higher (Bresin & Schoenleber, 2015).

Gender did emerge as a factor related to higher rates of re-attempt in our research. Our sample was predominantly female, and this distribution is consistent with that found in other studies in which most attempts are carried out by young women (Dávila Cervantes & Luna Contreras, 2019). Women attempt suicide three times more than men, but men die by suicide three times more than women, this phenomenon has been conceptualized as the gender paradox (Canetto & Sakinofsky, 1998), with some exceptions, as the article of Al-Halabi & Fonseca-Pedrero (2021) explains (Al-Halabí & Fonseca-Pedrero, 2021). These differences may be due to the studied relationship between non-suicidal self-harm and female sex, as indicated by the meta-analysis conducted by Bresin and Schoenleber in 2015, where the chances of non-suicidal self-harm were described as significantly higher among females (Bresin & Schoenleber, 2015).

Related to comorbidity, Jakobsen and collaborators (Jakobsen et al., 2011) explained that mental health disorders are strong predictors of suicide re-attempts in young people and those with comorbid diagnoses are at higher risk. But any mental health diagnosis itself could be associated with suicidal behavior, being depressive symptoms are among the most common. However, anxiety, affective disorders, disruptive behavior, and substance disorders were also essential variables for suicide behaviors in adolescents (Díez-Gómez et al., 2020). Concerning the predisposing factors among the mental health disorders, the only ones that showed significant differences between those who re-attempt and those who do not are personality disorders and maladaptive personality traits. This has been described in other studies, both in adolescent and adult sample populations, and it is accepted by the scientific community, especially regarding borderline personality disorder. It is also supposed to be the case in maladaptive personality traits, although there is no compelling data on these symptoms (Ramleth et al., 2017). Personality disorders are characterized by: difficulties in problem-solving, low tolerance to frustration and difficulties following the rules dictated by society, just as it happens in adolescence being an enhancer of these traits. Especially cluster B disorders due to high impulsivity and emotional lability, as well as



feelings of existential emptiness and loneliness. Those subjects, in vital circumstances that they attribute as negative, develop symptoms of hopelessness, losing motivations and vital expectations, and everything that links them to better functionality and emotional bonding with other people; causing suicidal behaviors to be triggered as the only "escape" to their vital problems (Jopling et al., 2016; Vega et al., 2017). The same happens in the cases of adaptive or social problems or even personality traits with chronic situations (mostly emerging in anxiety, behavioral problems, affective disorders or substance use), in which, although the specific problem or the acute situation is solved, they subsequently appear new situations that lead to suicidal behavior, because of this mechanism through which the difficulties of confronting and resolving problems lead to an increase in frustration, and therefore an accumulation of frustrations that will trigger in low self-esteem and feelings of hopelessness that in the moments of greatest lability will give as the only response to this situation a suicidal behavior. For this reason, psychopathological diagnosis should be treated in a holistic manner, as well as psychosocial and family situations and the vital antecedents to be able to make proper prevention (Brake et al., 2017; Rapp et al., 2017; Young et al., 2017).

Concerning a familial history of psychopathology, multiple studies have described its relationship to suicidal behavior in the offspring, involving difficulties in adaptability and family cohesion, difficulties in problem-solving, and negative parental relationships as predictors of suicidal behavior (Aiken et al., 2017; Oppenheimer et al., 2018a), since suicidal adolescents perceived their parents to be significantly more critical and less caring, differing from those who are more caring would inevitably have a better relationship with their children, which could have a positive impact on the adolescents' psychological well-being and lower their suicidal ideation (Kwok et al., 2011). In addition, mental health problems and suicidal behavior in close relatives are commonly related and frequently identified as risk factors for suicide attempts and re-attempts in adolescents (Oppenheimer et al., 2018b), probably genetics and imitation both play a role, but also a poor communication within the

family is also found in many cases of suicide, not only with the child or about the child's problems, but in general between family members with mental health problems (Bilsen, 2018). This evidence is shown in our second article, where we analyze the relationship between family and adolescent suicidal behavior in adolescents and their relationship with stressful life events.

When focusing on attachment and family-related variables explored in this research, a significant difference with the insecure-avoidant attachment style was found, with a higher prevalence observed in the clinical sample of adolescents, in line with previous research (Grunebaum et al., 2010). This is evidence of the needed confidence between parents and adolescents shown in other studies of the literature (Au et al., 2009; Lee et al., 2006). Similarly, a secure attachment was revealed as a protective factor for suicide. This was also found in the study by McLaughlin and colleagues, which showed that a greater secure attachment predicted lower rates of internalizing disorders in both genders (McLaughlin et al., 2012), from which we can infer that this would reduce suicidal behavior, as internalizing disorders are a risk factor for suicidal behavior (J. Liu et al., 2011; Sadeh et al., 2016). Also, childhood trauma repeatedly appears as a risk factor in different studies of suicide behaviors in adolescents (Wiebenga et al., 2021; Zatti et al., 2017) and can be related to stressful life events as observed in the present research. The developmental consequences of cumulative childhood trauma may similarly influence pathways for suicide behaviors risk in adolescents. Such mechanisms may involve neurocognitive problems that involve impulsivity, like inhibitory control and decision-making that may increase the possibility of suicide behaviors in adolescents (Polanco-Roman et al., 2021).

In regard to the parental bonding variables, a relationship between negligent and affectionless parenting and suicidal behavior was found out, as previously shown in the literature (Donath et al., 2014b; Goschin et al., 2013b). In this sense, the variable care expressed by parents and adolescents and the overprotection assessed by parents are considered protective factors for suicide. Previous studies have found that low family care (Brown,



2020), and living in dysfunctional households (Dube et al., 2001) are risk factors for suicide behaviors, while an increased ability to care as an element that could reduce the number of suicide behaviors (Chiang et al., 2015).

When focusing on family functioning variables and their association with suicidal behavior, a positive relationship between compensated family functioning (as in the Circumplex Model) and controls was found. Previous scientific literature has already pointed out that having a decompensated family functioning is a risk factor for suicidal behavior (Pavez et al., 2009a). Some research has also found that families with adaptability problems are at higher risk of suicidal behaviors (Pavez et al., 2009b). On the contrary, higher cohesion in the family is a protective factor for depressive symptoms in adolescents (Leyva-Jiménez et al., 2007) and this has served as a basis for research studying family cohesion as a protective factor for suicidal behavior in young people (Xiao & Lindsey, 2021). However, more studies are still required in this field to deepen these associations.

When focusing on stressful life events, a significant relationship between past trauma events and suicidal behavior regarding bullying and cyberbullying was found in the present research. This is in line with most research in this field pointing out this clear relationship between different forms of bullying and suicidal behavior (Zaborskis et al., 2019). In our sample, there is a significant relationship between the group of cases and the victimized aggressors, which agrees with previous studies that portray the victims-aggressive young people as being more maladjusted than their peers in terms of their social and emotional functioning (O'Connor et al., 2019). Also, concerning cyberbullying, a significant relationship between cyber victims and cases was identified, as stressed out in previous studies, which strongly relate them to suicidal behaviors (J. Kim et al., 2020; Nikolaou, 2017). We can also find similar results regarding bullying and cyberbullying in the quantitative items, having positive results for victimization and aggression as risk factors for suicidal behavior in adolescents, as shown in previous studies like the one by Hinduja and Patchin in 2010 in which both factors, aggression and victimization, are more likely to trigger suicidal thoughts and suicide attempts

(Hinduja & Patchin, 2010). Bullying and cyberbullying could be seen as a stressful event leading to higher stress, psychological distress and negative emotions, this could also lead to mental health problems and risk behaviors. Since social relationships are determinant in children and adolescent development victims could feel lonelier. In consequence, all of the factors combined would increase significantly suicidal behaviors (Dorol-Beauroy-Eustache & Mishara, 2021). On the other hand, the accumulation of different stressful life events (not only bullying in its different forms) has also been revealed as a risk predictor of suicidal behavior (the higher the number of stressful life events, the higher the risk of having suicide behaviors), and also it happens with the affectation caused by these stressful life events (the higher affectation, the higher risk of having suicide behaviors). This has been reported in previous theoretical and research studies about suicide in adolescents. For example, Yildiz reports that stressful life events increase suicidality in adolescents, partly by increasing psychological distress and eroding perceived social support, giving some valuable clues to some possible preventive strategies (Yildiz, 2020b).

As an important stressful life event in our sample, we find the academic performance that was also related to suicidal behavior as in other studies (Guo et al., 2019; Orozco et al., 2018), both showing school failure by repeating a course and the fact that the greater the number of repeated courses, the greater the risk of repeating the suicide attempt. This could be explained by the stress that might involve repeating a course, which could cause a certain sense of failure, low self-esteem and could also trigger new stressful situations like meeting new classmates or being older than the rest of the new classmates (Rathmann et al., 2020), but also because academic success is a protective factor for suicide behaviors due to the feeling of having achieved a life expectancy (Mirkovic et al., 2020). In this sense, the study of McBee-Strayer and colleagues explained that old-for-grade students were also more likely to report a suicide attempt with increased suicidal ideation and planning, suggesting that common risk factors for suicide repetition seem to be anxiety, substance use, depression symptoms, and others (McBee-Strayer et al., 2020).

## 6.1 Limitations

Our study is not without limitations.

First of all, it would be desirable to continue conducting research with larger samples, including adolescent populations from different sociocultural contexts, to explore the possible effect of such different backgrounds and cultural identities on suicide-related behaviors. The unicentric nature of our research hampers the generalization of results, however, its clinical value is indisputable, since this is a reference center in our area/region, and for the problem, the changes derived from the knowledge obtained in this research have favored changes in clinical practice. The aim of the study was predominantly focused on decision-making and clinical treatments, and based on the needs of a pediatric hospital in our region, for this reason, we decided to make a previous evaluation of the situation by reviewing the clinical history computer records retrospectively and finding which were the risk factors of the adolescents who re-attempt suicide, because of the severity of this adolescents, and because of the resources consumed in emergency care. The conclusions were profitable for us despite and let us start new projects with more scientific evidence and also useful for our clinical practice.

During the revision of the clinical history computer records, despite the huge amount of data collected, we found some difficulties in carrying out a follow-up with subjects older than 18 years old being a possible bias related to age, and finding information about the private practice or adolescents deaths by suicide. The over-represented female gender in our sample could be another limitation to consider related to statistical power despite it being similar to other study samples and research in this field. This fact, also lead our research team to carry out more research to delve into gender differences concerning suicide behaviors in adolescents.

## 6.2 Strengths

Few studies have been carried out on risk factors for re-attempt suicide exclusively in the adolescent population, as well as family factors in suicidal behavior in adolescents.

It should also be considered that the evaluation of suicidal behavior in adolescents in our region has been scarce until now, not by chance, but because of the many difficulties it entails. To begin with, recruiting adequate and large enough samples is tricky but still, essential to ensure representativeness. Similarly, to succeed in involving families into the research and its procedures is also challenging due to logistic reasons but to the nature of the situation under research. To be able to openly share their thoughts and experience related to such traumatic events and moments in their lives is not easy and must be recognized. This research (specifically, the second study) has been offered to many families, requiring many efforts, especially during the months of confinement due to COVID-19.

We must emphasize too the importance of having been able to contact different institutions in our field that have lent their help to participate as a control group in the second study, adding greater representativeness to the sample and allowing comparisons.

This confers a particular value to the present investigation, however, there is still a need to delve into the data and risk factors, evaluating those not identified in this investigation but usually described in other studies like child physical maltreatment or sexual abuse (Park et al., 2021).

## **VII. GENERAL IMPLICATIONS**

### **7.1 Implications for clinical practice**

The major asset of this research is its direct clinical application.

Nowadays, our practice offers emergency room visits for the general population who need urgent attention. In our Hospital, around 400 cases a year present suicide behaviors, during pandemic COVID-19 surpassing the 1,000 cases, with the need for fast decision making between hospital admissions or refer to outpatient consultation. Besides, the poor hospital admission capacity brings the critical need of having good prevention programs for families and adolescents with suicide behavior that can be handled and deployed in the outpatient consultations.

The answers obtained at the research level provide professionals with a greater understanding of the problem and allow them to base their decisions on the results presented. This could change daily practice by incorporating new protocols in dealing with this problem in our hospital, and we believe that it can help professionals from other hospitals that treat this problem in the same population.

Derived from our work we have obtained different theoretical-practical applications. First of all is the importance of non-suicidal self-harm behavior since it is an easily identifiable indicator of the poor prognosis of subjects with suicidal behavior. We may conclude that as long as self-injurious behavior is present in subjects with suicidal ideation, the risk of re-attempt is very high. Moreover is a clear target to focus our efforts in prevention both in outpatient units with specific treatments, often assessments and group therapies, and in emergency units where we can prioritize a hospital admission or communicate to outpatients units to manage these situations. This is most likely because the presence of self-harmful behavior as a strategy to cope with the demands of daily life is an indicator of the lack of adaptive resources of the individual. The second aspect is that early onset of suicidal

behavior, before the age of 14, is indicative of a worse evolution than a late onset, which the continuous increase in interpersonal problems may explain, the differences in family care, academic and work-related problems, and social demands that adolescents have to face in their transition to adulthood, being important to focus prevention in adolescents social areas as school and insight of own problems and mechanism for cope with them, creating programs for school educations and self-management and resolution strategies, and also helping improve socio-emotional skills for assisting adolescents in facing stressful life events related or not with school problems. In third place, there is a clear need to incorporate a family approach to the treatment of adolescents with suicidal behavior, since our research has found out that there are relationship models that might play a protective function. Family-based therapies have great potential to prevent suicidal behaviors in adolescents (Sullivan et al., 2021).

In the same way, this research clearly reveals the most important adolescent profile, that of the *repeater*. Identifying the recurrence predictor profile, knowing how to select the most discriminating risk factors from among the many indicated in the scientific literature, helps to prescribe and administer treatments or containment devices, adjusted according to the needs of each profile, and achieving, therefore, an improvement in terms of cost-utility and cost-effectiveness in the management of care resources.

In this line of care resources, another of the most relevant clinical implications is when making decisions regarding the creation of new lines of treatment in the different community or hospital care devices. Suicide is rarely due to a single cause and requires a range of prevention initiatives and evaluation methods (Al-Halabí & Fonseca-Pedrero, 2021). This translates into the relevance of promoting the implementation of treatments based on the acquisition of skills, such as Dialectical Behavioral Therapy for adolescents (Miller, 2017). This approach would cover a greater number of adolescents who present suicidal behavior, directly influencing this group with a poor prognosis and with a higher risk of recurrence. Therefore, the promotion of these treatments will reduce the suffering of patients diagnosed

with maladaptive personality traits and their relatives, while reducing the incidence of suicidal behavior.

## **7.2 Future lines of research**

Despite our research, there is a need for better understanding risk factors of suicide in adolescence. We still need better-designed studies for repetition of suicide behavior in adolescents, as prospective multicentric studies that allow us to generalize our results. It's also important to clarify all the variables related to the family that influence the adolescence decision of committing a suicide behavior, working with these families with relational problems or background of mental health for deep in their situations and try to solve these risk factors. These requirements lead us to develop future research projects that allow us to obtain answers.

On the other hand, we are already planning to start different clinical implications related to our results that will allow us to initiate more appropriate investigations, such as a decision-making protocol for emergency attention for adolescents with suicide behaviors, family risk groups for prevention, socio-emotional skill programs in schools and dialectical behavioral group treatment for adolescents with suicidal behaviors.

## VI. CONCLUSIONS

As a resolution of our general objective:

The risk factors associated with suicidal behavior in adolescents in our territory are age, personal history of self-harm, insecure attachment, negligent or authoritarian parenting style, unbalanced family function, stressful life events, and specifically bullying and cyberbullying.

Related to specific objectives we found the following conclusions:

C1. The risk factors associated with repetition of suicidal behavior in adolescents in our territory and its evolution at mid-term are an earlier age (<15 years) and a personal history of self-harm, showing a worse prognosis during the following year than other adolescents.

C1.1. We assume that clinical and epidemiological risk factors can help us predict relapses in suicide behaviors in the adolescent population.

C1.2. The risk factors we found related to repetition of suicide behavior in adolescents are age (<15 years) and personal history of self-harm.

C2. The environmental risk factors that predict the onset of suicidal behaviors in adolescents are an insecure attachment, a negligent or authoritarian parenting style and an unbalanced family functions as a family-related variables. Also, the number and intensity of stressful life events have been found to be positively related to suicidal behavior in adolescence, and specifically school difficulties, bullying and cyberbullying.

C2.1. We verify that an insecure attachment, a negligent or authoritarian parenting style and an unbalanced family function are family-related variables that are associated with higher risk of suicide behaviors in adolescents.

C2.2. We elucidate that bullying and cyberbullying are factors related with a higher risk of suicide behavior in adolescence, as far as school difficulties.

C2.3. We found that the number and intensity of stressful life events are positively related to suicidal behavior in adolescence.



C2.4. We can affirm that personal risk factors in adolescents and stressful life events in addition to lack of family support seem to be elements that can suggest the poor prognosis during the following year of these cases, with such high levels of relapse.

C3. The potential protective factors reducing the risk of committing suicidal acts are a family functioning characterized by care, security and flexibility.

C3.1. We finally can assert that a family functioning characterized by care, security and flexibility could be considered a protective factor for suicidal behavior in adolescence.

## VII. REFERENCES

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