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Variables related to suicide attempt in a Spanish province over a three-year period (2009-2011)

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Abstract *The aim was to identify and describe sociodemographic and clinical variables in individuals who have made a suicide attempt. An analysis of electronically stored records on persons admitted to the emergency departments of a northern health district during the period 2009–2011 for mental disorders was conducted. The records of 826 patients (30.1% of the total), where 485 (58.7%) were female, aged between 14 and 94 years (M = 49.3; SD = 12.7), were selected. This amounted to 412 individuals (49.9%) who had made a suicide attempt, and were compared with others without prior suicide attempt. A binary logistic regression analysis was performed to examine the strongest predictors of suicide attempt. The results show that the risk of making a suicide attempt increases with age, those most at risk being aged 34 to 53 years ($p < 0.01$; OR = 6.99), female ($p < 0.05$; OR = 2.70) and unemployed ($p < 0.05$; OR = 4.98). The most predictive psychopathological diagnoses for suicide attempt were anxiety disorders ($p < 0.01$; OR = 3.95) and impulse control disorders/addictions ($p < 0.01$; OR = 3.76). The importance of creating specific risk and protection profiles when implementing contextualized health policies on suicide attempt prevention is discussed.*

Key words *Suicide attempt, Emergency department, Epidemiology, Mental health*

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Introduction

Suicide is among the three leading causes of non-accidental death worldwide[1]. The highest rates of death by suicide are recorded in Japan, Australia, the United States and Canada, and now also in emerging economies such as China and Brazil[2,3]. However, there do not appear to be differences in the number of suicide attempts between developed and developing countries[4].

Regarding the European Union, the latest published figures on completed suicides reveal significant differences among member states, with northern European countries being the most affected and Mediterranean countries the least affected[5]. That said, a downward trend in suicide rates has been observed across all these nations, except in Spain where a linear trend of increasing suicide mortality has been found[6]. The most recent data published in this country show suicide to be the leading external cause of death, well ahead of homicide and road traffic accidents[7]. There are, however, no official records available on suicide attempts, although estimates could place this figure at 120,000 suicide attempts per year[8], yielding significant financial and personal adverse effects[9].

There is a wide body of research that gives us varying and even contradictory results concerning the factors related to suicide attempt when compared with completed suicide[10,11]. Some studies have shown that certain sociodemographic (sex, age, unemployment) and clinical variables (active mental disorders) modulate, to a greater or lesser extent, the number of suicide attempts[8], and that this influence varies according to different geographical contexts[12].

As such, it would appear that suicide attempts are undertaken more frequently by women than by men, and that men resort to more lethal methods than their female counterparts[13]. However, gender-based modulation of suicide attempt varies from one country to another[12,14,15] and even from region to region within the same country[16-19]. There is also a strong relationship between sex and age relative to suicidal behavior[20]. Evidence seems to show that individuals aged between 16 and 39 years and those over 50 are at greater risk of completed suicide[11]. However, significant differences by age range are found when analyzing suicide attempt according to the country's different regions[21-23]. Therefore, there appear to be gaps in our knowledge of the most prevalent age for suicide attempt in Spain.

Marital status also seems to exert a degree of influence on completed suicide, although the most at-risk status for suicide attempt is not clear[24]. In fact, some studies identify separated or divorced individuals as being most at risk of making a suicide attempt[25], whereas others suggest that the single population is the most at-risk group[26] or even that marital status has no bearing whatsoever on suicide attempt[8,27].

Other variables such as economic situation and unemployment have a decisive

impact on completed suicide rates, especially in developed and developing countries[2,3,28]. However, results that emerge from analyses of unemployment and suicide attempt are limited, in particular during times of financial crisis[21]. Thus, recent studies have shown how unemployment modulates the seriousness of the suicide attempt[23,29], although this variable appears to be influenced by other factors such as sex, age and active psychological disorders[30-32].

From this perspective, it would appear that mood and psychotic disorders produce very high rates of completed suicide[26,33]. However, behavioral disorders, borderline personality disorder, addictions and anxiety disorders seem to be the strongest predictors of suicide attempt[4,34], the latter ones considered most predictive of repeated suicide attempts[35], although sex and age both modulate this influence[12,22].

Some health authorities have published effective clinical practice guidelines based on the evidence collated regarding attempted suicide[36]. However, the recommendations contained within have yet to make a sufficient impact in the emergency department context[37], given the highly heterogeneous nature of suicide attempt in terms of its sociodemographic and clinical variables by region and healthcare district in the respective country[11,38]. In the case of Spain, offering province-specific data of this kind holds special health and clinical relevance for several reasons. First, because of its implications for the suicide prevention public policies that could be adopted[13]. What is more, it facilitates data comparison across the country's provinces and autonomous communities[18]. And lastly, it responds to the current absence of official methods for recording attempts not resulting in death[6,33,39].

Consequently, the aim of this study was to identify and describe the sociodemographic and clinical variables of individuals who have made a suicide attempt, and to verify the most predictive sociodemographic and clinical variables for undertaking a suicide attempt. Furthermore, it was hypothesized that (i) suicide attempt would, for the most part, be explained by some sociodemographic variables such as sex, age and being

unemployed; and (ii) it would be explained by clinical variables including anxiety, impulse control and addictive disorders.

Methodology

Participants [subsubtítulo]

The sample comprised 826 medical records of people admitted to hospitals located in the northern district of Jaén (Spain) by the respective emergency departments during 2009, 2010 and 2011, a period of major economic crisis in Spain. The average population in Jaén's northern district during the period of study was 280,987 inhabitants. The total number of people admitted by the emergency departments of these district hospitals from 2009 through 2011 was 2,742 (2,467 admissions). The inclusion criteria were emergency admission to a regional district hospital for psychiatric assessment or referral to a regional mental health center. The adopted exclusion criteria were two or more readmissions over the same study period. A total of 826 individuals (30.1% of all emergency admittees) were selected, where 485 (58.7%) were female and 341 (41.3%) were male, aged between 14 and 94 years (M = 49.3; SD = 12.7), and presenting a range of sociodemographic and clinical characteristics (Table 1). The total sample was divided into persons who had been admitted for making a previous suicide attempt (412; 49.9%) and those who had been admitted for other reasons (414; 50.1%). Suicide attempters must have had a primary diagnosis of *suicidal intent*, *self-harming behavior* or *suicide attempt* recorded in their medical files. Spanish Data Protection Law (LOPD) 15/1999 concerning the protection of personal data (December 13, 1999) was adhered to at all times. Each patient's personal details (forename(s), surname(s), national identity card number (DNI for Spanish nationals), address and contact telephone number) were removed, assigning each record a number to prevent any information about the person's identify from being disclosed. In fact, favorable reports were previously obtained from the Ethical Research Committee at the University of Jaén and from the Andalusian Health Service Ethical Research Committee attached to the Department of Health of the Regional Government of Andalusia (Spain).

Table 1. Description of socio-demographic and clinical data from the sample.

	n (%)
Sex	
Female	485 (58.7)
Male	341 (41.3)
Age	
14 to 23 years	104 (12.6)
24 to 33 years	117 (14.1)
34 to 43 years	174 (21.1)
44 to 53 years	174 (21.1)
54 to 63 years	142 (17.2)
64 to 94 years	115 (13.9)
Marital status	
Single	261 (31.6)
Married	224 (27.1)
Separated/divorced	183 (22.2)
Common law partner	111 (13.4)
Widowed	47 (5.7)
Previous pathology	
Mood disorders	136 (16.5)
Anxiety disorders	145 (17.6)
Psychotic disorders	64 (7.7)
Personality disorders	111 (13.4)
Impulse control disorders /Addictions	128 (15.5)
Physical disorders	91 (11.0)
No prior diagnosis	151 (18.3)
Employment situation	
Unemployed	488 (59.1)
In work	338 (40.9)
Total	826

Measures and assessment tools

This study enlisted the help of healthcare personnel (one clinical psychologist and two emergency department nurses) to gather the data pertaining to the entire sample. Information on the individuals admitted by the hospitals' respective emergency departments was retrieved from the patients' electronically stored mental health records. This information was transferred to an Excel file which included the study's target variables: sex, age, marital status, previous pathology and employment situation. The staff trained to carry out this task obtained this information from a computer program called DIRAYA (Integrated Management and Information System for Health Care) belonging to the Autonomous Community of Andalusia. Paper-based medical records are replaced with a set of electronic

clinical records related to health and illness processes in digital format, guaranteeing electronic data transmission and complete confidentiality. Recent studies have posited that medical records (digital or on paper) are appropriate tools for evaluating mental health and suicide risk[40].

Procedure

Permission requests were submitted to the management of the public hospitals located in this southern Spanish province. Collaboration was then sought from healthcare personnel working at each of the hospitals' emergency departments, who were trained in data collection for the variables of interest. At the time of study, the participating staff had between 8 and 15 years' experience working at referral hospitals, and were trained in data collection over two sessions. Based on the collaborating healthcare staff's availability, the gathering of information took approximately three to four months to complete. Sociodemographic and clinical data on persons admitted by the hospitals' emergency departments in the northern health district of Jaén province were obtained.

Data analysis

In order to identify the presence of relationships between variables, χ^2 was calculated, generating a 95% confidence interval (CI) estimate, as well as the effect size (η^2) and statistical power. This was followed by an assessment of multivariate normality, multicollinearity on the sample, and an evaluation of the independence of errors in the independent variables (IVs), where the nominal, dichotomous dependent variable (DV) was artificially transformed into a metric variable. The indices needed to find the underlying assumptions were then applied. After, a binary logistic regression analysis using the intro method was performed, where DV would be the suicide attempt ("yes" or "no") and the IVs the sociodemographic and clinical variables. This method of analysis is the only one that allows dichotomous dependent variables into regression models. The statistical analysis of data was conducted using SPSS version 19.0. The significance level required for each test was set at $p < 0.05$ or $p < 0.01$.

Results

The results obtained in this study appear to show no differences between both groups (with and without suicide attempt) in any of the sociodemographic and clinical variables under study (χ^2 = between 2.98 and 19.26; $p > 0.05$). In addition, all variables demonstrated adequate effect size (η^2 = between 0.51 and 0.94) and adequate power (between 0.10 and 1) (Table 2).

Regarding the second hypothesis, a binary regression analysis using the intro method was performed. In order to assess the assumptions of independence of errors and non-multicollinearity, the dependent variable was transformed into a metric variable using SPSS-22. The results relating to the assumption of independence of errors obtained using the Durbin–Watson test indicate that this assumption is fulfilled for all of the independent variables (IVs) used as criteria. The assumption of non-multicollinearity is also fulfilled for all IVs, given that the value is below 10[41] (VIF= between 2.12 and 9.14). The result obtained for Roa's (χ^2) efficient score statistic indicates a significant improvement in predicting the probability of occurrence of the DV dichotomous categories (with and without suicide attempt) in persons that have been admitted by the emergency departments. Furthermore, the Nagelkerke values indicate that the prognostic model explains between 17.5% and 78.9% of the variance of the dependent variable according to the included independent variable. The power of the goodness-of-fit model test is high according to the Hosmer–Lemeshow statistic (0.831 to 0.982) (Table 3). All of these criteria provide an adequate prediction concerning the fulfilment of the assumptions needed in order to apply a binary logistic regression analysis, and offer a guarantee regarding the power of the prediction.

The analysis for predicting independent variables over the dichotomous dependent variable (with and without suicide attempt) has shown that some sociodemographic (sex, age, employment situation) and clinical aspects (anxiety disorder, impulse control disorder, addiction) predict the probability of occurrence of a suicide attempt, confirming the study's hypotheses. According to the results given in Table 4, the equation yields a positive beta (β) coefficient for each of the IVs (sex, age, previous pathology and employment situation) in the dependent variable (from 0.23 to 0.98), which tells us that they are all risk factors. The standard error is adequate, not exceeding 1 (SE from 0.01 to 0.17), and the

Wald hypothesis test statistic (equivalent to the t-value in simple and multiple regressions) indicates that these independent variables are good (significant) predictors of suicide risk (H0: β = 0) (p = between .00 and 02). Specifically, the beta values and the odds ratios (CI 95%) reveal that the variables 'being female', 'age' (between 24 and 53 years), 'having a previous pathology' (anxiety, impulse control disorder, addiction) and 'being unemployed' are the sociodemographic and clin-

Table 2. Description of sociodemographic and clinical data from the sample with and without suicide attempt.

	With suicide attempt (%)	Without suicide attempt (%)	χ^2	df	p	η2***	power
Sex							
Female	268(65.0)	260(62.8)	13.98	1	0.92^{ns}	0.72	0.89
Male	144(35.0)	154(37.2)					
Age							
14 to 23 years	67(16.2)	57(13.8)	19.26	5	0.83^{ns}	0.94	1.00
24 to 33 years	82(20.0)	85(20.5)					
34 to 43 years	111(26.9)	110(26.6)					
44 to 53 years	89(21.6)	91(21.9)					
54 to 63 years	33(8.0)	36(8.7)					
64 to 94 years	30(7.3)	35(8.5)					
Marital status							
Single	131(31.8)	130(31.4)	2.98	4	0.97^{ns}	0.51	0.10
Married	113(27.4)	111(26.8)					
Separated/divorced	90(21.8)	93(22.5)					
Common law partner	56(13.6)	55(13.3)					
Widowed	22(5.4)	25(6.0)					
Previous pathology							
Mood disorders	43(10.4)	53(12.7)		6			
Anxiety disorders	89(21.6)	86(20.8)					
Psychotic disorders	30(7.3)	24(5.8)					
Personality disorders	82(19.9)	79(19.1)					
Impulse control disorders /Addictions	91(22.1)	97(23.4)					
Physical disorders	10(2.4)	11(2.7)					
No prior diagnosis	67(16.3)	64(15.5)					
Employment situation							
Unemployed	269(65.8)	263(63.5)	14.1	1	0.34^{ns}	0.91	0.96
In work	143(34.2)	151(36.5)					
Total	412	414					

df = degree of freedom; *p < .05; **p < .01; ns = not significant; ***Effect size *(Eta-squared)*.

Table 3. Assumptions of independence of errors, Roa's efficient score statistic, Nagelkerke R^2 and power of the test (Hosmer–Lemeshow) for the independent variables (sociodemographic and clinical) in persons admitted by emergency departments (N = 826).

IVs	D–W	VIF	χ^2	df	-2Log(LR)	Nagelkerke R^2	H–S
Sex	2.03	9.14	41.03*	1	8.12	0.175	---
Age	1.86	7.16	9.78**	1	0.34	0.609	0.831
Previous pathology	6.26	3.22	4.12**	1	0.13	0.789	0.982
Employment situation	4.38	2.12	5.34**	1	0.22	0.682	0.834

D–W = Durbin–Watson test; VIF= Variance inflation factor-VIF (multicollinearity statistic); χ^2 = Roa's efficient score statistic test; *p < 0.05 ** p < 0.01; ns = not significant; -2Log(LR)= Log-likelihood ratio minus 2; Nagelkerke R^2= Explained variance for each IV; H–S = Hosmer–Lemeshow statistic or power of the test.

Table 4. Values of the regression equation for the independent variables (sociodemographic and clinical) in persons admitted by emergency departments (N = 826).

IV	β	SE	Wald	DF	OR	CI (95%) for OR	
						LL	UL
Sex (female)	0.36	0.17	3.41*	1	2.70	2.23	3.11
Age (24–33 years)	0.23	0.01	4.78*	1	4.72	3.22	4.98
Age (34–33 years)	0.42	0.29	3.45*	1	2.89	1.29	3.11
Age (34–53 years)	0.31	0.03	6.73**	1	6.99	5.45	8.01
Previous pathology (anxiety)	0.83	0.07	3.34**	1	3.95	2.40	4.01
Previous pathology (ICD/addiction)	0.98	0.04	2.25**	1	3.76	2.93	4.89
Employment situation (unemployed)	0.43	0.11	7.28*	1	4.98	1.62	2.45

β = beta coefficient; SE = standard error; Wald = power of the test statistic; p = Significance level; *p < 0.05 ** p < 0.01; ns = not significant; OR = Odds ratio or result of the regression equation-Exp. (β).

ical factors most likely to lead to a suicide attempt among the population under study.

Discussion

The aim of this study was to identify and describe the sociodemographic and clinical variables of individuals who have made a suicide attempt in a province in southern Spain, and to verify which sociodemographic and clinical variables are most predictive for undertaking a suicide attempt in this region. The hypotheses were that suicide attempt would, for the most part, be explained by some sociodemographic variables such as sex, age and being unemployed, as well as by clinical variables including anxiety, impulse control and addictive disorders.

The findings of this study reveal that sex, specifically being female, is a risk factor for suicide attempt in this southern Spanish province, as posited in earlier studies addressing other parts of Spain[16,18]. These findings are also in line with other international studies that tackle the issue of suicide attempt in European countries[32]. This could be explained by the fact that women tend to use less lethal suicide methods than men, as reported in previous research[21], and also because they are quick to seek help at the first signs of emotional problems[14,24]. Here we are reminded of the tremendous importance of taking this demographic variable into account when implementing effective prevention programs on the stages prior to completed suicide, such as those of suicide attempt.

In addition, the data collected in this study regarding the age ranges most vulnerable and at risk for suicide attempt confirm what many national and international authors and organizations have to say about it; that is, the age range particularly at risk is 15 to 44 years (for both sexes) in developed and developing countries[7,11,42-45]. This study shows that being between 24 and 53 years of age is a high risk factor for suicide attempt and, specifically, the 34 to 53 years age range is the most at risk. This fact could be explained by the vulnerability that plays out at these stages of life, where certain adverse situations (work-related problems, relationship problems, lack of social support, etc.) cause higher levels of stress compared with other important stages in a person's life. As such, this may be a factor that modulates the appearance of psychological disorders or aggravates them, as claimed in previous studies[19,46]. Thus, it is particularly important to consider the person's age and the difficult situations they are likely to face in order to gauge the risk level for a suicide attempt, as reflected in other findings[23,31]. This would not only help to determine what risk level a suicide attempt entails, but it would also reveal which ages are most vulnerable to a more lethal repeat attempt, enabling us to implement completed suicide prevention programs in a much more targeted and accurate way.

Furthermore, the results of this study confirm that marital status is not a predictor of suicide attempt in this southern Spanish province. These results echo those of other previous studies which argue that holding one or another marital status does not affect the risk of making a suicide attempt[27], and that other variables present higher predictive levels[35]. Unemployment, meanwhile, is an extremely important factor in countries like Spain, which has the highest rates of unemploy-

ment and temporary hiring practices in the European Union[47]. In fact, the results of this study, compiled in the midst of an economic crisis in Spain, reveal that being unemployed may have a decisive influence on making a suicide attempt, as reported in previous literature[23], some reviews and meta-analyses[29]. Although Spain has policies in place for combating unemployment, these proposed actions do not appear to improve the living standards and well-being of the population, which can lead to poor mental health and a rise in suicide rates among the unemployed. This aspect certainly needs to be taken into account in order to make improvements to the social protection system that serves the unemployed.

Furthermore, international health authorities claim that individuals who present previous and active mood or psychotic disorders are at particular risk for completed suicide[11]. However, the results related to suicide attempts seem to follow a different trend, contradicting other studies[4]. In fact, the findings of this research reveal that anxiety, impulse control/addictive disorders are the strongest predictors among the sample of people who had made a suicide attempt, as demonstrated in other recent studies[34], some of which were conducted in European countries such as France and Spain[35]. These findings are in line with prior studies on suicide attempts in other regions of Spain[8,16,21], including some which were carried out in the south of the country yielding similar results to those presented here[30]. This surprising result might be explained by the modulation of variables such as sex and age in suicide attempt, coinciding with other earlier studies[35]. The transition from attempted to completed suicide is of crucial interest when it comes to global suicide prevention, and some sociodemographic and clinical variables are especially significant in this regard. The findings of this study therefore highlight the importance of certain clinical variables such as anxiety and impulse control/addictive disorders in the transition from suicide attempt to more lethal suicidal behavior.

In line with other previous findings, the regression analysis performed in this study on individuals who had undertaken a suicide attempt in the south of Spain shows sex, age, unemployed status and anxiety and impulse control/addictive disorders to be the strongest predictors for suicide attempt[14,22]. Specifically, these sociodemographic and clinical variables under study explained between 17.5% and 78.9% of the variance in making a suicide attempt in a southern Spanish province, which supports other findings relating to this autonomous community (Jaén)[30]. This study offers a very specific profile of the people who make a suicide attempt in this regional context. Specifically, they are female, aged between 24 and 53 years, unemployed and diagnosed with anxiety or impulse control/addictive disorders. Thus, this research not only underlines the importance of cultural and sociodemographic variables when analyzing suicide attempt, but it also highlights which variables should be considered when developing and implementing prevention programs that address this behavior in specific subpopulations, as put forward by other authors[14]. What is more, its most novel contribution lies in the modulation of the clinical variables, unlike completed suicide, such as the presence of anxiety or impulse control and addictive disorders when it comes to assessing suicide.

In recent years, professional bodies and health authorities across Spain have started to view suicide as a real public health issue[36,43]. However, given the multifactorial origin of this conduct, we are still dealing with many unknowns. To our knowledge, this is the first study to explore which sociodemographic and clinical variables are the strongest predictors for suicide attempt using data from records held by emergency departments in this southern Spanish province. However, this study has identified limitations associated with the procedure behind obtaining data based on digitalized medical records. Previous studies have already raised the issue of exercising due caution in interpreting results obtained using these types of procedures when assessing suicide attempts[35]. However, in many countries with high completed suicide rates, health records and statistics on attempts are either non-existent or seldom updated[33]. There are a few exceptions to the case, such as the Republic of Ireland, where they have started to officially register the number of suicide attempts based on data from emergency departments[48]. Furthermore, the lack of culturally adapted scales related to suicide attempt, and not merely translations, continues to be a methodological challenge for this type of analysis[39]. Both these facts may justify the methodology used in the present research. Future studies addressing this pre-completed suicide stage would do well to employ mixed method data collection, where culturally adapted self-report measures should form a substantial part of the applied methodology. Another of this study's limitations is the tremendous regional contextualization of the data obtained, which makes it difficult to generalize the results. However, earlier

studies have posited that cultural and other factors exert a tremendous influence on the analysis of suicide attempts[12,14]. Thus, there is a need to analyze this behavior in specific geographical contexts in order to learn more about the factors that modulate it, and to consider contextualized public prevention policies that combat this pre-completed suicide stage.

Collaborations

D Sánchez-Teruel worked on the preparation and final drafting of this article; AG León conducted the literature review; MR Fernández-Amela y Herrera collected the sociodemographic and clinical data from Hospital 1; M González-Cabrera collected the sociodemographic and clinical data from Hospital 2; JA Muela-Martínez conducted the data analysis and methodology of this article.

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