

Self-inflicted injuries in adolescents and young adults: A longitudinal approach

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Abstract

Background: Suicide has become a major global public health problem in some clinical subpopulations. Adolescents and young adults with self-inflicted injuries or non-suicidal self-harm appear to have been understudied. The aim of this study is to assess which socio-demographic and prior comorbid psychopathology condition variables in adolescents and young adults with self-inflicted lesions are likely to be more predictive of future self-injury after 12 months. **Method:** The eligible participants were 176 people (99 women and 77 men) aged 15-25 (mean = 20.3; SD = 4.56) who were subsequently divided into two groups (those who had been admitted again for self-inflicted injuries or non-suicidal self-harm (104; 59.1%), and those who had not (72; 40.9%) during the following 12 months. **Results:** The results obtained offer (i) a specific *socio-demographic profile* in which women (OR [CI95%] = 6.22[6.03-7.11]) aged 21-22 (OR [CI95%] = 4.71[4.29- 5.73]) who are students (OR [CI95%] = 2.99 [1.58-6.01]) are likely to inflict a new self-injury on themselves after 12 months, and (ii) a clear *clinical profile* where several afflictions are predictors of a new self-injury after 12 months. **Conclusions:** We discuss the urgent need to develop specific health protocols and improve public health alert measures for certain subpopulations.

Keywords: Epidemiology, psychosocial profile, clinical protocols, self-inflicted injuries.

Resumen

Lesiones autoinfligidas en adolescentes y jóvenes: un enfoque longitudinal. Antecedentes: el suicidio se ha convertido en un verdadero problema de salud pública mundial en algunas subpoblaciones clínicas. Los adolescentes y adultos jóvenes con lesiones autoinfligidas o autolesiones no suicidas parecen haber sido poco estudiados. El objetivo de este estudio es evaluar qué variables sociodemográficas y comorbilidad psicopatológica previa en adolescentes y adultos jóvenes con lesiones autoinfligidas son más propensas a predecir una autolesión futura después de 12 meses. **Método:** 176 personas (99 mujeres y 77 hombres) de entre 15 y 25 años (media = 20.3; DE = 4.56) divididos en dos grupos: los ingresados nuevamente por lesiones autoinfligidas o autolesiones no suicidas (104; 59,1%) y aquellos que no lo hicieron (72; 40,9%) durante los siguientes 12 meses. **Resultados:** los resultados ofrecen (i) un perfil sociodemográfico específico caracterizado por mujeres (OR [CI95%] = 6.22 [6.03-7.11]) de 21 a 22 años (OR [CI95%] = 4.71 [4.29-5.73]) y estudiantes (OR [CI95%] = 2.99 [1.58-6.01]) que pueden autoinfligirse una nueva autolesión después de 12 meses, y (ii) un perfil de comorbilidades psicopatológicas previas claras donde varios trastornos son predictores de una nueva autolesión después de 12 meses. **Conclusiones:** discutimos la urgencia de desarrollar protocolos de salud específicos y mejorar las medidas de alerta de salud pública para ciertas subpoblaciones.

Palabras clave: epidemiología, perfil psicosocial, protocolos sanitarios, lesiones autoinfligidas.

Suicide has become one of the three leading causes of death among adolescents and young adults worldwide (World Health Organization [WHO], 2014), representing a real public health problem in both developed and developing countries (WHO, 2018). Every year, 600,000 adolescents and young adults between 14 and 28 years old commit suicide, with European countries being the most affected, accounting for around 200,000 of these suicides (Samele, Frew, & Urquía, 2013; Wasserman et al., 2015). In Spain, according to the latest available data, a total of 268 adolescents and young adults (203 men and 65 women) between 15 and 29

years old committed suicide. Among children under 15, there were seven suicides (four boys, three girls) (Instituto Nacional de Estadística [INE], 2018). Also, it has been observed that Spanish adolescents in the general population have a high prevalence of suicidal ideation (Fonseca-Pedrero et al., 2018). In Spain, non-lethal suicidal risk behaviours are frequent in adolescents and young people (Sánchez-Teruel & Robles-Bello, 2014), but this has been given insufficient attention (Grandclerc et al., 2016). Indeed, it is difficult to make accurate predictions about future injuries in this age group due to the complex list of risk variables (Miron et al., 2019).

In this regard, risk factors are as diverse as a family history of suicide (Bilsen, 2018; Rijsselberge, Portzky, & Heeringen, 2009); suffering from a chronic illness that might lead to pain (Vargas & Robles, 2019); a poor support network (Sánchez-Teruel & Robles-Bello, 2014); and perceiving that you are a burden to others (Hill & Pettit, 2014); easy access to lethal methods (Brown & Plener,

2017); exposure to information about the suicide of a loved or known person (Kline, 2019; Poland, Lieberman, & Niznik, 2019; Tang, Hung, Lee, Ho, & Leung, 2019); specific personality variables, such as impulsivity or lack of emotional control (Czyz, Horwitz, Arango, & King, 2019; Dickter, 2019; Wolfe et al., 2019), alcohol consumption (Bousoño et al., 2017), or the heavy burden of emotional distress (Levi-Belz et al., 2019); etcetera. Nevertheless, some variables seem to have special relevance for predicting suicidal vulnerability, although they have been sparsely studied in this population. Negative life events stand out (Horváth et al., 2018), particularly bullying (Koyanagi et al., 2019), a previous psychological disorder (Mars, 2019), a preceding suicide attempt (Goñi-Sarriés, Blanco, Azcárate, Peinado, & López-Goñi, 2018) and early exposure to self-inflicted or non-suicidal self-injury that become a gateway to suicide (Miron et al., 2019; Brown & Plener, 2017).

It should not go unnoticed that after a non-fatal act of self-injury, the risk of suicide is very high (Runeson et al., 2016), which is why deliberate self-injury is commonly associated with a particularly high rate of completed suicides (Madsen et al., 2013). More specifically, self-inflicted injuries in adolescents and young adults are associated with subsequent suicide attempts (Ribeiro et al., 2015). In fact, self-harming behavior and self-inflicted injuries generally represent a transitional period of seeking help, but sometimes they are an important indicator of mental health problems and actual risk of death by suicide (Fliege, Lee, Grimm, & Klapp, 2009). These behaviors are considered to be mild early warning signs that may be predictive of more serious future suicide attempts. Thus, meta-analyses suggest that this type of behaviour might be a discrete clinical phenomenon requiring further research (Claes & Vandereycken, 2007; McMahon et al., 2010). Such research will need to address the intense heterogeneity in risk factors and will require assessments based on alternative informants (Bježančević, Groznica Hržić, & Dodig-Čurković, 2019). Given the above, as well as the strong relationship between self-inflicted injuries in adolescents and young adults and more serious self-harming behaviours, such as attempted or completed suicide, we propose that further research addressing this behaviour is now needed (Hooley, Fox, & Boccagno, 2020; WHO, 2018).

The rates of previous suicide attempts in this group are 3-times higher than rates of death by suicide (Wenzel et al., 2011), and, so far, previous attempts are the only behaviours that can predict future more serious attempts or completed suicide (Ayuso-Mateos et al., 2012). In this regard, previous attempts are of particular interest, since more than half of the population of completed suicides die on their first attempt (Jordan & McNiel, 2019). There must be predictive variables that report on suicidal vulnerability after one or more self-inflicted injuries in early adolescence and youth, before the first serious suicide attempt (Hill & Pettit, 2014). If we can identify these variables, early prevention and intervention actions could be implemented in this clinical subpopulation before the first serious approach to suicidal behaviour occurs (Sánchez-Teruel & Robles-Bello, 2014). Since previous self-inflicted injuries could already be considered indicative of this approach – since it shows an ability to harm oneself – the variables involved in the transition to desire or the first attempt to die should be further analysed (Dhingra, Klonsky, & Tapola, 2019).

In Spain, few studies have analysed the sociodemographic conditions and comorbid psychopathology of adolescents and young adults who have previously suffered self-inflicted injuries.

We have also found that while there is clear evidence that these variables, on first admission to the emergency department, may predict long-term suicide (Aaltonen, Isometsä, Sund, & Pirkola, 2019), there are not many studies that have addressed those of adolescents and young adults who have previously suffered self-injury.

The aim of this study was to evaluate which sociodemographic variables and comorbid psychopathological conditions in adolescents and young adults who have suffered previous self-injury are most predictive of future self-injury at 12 months after the first injury, as well as to assess health care performance in hospital emergency departments after the intervention on physical injuries.

Method

Participants

The total sample was made up of 832 digital medical records of individuals admitted to the emergency room of several hospitals in two Andalusian provinces (Cordoba and Jaen). The average population of the analyzed area during the study period was 280,987. The total number of people admitted to the emergency room of the hospitals in the analyzed area was 2742 (2467 admissions). The eligibility criteria were the following: individuals aged 15-25 with a diagnosis of self-inflicted lesions (SIL) or non-suicidal self-injury (NSSI) during the years 2013, 2014 and 2015 (study period). The exclusion criterion used was readmission for two or more times during the study period. Only 176 individuals (99 women and 77 men: mean = 20.3; SD = 4.56) bearing different socio-demographic and previous co-morbid psychopathology conditions characteristics were selected from the original sample (Table 1). Subsequently, each participant was scrutinized over 12 months throughout 2016 and 2017, for which we used their exact date of admission and digital health record number. The sample was divided once more into those individuals who had been admitted again for self-inflicted injuries or non-suicidal self-harm (104; 59.1%) and those who, over the same period, had not (72; 40.9%). We noted that there were no differences between the two groups (NSSI = non-suicidal self-injury; RANSSI = re-attempt non-suicidal self-injury) in any of the socio-demographic and previous co-morbid psychopathology conditions variables assessed ($\chi^2 =$ between 1.11 and 19.22; $p > .05$). In addition, we noted that all variables presented an adequate size of effect ($\eta^2 =$ between .16 and .98) and an adequate statistical power (between .10 and 1.12), as can be checked in table 1.

On carrying out our study, Spain's Law on the Protection of Personal Data (1999) was never infringed. Some positive assessments were granted too by the University of Jaen's Research Ethics Committee and the Andalusian Regional Government's Health Service Research Ethics Committee.

Instruments

Our research profited from the assistance of some previously trained emergency healthcare personnel, who generously obtained the raw data (i.e. the digital health records) needed to complete the target sample and subsequently fed it into a database, with

Table 1
Description of socio-demographic and clinical data of the sample with non-suicidal self-injury and without suicide re-attempt

	NSSI n(%)	RANSSI n(%)	χ^2	p	η^2	Statistical power
Gender						
Female	43(59.7)	68(65.4)	12.38	.92 ^{ns}	.72	.89
Male	29(40.3)	36(34.6)				
Age						
From 15 a 16 years	5(6.9)	7(6.7)				
From 17 a 18 years	8(11.1)	9(8.6)				
From 19 a 20 years	12(16.7)	17(16.3)	18.16	.83 ^{ns}	.94	1.00
From 21 a 22 years	26(36.1)	32(30.8)				
From 23 a 24 years	14(19.4)	21(20.2)				
25 years	7(9.7)	18(17.4)				
Civil status						
Single	57(79.2)	85(81.7)	2.98	.07 ^{ns}	.51	.10
Married	9(12.5)	11(10.6)				
Other	6(8.3)	8(7.7)				
Academic or employment status						
Studying	31(43.1)	46(44.2)				
Not studying	18(25)	22(21.2)	3.89	.09 ^{ns}	.73	.82
Working	16(22.2)	19(18.3)				
Neither studies nor works	7(9.7)	17(16.3)				
Previous co-morbid psychopathology conditions						
Mood Disorders	18(25)	19(18.3)				
Anxiety Disorders	15(20.8)	35(33.7)	19.22	.41 ^{ns}	.98	1.00
Addictive Disorders	19(26.4)	21(20.)				
Personality disorders	4(5.6)	9(8.6)				
No prior diagnosis	16(22.2)	20(19.2)				
Triggering situation						
Bullying	19(26.4)	26(25.0)				
Couple Problems	22(30.6)	23(22.1)	14.12	.34 ^{ns}	.82	.98
Family problems	16(22.2)	18(17.3)				
Problems with friends	6(8.3)	24(23.1)				
Not specified	9(12.5)	13(12.5)				
Single self-injury method						
Scrape	11(15.3)	15(14.4)				
Cutting	31(43.1)	45(43.3)	18.41	.84 ^{ns}	.91	1.12
Burn	28(38.9)	39(37.5)				
Other	2(2.7)	5(4.8)				
Health action after valuation						
Hospital admission	9(12.5)	10(9.6)				
Referral to primary care	28(38.9)	31(29.8)				
Referral to mental health	12(16.7)	16(15.4)	1.11	.06 ^{ns}	.16	.46
Discharge	23(31.9)	47(45.2)				
TOTAL	72	104				

NSSI = non-suicidal self-injury; RANSSI = re-attempt non-suicidal self-injury; *p < .05; **p < .01; ns = no significant; η^2 = Effect Size (Square eta)

all the variables under scrutiny, by means of an integrated management and information system for healthcare developed by the Andalusian Regional Government. The system, running on the DIRAYA software, advantageously replaces the traditional paper health records with a number of digital clinical (health, illness, treatment) records, thus ensuring ultra-rapid communications, exclusive access by authorized healthcare personnel and total confidentiality.

All variables in this research (Table 1) were obtained from the digital medical records of each participant, including previous co-morbid psychopathology conditions made by emergency medical staff and triggering situation obtained by nursing staff in emergency triage consultation. The data collected from the clinical

records (digital or paper) are appropriate instruments for assessing mental health and suicide risk (García-Nieto et al., 2012).

Procedure

We requested access permits from hospital managements and leaves to proceed from Research Ethics Committees, and they were both granted. Subsequently, we asked some hospital emergency room personnel to cooperate, and they accepted to be trained to collect data on variables of interest on two separate sessions. At the time of the study, the cooperating hospital personnel had between 8 and 15 years of professional experience in their places of work. Data collection took from 4 to 6 months throughout the year 2018.

Data analysis

Initially we evaluated multivariate normality, sample multicollinearity and measurement of error independence of independent variables (IVs). Later on, we transformed artificially the dichotomous nominal dependent variable (DV) into a metric one and then applied the indices needed to find the suitability assumptions. Subsequently, we performed a binary logistic regression analysis with an intro method, whereby the DV would be a non-suicidal self-injury or a re-attempt of a non-suicidal self-injury during 2016 and 2017, while the IVs would be the socio-demographic and previous co-morbid psychopathology conditions variables (it should be noted that only this method of analysis supports dichotomous dependent variables within regression models). We finally performed all of our statistical analysis by means of the SPSS software package (release 22.0). The level of significance required in our tests was set at $p < .05$ or $p < .01$.

Results

The results obtained from assuming the independence of errors through the Durwin-Watson test showed that the latter was met in all IVs used as criteria. The non-multicollinearity assumption was met too for all IVs, since the value obtained was below 5 (IVF = between .08 and 2.91). As for the results obtained from the ROA statistical efficiency score (χ^2), they showed that there is a significant improvement in the prediction of the probability of occurrence of the dichotomous categories of the DV. Additionally, the Nagelkerke values indicated that the predictive model explains between 16.2% and 92.7% of the variance of the DV according to the included IVs. The power of the contrast fit of the model is high according to the Hosmer-Lemeshow statistics (.62 to .98), as can be seen in table 2. All the assumed criteria provided an adequate prediction of compliance with the baseline assumptions needed to apply a binary logistic regression analysis, as well as a strong guarantee of predictive power.

Through the analysis of the prediction of the IVs on the dichotomous DV (NSSI = a non-suicidal self-injury; RANSSI = a re-attempt of a non-suicidal self-injury), we could verify that some socio-demographic and previous co-morbid psychopathology conditions aspects may predict the probability of occurrence of a new self-injury after 12 months. As noted in table 3, the equation showed the positive beta coefficient (β) of each of the predicting

variables on the predicted variable (between .21 and .98). It also reported (i) that all of them are risk factors; (ii) that the standard error is adequate since it is not superior to 1 (S.E. from .01 to .27); and (iii) that Wald's hypothesis contrast statistics (equivalent to the t-value in single and multiple regressions) indicate that the IVs are good significant predictors of the risk of further future self-harm ($H_0: \beta = 0; p =$ between .00 and .02).

Beta values and odds ratio (95% CI) specifically show that such socio-demographic variables as being a female student aged 19-22, together with such previous co-morbid psychopathology conditions as suffering from anxiety, being a victim of bullying, cutting oneself as a means of self-injury, or being discharged from a hospital emergency room, are all factors promoting a greater probability of a new attempt at self-inflicted re-injury in adolescents and young adults.

Discussion

Our study was focused on evaluating the socio-demographic and previous co-morbid psychopathology conditions in adolescents and young adults who had suffered from self-inflicted lesions. It was aimed at determining which variables might predict a future self-inflicted lesion after 12 months, as well as assessing the health care received by patients in hospital emergency rooms after their body injuries were duly treated.

It is essential to focus on the origin of self-inflicted injuries to detect the most predictive variables of more serious suicidal behaviour, and an appropriate way is to use alternative informants, such as health professionals, which is in line with other research (Bježančević, Groznica-Hrzić, & Dodig-Ćurković, 2019; García-Nieto et al., 2012).

The results show that the most reliable predictors for repeated self-inflicted injuries in adolescents and young adults who have suffered previous injuries are *age, gender, anxiety disorder* and *bullying*. In recent years, bullying has caught the interest of researchers as a predictor of suicide (Hertz, Donato, & Wright, 2013; Holt et al., 2015). In this study, bullying has proved to be one of the strongest predictors of self-inflicted or non-suicidal injuries in adolescents and young people - indeed, it got, in line with some other previous studies (Hinduja & Patchin, 2019), an important predictive weight (O.R. = 7.76) in the repetition of self-injury after 12 months. In our opinion, campaigns should be implemented to detect bullying at an early stage, to raise awareness of the

Table 2
Assumptions of error independence, statistical efficiency of ROA, R² Nagelkerke and power of contrast (Hosmer-Lemeshow) of independent variables (socio-demographic and previous co-morbid psychopathology conditions) (N= 176)

	D-W	VIF	χ^2	-2Log(vero)	R ² Nagelkerke	H-S
Gender	2.13	.19	46.23*	9.53	.391	-
Age	1.19	1.22	9.56**	.32	.712	.76
Civil status	2.54	2.91	10.34**	.73	.691	.88
Academic or employment status	3.98	1.59	12.51**	.93	.162	.62
Previous pathology	6.16	.08	4.91**	.52	.785	.98
Triggering situation	5.31	.26	7.18**	.93	.816	.84
Single self-injury method	3.22	1.76	11.56**	.83	.927	.90
Health action after valuation	4.12	.78	9.59**	.69	.759	.73

D-W = Durwin-Watson test; VIF = Variance inflation factor-VIF (multicollinearity statistic); χ^2 = ROA statistical efficiency test; * $p < 0.05$ ** $p < 0.01$; ns = non-significant; -2Log(vero)= Logarithm of likelihood minus 2; R² Nagelkerke = Variance explained by each IVs; H-S = Hosmer-Lemeshow test or power of contrast

Table 3
Values of the regression equation for independent variables (sociodemographic and previous co-morbid psychopathology conditions) (n=104)

	β	SE	Wald	O.R.	C.I. (95%) for O.R	
					L.L.	U.L.
Gender (female)	.39	.11	3.71*	6.22	6.03	7.11
Age (19-20 years)	.21	.01	3.18*	2.19	2.09	4.98
Age (21-22 years)	.75	.24	4.52**	4.71	4.29	5.73
Academic or employment status (studying)	.72	.03	6.36**	2.99	1.58	6.01
Previous pathology (anxiety disorders)	.81	.27	3.39**	6.12	5.43	7.21
Triggering situation (bullying)	.98	.04	6.58**	7.76	5.69	8.89
Single self-injury method (cutting)	.43	.11	8.82*	2.18	1.62	2.45
Health action after valuation (discharge)	.69	.19	7.34**	4.53	4.11	5.23

β = beta coefficient; SE = Standard error; Wald = contrast power statistic; p = significance level; *p<.05 ** p<.01; ns = non-significant; O.R. = Odds Ratio or result of the regression-Exp. equation (β); CI = Confidence Interval; LL = Lower limit; UL = Upper Limit

seriousness of its consequences among school, high school and university communities, and to design fast and effective intervention protocols. We are aware that some suicide prevention programs for community populations need to be improved (Soto-Sanz et al., 2019). However, previous self-inflicted injuries in adolescents or young people are indirect requests for help that are modulated by the perception about the existence and adequate utility of a social support network, as has been raised by other authors (Sánchez-Teruel & Robles-Bello, 2014). School-based suicide prevention programmes in 12 European countries (Saving and Empowering Young Lives in Europe- SEYLE) (Wasserman et al., 2015) have shown that this influence acts as a catalyst for revealing suffering and, at the same time, can provide clues for teachers, parents, and peers to perceive the prior danger signs that an adolescent or young person show before a more serious injury or suicide attempt (Levi-Belz et al., 2019). Also, in previous research conducted across 47 low- and middle-income countries, time of exposure (over 20 days) to bullying was identified as a strong predictor of severity in adolescent suicide attempts (Koyanagi et al., 2019). Therefore, suicide prevention programmes targeting community populations are possible and reduce risk factors by making an existing problem visible in schools. But also, it is essential to implement specific components aimed at specific populations that suffer from bullying situations with agile response protocols, and that are perceived as appropriate and useful by their addressees. A few basic educational actions can save lives.

On the other hand, we strongly believe that there is an urgent need to design and implement specific healthcare protocols for suicide prevention in this clinical sub-population that (i) help health professionals conduct ongoing assessments by using direct questions about suicidal intent, and (ii) allow the quick detection of any other factors associated with an increased risk of suicide. Those protocols could be useful to determine a profile of the population at risk, as advocated in this study. We have identified such risk factors for self-injury as being a female (O.R. = 6.22), in line with most previous studies (Bježančević, Groznica-Hrčić, & Dodig-Čurković, 2019; Brown & Plener, 2017; Cano-Montalbán & Quevedo-Blasco, 2018). However, in this study, the most predictive age was 21–22 years (OR = 4.71), as in another European study on Swedish adolescents (Beckman, 2019). However, there are age differences in French youths (Fedorowicz & Fombonne, 2007). The age difference as a factor

of greatest suicidal vulnerability in adolescents and young adults who have made previous suicide attempts or self-inflicted injuries might be determined by the tremendous modulation of cultural conditioners, as some studies have suggested (López-Castromán et al., 2015), because of differences in the vital challenges they are exposed to according to age (Horváth et al., 2018). Therefore, context and geography are key to understanding and improving the mental health of those groups, so any local knowledge about self-inflicted injuries might be key to better adapting such community-based prevention. Also, intervention programmes should be aware of the heterogeneity in age-specific adverse events, because this demographic variable seems to imply a differentiated modulation on suicidal severity.

It should not go unnoticed that anxiety disorders in adolescents and young adults that are associated with self-inflicted injuries might be a clear indicator of an increased likelihood of future more serious injuries or subsequent suicide attempts in line with other studies (Mars, 2019; Wasserman et al., 2015). This should be well taken into consideration by doctors when their youth patients repeatedly visit hospital emergency rooms and report anxiety-related problems (Greger, 2019). In fact, according to the results of our study, an anxiety disorder is a major predictor (O.R. = 6.12) of repeated self-inflicted injuries in those adolescents and young adults who had shown this behaviour in the 12 months following the first injury; this is especially serious because in these cases the injuries are indicative of an already activated capacity for suicide. More than half of the people who attempt suicide die on the first attempt (Jordan & McNiel, 2019). The notion that there is a need for a comprehensive approach to suicide from a broad, multidisciplinary perspective (including hospital emergency care provided by mental health professionals) can hardly be challenged. Additionally, the need to monitor, in the short term, any suicidal behaviour among high-risk adolescents has become an urgent measure.

Regarding suicide prevention, there is a tremendous difference between the health systems of the Member States of the European Union. However, some countries have taken specific health actions that have reduced suicide death rates by almost 41% (Sademiemi et al., 2018). In our study we showed that adolescents and young adults who self-injure are, after getting treated of body wounds, promptly discharged from hospital emergency rooms (O.R. = 4.53) without being offered any specific mental health care, let alone a follow-up

treatment. We have also found that those individuals with a history of self-harm make up a well-defined group of high risk of suicide and need immediate treatment after each episode. Additionally, we support the idea, already outlined in some works (e.g. Christiansen & Jensen, 2007), that all such emergency services as may be in contact with those individuals prone to having a suicidal behavior need to count on a reliable onsite action plan to ensure that they receive the best possible treatment immediately after every attempt at their self-inflicting an injury. In this paper we provide enough evidence of the urgent need to develop specific health protocols so as to prevent adolescents and young adults from being re-exposed to future self-inflicted injuries, since self-harm behaviors may become gateways for suicide attempts or completed suicide. Self-inflicted injuries are indeed warnings that may be understood as alerts of a potentially greater lethality. Suicide prevention protocols should be adapted to the psycho-social characteristics of each risk group, and specialized public health warning actions for adolescents and young adults with a profile associated with a high risk of suicide should certainly be improved. An example of such a health action is that the state co-finances private psychotherapy, which is more agile and quicker, or that it includes a decent number of psychologists in the public health system, both in primary and specialised care, which could, in the short term, save lives.

Our work had but two principal constraints. The *first* one was the data collection procedure we used (digital medical records). It has been suggested that authors should be cautious when including behaviour results obtained through this approach (López-Castroman et al., 2011). However, given that health or statistical records of self-inflicted or non-suicidal injuries are non-existent or poorly updated in adolescents and young adults in many countries across the world (WHO, 2018) and that the available data can provide an epidemiological approach to a clinical phenomenon (García-Nieto et al., 2012), we consider our methodology approach well-suited to the problem. Future studies on self-inflicted injuries should indeed use direct procedures of data collection. The *second* constraint was the highly territorially-biased context of the data obtained, a hard fact that makes it difficult for us to generalize the results obtained. It is undeniable that cultural factors, among others, have a strong influence on the analysis of some key risk variables in suicide prevention, as some works have noted (Boyd et al., 2015). But it was precisely this aspect that invited more in-depth analyses of risk behaviour modulated by specific geographical contexts (WHO, 2018). The results obtained could lead to implementing local public policies of prevention (adjusted to specific countries and territories) of consummated suicide in target clinical subpopulations.

References

- Aaltonen, K. I., Isometsä, E., Sund, R., & Pirkola, S. (2019). Risk factors for suicide in depression in Finland: First-hospitalized patients followed up to 24 years. *Acta Psychiatrica Scandinavica*, *139*(2), 154-163.
- Bilsen, J. (2018). Suicide and Youth: Risk Factors. *Frontiers in Psychiatry*, *9*, 540. doi:10.3389/fpsy.2018.00540
- Goñi-Sarriés, A., Blanco, M., Azcárate, L., Peinado, R., & López-Goñi, J.J. (2018). Are previous suicide attempts a risk factor for completed suicide? *Psicothema*, *30*(1), 33-38 doi:10.7334/psicothema2016.318
- Ayuso-Mateos, J. L., Baca-García, E., Bobes, J., Giner, J., Giner, L., Pérez, V., Sáiz P. A., Sáiz-Ruiz, J., & Grupo RECOMS (2012). Recomendaciones preventivas y manejo del comportamiento suicida en España [Preventive recommendations and suicidal behavior management in Spain]. *Revista de Psiquiatría y Salud Mental*, *5*(1), 8-23.
- Bježančević, M., Groznica-Hrzić, I., & Dodig-Ćurković, K. (2019). Self-Injury in Adolescents: A Five-Year Study of Characteristics and Trends. *Psychiatria Danubina*, *31*(4), 413-420. doi: 10.24869/psyd.2019.413
- Beckman, K., Lindh, A. U., Waern, M., Stromsten, L., Renberg, E. S., Runeson, B., & Dahlin, M. (2019). Impulsive suicide attempts among young people-A prospective multicentre cohort study in Sweden. *Journal of Affective Disorders*, *243*, 421-426.
- Brown, R. C., & Plener, P. L. (2017). Non-suicidal Self-Injury in Adolescence. *Current Psychiatry Report*, *19*(3), 19-20 doi:10.1007/s11920-017-0767-9
- Boyd, A., Van de Velde, S., Vilagut, G., de Graaf, R., O'Neill, S., Florescu, S., ... & EU-WMH Investigators (2015). Gender differences in mental disorders and suicidality in Europe: Results from a large cross-sectional population-based study. *The Journal of Affective Disorder*, *173*, 245-254. doi:10.1016/j.jad.2014.11.002
- Bousoño, M., Al-Halabí, S., Burón, P., Garrido, M., Díaz-Mesa, E.M., Galván, G., ... Bobes, J. (2017). Substance use or abuse, internet use, psychopathology and suicidal ideation in adolescents? *Adicciones*, *29*(2), 97-104.
- Cano-Montalbán, I., & Quevedo-Blasco, R. (2018). Sociodemographic variables most associated with suicidal behaviour and suicide methods in Europe and America. A systematic review. *The European Journal of Psychology Applied to Legal Context*, *10*(1), 15-25. doi:10.5093/ejpalc2018a2
- Claes, L., Vandereycken, W. (2007). Self-injurious behavior: Differential diagnosis and functional differentiation. *Comprehensive Psychiatry*, *48*(2), 137-144.
- Christiansen, E., & Jensen, B.F. (2007). Risk of repetition of suicide attempt, suicide or all deaths after an episode of attempted suicide: A register-based survival analysis. *Australian and New Zealand Journal of Psychiatry*, *41*(3), 257-265. doi:10.1080 / 00048670601172749
- Czyz, E. K., Horwitz, A. G., Arango, A., & King, C. A. (2019). Short-term change and prediction of suicidal ideation among adolescents: A daily diary study following psychiatric hospitalization. *Journal of Child Psychology and Psychiatry*, *60*(7), 732-741.
- Dickter, B., Bunge, E. L., Brown, L. M., Leykin, Y., Soares, E. E., Van Voorhees, B., ... & Gladstone, T. R. (2019). Impact of an online depression prevention intervention on suicide risk factors for adolescents and young adults. *Health*, *5*, 11.
- Dhingra, K., Klonsky, E. D., & Tapola, V. (2019). An empirical test of the three-step theory of suicide in UK university students. *Suicide and Life-Threatening Behavior*, *49*(2), 478-487.
- Fedorowicz, V. J., & Fombonne, E. (2007). Suicidal behaviours in a population-based sample of French youth. *The Canadian Journal of Psychiatry*, *52*(12), 772-779.
- Fliege, H., Lee, J. R., Grimm, A., & Klapp, B. F. (2009). Risk factors and correlates of deliberate self-harm behavior: A systematic review. *Journal of Psychosomatic Research*, *66*(6), 477-493.
- Fonseca-Pedrero, E., Inchausti, F., Pérez-Gutiérrez, L., Aritio-Solana, R., Ortuño-Sierra, J., Sánchez-García, ... & Pérez de Albéniz-Iturriaga, A. (2018). Suicidal ideation in a community-derived sample of Spanish adolescents. *Revista de Psiquiatría y Salud Mental*, *11*(2), 76-85. doi: 10.1016/j.rpsm.2017.07.004
- García-Nieto, R., Parra, I., Palao, D., López-Castroman, J., Sáiz, P.A., García-Portilla, M.P., ... Baca-García, E. (2012). Protocolo breve de evaluación de suicidio: fiabilidad interexaminadores [Short Protocol for Suicide Assessment: Inter-Examiner Reliability]. *Revista de Psiquiatría y Salud Mental*, *5*(1), 24-36. doi:10.1016/j.rpsm.2011.10.001
- Greger, H. K., Myhre, A. K., Lydersen, S., & Jozefiak, T. (2019). Previous maltreatment and present mental health in a high-risk adolescent population. Corrigendum.

- Grandclerc, S., De Labrouhe, D., Spodenkiewicz, M., Lachal, J., & Moro, M.R. (2016). Relations between Nonsuicidal Self-Injury and Suicidal Behavior in Adolescence: A Systematic Review. *PLOS ONE* 11(4), e0153760. doi:10.1371/journal.pone.0153760
- Hertz, M. F., Donato, I., & Wright, J. (2013). Bullying and suicide: A public health approach. *Journal of Adolescent Health*, 53(1), S1-S3.
- Hooley, J.M., Fox, K.R., & Boccagno, C. (2020). Nonsuicidal Self-Injury: Diagnostic Challenges and Current Perspectives. *Neuropsychiatric Disease and Treatment*, 16, 101-112. doi:10.2147/NDT.S198806
- Holt, M. K., Vivolo-Kantor, A. M., Polanin, J. R., Holland, K. M., DeGue, S., Matjasko, J. L., ... & Reid, G. (2015). Bullying and suicidal ideation and behaviors: A meta-analysis. *Pediatrics*, 135(2), e496-e509.
- Horváth, L. O., Balint, M., Ferenczi-Dallos, G., Farkas, L., Gadoros, J., Gyori, D., ... Balazs, J. (2018). Direct Self-Injurious Behavior (D-SIB) and Life Events among Vocational School and High School Students. *International Journal of Environmental Research and Public Health*, 15(6), 1068. doi:10.3390/ijerph15061068
- Hill, R. M., & Pettit, J. W. (2014). Perceived burdensomeness and suicide-related behaviors in clinical samples: Current evidence and future directions. *Journal of Clinical Psychology*, 70(7), 631-643.
- Hinduja, S., & Patchin, J. W. (2019). Connecting adolescent suicide to the severity of bullying and cyberbullying. *Journal of School Violence*, 18(3), 333-346.
- Instituto Nacional de Estadística-I.N.E. (2018). *Estadísticas de defunciones según causa de muerte* [Death statistics by cause of death]. Retrieved from <https://www.ine.es/dynt3/inebase/es/index.htm?padre=6181&capsel=6182>
- Jordan, J., & McNiel, D. (2019). Characteristics of persons who died on their first suicide attempt: Results from the National Violent Death Reporting System. *Psychological Medicine*, 1-8. doi:10.1017/S0033291719001375
- Kline, E. A. (2019). Exposure to Suicidal Behavior Predicts a Suicide Attempt, Depending on Past Psychiatric Diagnosis. *CUNY Academic Works*. Retrieved from https://academicworks.cuny.edu/hc_sas_etds/445
- Koyanagi, A., Oh, H., Carvalho, A.F., Smith, L., Haro, J.M., Vancampfort, D., ... DeVylder, J.E. (2019). Bullying victimization and suicide attempt among adolescents aged 12-15 years from 48 countries. *Journal of the American Academy of Child & Adolescent Psychiatry*, 58(9), 907-918.
- Levi-Belz, Y., Gavish-Marom, T., Barzilay, S., Apter, A., Carli, V., Hoven, C., ... & Wasserman, D. (2019). Psychosocial factors correlated with undisclosed suicide attempts to significant others: Findings from the Adolescence SEYLE Study. *Suicide and Life-Threatening Behavior*, 49(3), 759-773.
- López-Castroman, J., Pérez-Rodríguez, M. L., Jaussent, I., Alegría, A. A., Artes-Rodríguez, A., Freed, P., ... & European Research Consortium for Suicide (EURECA) (2011). Distinguishing the relevant features of frequent suicide attempters. *The Journal of Psychiatry Research*, 45(5), 619-25. doi:10.1016/j.jpsychires.2010.09.017
- López-Castroman, J., Baca-García, E., WORECA authors, Courtet, P., & Oquendo, M. A. (2015). A Cross-National tool for assessing and studying suicidal behaviors. *Archives of Suicide Research*, 19(3), 335-349. doi:10.1080/13811118.2014.981624
- Madsen, T., Agerbo, E., Mortensen, P. B., & Nordentoft, M. (2013). Deliberate self-harm before psychiatric admission and risk of suicide: Survival in a Danish national cohort. *The Social Psychiatry and Psychiatric Epidemiology*, 48(9), 1481-1489.
- Mars, B., Heron, J., Klonsky, E. D., Moran, P., O'Connor, R. C., Tilling, K., ... & Gunnell, D. (2019). What distinguishes adolescents with suicidal thoughts from those who have attempted suicide? A population-based birth cohort study. *Journal of Child Psychology and Psychiatry*, 60(1), 91-99.
- McMahon, S.M., Parker, G.G., & Miller, D.R. (2010). Evidence for a recent increase in forest growth. *Proceedings of the National Academy of Sciences*, 107, 3611-3615.
- Miron, O., Yu, K.H., Wilf-Miron, R., & Kohane, I.S. (2019). Suicide Rates Among Adolescents and Young Adults in the United States, 2000-2017. *Journal of the American Medical Association*, 321(23), 2362-2364. doi:10.1001/jama.2019.5054
- Poland, S., Lieberman, R., & Niznik, M. (2019). Suicide Contagion and Clusters-Part I: What School Psychologists Should Know. *Communique*, 47(5), 21-23.
- Ribeiro, J.D., Franklin, J.C., Fox, K.R., Bentley, K.H., Kleiman, E.M., Chang, B.P., & Nock, M.K. (2015). Self-injurious thoughts and behaviors as risk factors for future suicide ideation, attempts, and death: A meta-analysis of longitudinal studies. *Psychology Medicine*, 46(2), 225-236. doi:10.1017/S0033291715001804
- Rijsselberge, Van L., Portzky, G., & Heeringen, van C. (2009). Self-harm in adolescents in Flanders. *Dutch Journal of Psychiatry*, 51, 629-640.
- Runeson, B., Haglund, A., Lichtenstein, P., & Tidemalm, D. (2016). Suicide risk after nonfatal self-harm: A national cohort study, 2000-2008. *The Journal of Clinical Psychiatry*, 77(2), 240-246.
- Sadeniemi, M., Almeda, N., Salinas-Pérez, J.A., Gutiérrez-Colosía, M.R., García-Alonso, C., Ala-Nikkola, T., ... & Salvador-Carulla, L. (2018). A comparison of mental health care systems in northern and southern Europe: A service mapping study. *International Journal of Environmental Research and Public Health*, 15(6), 1133. doi:10.3390/ijerph15061133
- Samele, C., Frew, S., & Urquía, N. (2013). *European profile of prevention and promotion of mental health (EuroPoPP-MH)*. Brussels: European Commission
- Sánchez-Teruel, D., & Robles-Bello, M. A. (2014). Protective factors promoting resilience to suicide in young people and adolescents. *Papeles del Psicólogo*, 35(2), 181-192.
- Soto-Sanz, V., Ivorra-González, D., Alonso, J., Castellvi, P., Rodríguez-Marín, J., & Piqueras, J.A. (2019). Revisión sistemática de programas de prevención del suicidio en adolescentes de población comunitaria [Systematic review of adolescent suicide prevention programs in community populations]. *Revista de Psicología Clínica con Niños y Adolescentes*, 6(3), 62-75. doi: 10.21134/rpna.2019.06.2.1
- Tang, C. P., Hung, S. F., Lee, C. C., Ho, T. P., & Leung, P. W. (2019). 15-year computer-record study of adolescents exposed to peer suicide. *Hong Kong Medical Journal*, 25(3), 11-12.
- Vargas, P. A., & Robles, E. (2019). Asthma and allergy as risk factors for suicidal behavior among young adults. *Journal of American College Health*, 67(2), 97-112.
- Wasserman, D., Hoven, C.W., Wasserman, C., Wall, M., Eisenberg, R., Hadlaczky, G., Kelleher, I., ... & Carli, V. (2015). School-based suicide prevention programmes: The SEYLE cluster-randomised, controlled trial. *The Lancet*, 385(9977), 1536-1544. doi:10.1016/S0140-6736(14)61213-7
- Wolfe, K. L., Nakonezny, P. A., Owen, V. J., Rial, K. V., Moorehead, A. P., Kennard, B. D., & Emslie, G. J. (2019). Hopelessness as a predictor of suicide ideation in depressed male and female adolescent youth. *Suicide and Life-Threatening Behavior*, 49(1), 253-263.
- World Health Organization-WHO (2014). *Preventing suicide: A global imperative (Spanish version)*. Washington, DC: Panamerican Health Organization.
- World Health Organization-WHO (2018). *Practice manual for establishing and maintaining surveillance systems for suicide attempts and self-harm (Spanish version)*. Washington, DC: Panamerican Health Organization.
- Wenzel, A., Berchick, E. R., Tenhave, T., Halberstadt, S., Brown, G. K., & Beck, A. T. (2011). Predictors of suicide relative to other deaths in patients with suicide attempts and suicide ideation: A 30-year prospective study. *Journal of Affective Disorders*, 132(3), 375-382.