

## Characteristics and Unidimensionality of Non-Suicidal Self-Injury in a Community Sample of Spanish Adolescents

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### Abstract

**Background:** Few studies have explored the prevalence and unidimensional structure of Non-Suicidal Self-Injury (NSSI) in Spanish adolescents. **Method:** In this study, we estimated the prevalence, types, and functions of NSSI in 1,733 Spanish adolescents, and we tested the unidimensional factorial structure of non-suicidal self-injury. **Results:** 24.6% of the adolescents referred to having self-injured at least once during their lifetime, and 12.7% had self-injured using more severe methods of NSSI. The most frequent types of NSSI were interfering with wounds (14.6%), scratching (12.5%), and hitting (11.7%). We found no differences between genders in NSSI frequency. The majority of the participants who self-injured referred to intrapersonal functions. The confirmatory factor analyses of the ISAS-I structure showed a single factor with 10 items, thus supporting the unidimensionality of the construct of NSSI. **Conclusions:** NSSIs reflect difficulties in regulating emotions or managing interpersonal relationships in young Spanish people, and these behaviours seem to constitute a unique and latent dimension. Thus, there is a need for intervention programmes focused on managing problems of emotional regulation and maladaptive self-injury behaviours.

**Keywords:** Non-suicidal self-injury, Confirmatory Factor Analyses (CFA), adolescents, ISAS-I.

### Resumen

**Características y Unidimensionalidad de las Autolesiones No Suicidas en una Muestra Comunitaria de Adolescentes Españoles. Antecedentes:** muy pocos estudios han explorado la prevalencia y la estructura unidimensional de las autolesiones no suicidas (ANS) –ISAS-I– en adolescentes españoles. **Método:** en este estudio, estimamos la prevalencia, tipos y funciones de las ANS en 1.733 adolescentes españoles y probamos la estructura factorial unidimensional de las ANS. **Resultados:** un 24,6% de los adolescentes refirieron haberse autolesionado al menos una vez en su vida, y un 12,7% se autolesionaron utilizando métodos más graves. Los tipos más frecuentes de ANS fueron interferir en la curación de heridas (14,6%), rascarse (12,5%) y golpearse (11,7%). No encontramos diferencias por género en la frecuencia de las ANS. La mayoría de los participantes que se autolesionaron refirieron funciones intrapersonales. El análisis factorial confirmatorio para la estructura de los tipos de ANS mostró un factor único con 10 ítems, apoyando así la unidimensional del constructo de ANS. **Conclusiones:** las ANS reflejan dificultades para regular las emociones o manejar las relaciones interpersonales en los jóvenes españoles y estos comportamientos parecen constituir una dimensión única y latente. Por lo tanto, es necesaria la existencia de programas de intervención enfocados en el manejo de problemas de regulación emocional y de conductas autolesivas no suicidas en este tipo de población.

**Palabras clave:** autolesiones no suicidas, estructura unidimensional, prevalencia, tipos, adolescentes españoles.

Non-Suicidal Self-Injury (NSSI) is any deliberate self-directed, and intentional damage or destruction of bodily tissue that is likely to induce bleeding, bruising, or pain, but without suicidal intent and for purposes that are not socially sanctioned. It includes methods that involve skin cutting, burning, stabbing, hitting, scraping, or carving, among others (Klonsky et al., 2011). Due to its inclusion in the Diagnostic and Statistical Manual of Mental Disorders - 5th edition ([DSM-5] American Psychiatric Association [APA], 2013) and the rising prevalence of self-harm behaviours in adolescent populations (Olfson et al., 2005), studies on NSSI in adolescents have increased in the past decade.

Adolescence has been found to be a period when the risk of participating in self-injurious behaviours increases (e.g. Plener et al., 2015). In fact, this behaviour seems to be highly prevalent among college students, with prevalence rates ranging from 2.9% in Sweden (Larsson & Sund, 2008) to 42% in Italy (Cerutti et al., 2011), with an average of 18% across studies in different countries (Muehlenkamp et al., 2012). The elevated heterogeneity in these rates has been explained by differences in assessment methods. Lower rates have been found when using a single-item response (NSSI-yes or no) than when using a multiple-item response method, even for the assessment of different types of NSSI (e.g. Madge et al., 2008; Swannell et al., 2014). In a recent meta-analysis, after controlling for the methodologies employed, Swannell et al. (2014) identified a cross-cultural average rate of NSSI in adolescents of 17.2%. Only a few studies have considered the frequency of NSSI according to criteria A of the DSM-5 (APA, 2013) (e.g. a minimum of 5 self-injury behaviours in the previous year) to estimate NSSI

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prevalence, finding very low rates of about .3-.8 % (e.g. Buelens et al., 2020; Zetterqvist et al., 2013). Finally, in a study carried out in Spain with a community sample of 1864 adolescents, Calvete et al. (2015) found that more than half of the sample showed such behaviour in the past year, and 32.2% had carried out severe NSSI behaviours (e.g. cutting, burning, scraping, or erasing skin, tattooing oneself).

The literature has shown differences in the methods that are considered non-suicidal self-injuries. In its definition of NSSI, the DSM-5 (APA, 2013) includes behaviours such as cutting, burning, stabbing, hitting, or excessive rubbing. In the construction of the Inventory of Statements about Self-injuries, Klonsky and Glenn (2009) included methods such as banging/hitting oneself, biting, burning, carving, cutting, wound picking, needle-sticking, pinching, hair pulling, rubbing skin against rough surfaces, severe scratching, and swallowing chemicals.

Moreover, Nock and Prinstein (2004) considered non-suicidal self-injuries to be actions such as cutting or carving on the skin, picking at a wound, hitting oneself, scraping skin to draw blood, biting oneself, picking areas of the body to the point of drawing blood, inserting objects under the skin or nails, tattooing, burning one's skin, pulling out one's own hair, or erasing skin to draw blood. These authors included these methods in the construction of the Functional Assessment of Self-Mutilation (FASM) measure of NSSI (Nock & Prinstein, 2004). To date, the majority of studies exploring the structure of NSSI behaviours and functions have mainly paid attention to the functional structure of NSSI (Dahlström et al., 2015; Klonsky & Glenn, 2009; Muehlenkamp et al., 2019; Nock & Prinstein, 2004). To our knowledge only a few studies (Bildik et al., 2012; Klonsky & Olino, 2008) have explored the overall score for these behaviours, based on the idea that they represent unique phenomena, and in a most recent work, Evans and Simms (2018) examined the latent structure of the broader construct of self-harm. Both in the original work by Klonsky and Olino (2008) and in Bildik et al.'s (2012) study, the authors performed internal consistency analysis for NSSI behaviours from the ISAS, and they reported quite high internal consistency rates. In addition, Bildik et al. (2012) pointed out the different frequency and severity of the diverse NSSI types, highlighting that calculating the frequency of behaviours directly could produce misleading results (e.g. cutting oneself ten times is not comparable to rubbing one's skin the same number of times). In addition, Evans and Simms (2018) examined whether suicidality and non-suicidal self-injury lie on a single dimension (one factor model) or two separate dimensions (two correlated factors or a bifactor model, the latter with a general self-harm factor and two specific and orthogonal factors). Findings supported the bifactor model, suggesting that suicidality and NSSI represent dimensions of self-harm that overlap but not entirely, and that there is more unique variance associated with NSSI than with suicidality. These results thus indicate that NSSI represents a unique dimension, supporting Joiner's interpersonal theory of suicide (Joiner, 2005) in which NSSI although represents a means to acquire capability for suicide, is neither necessary nor sufficient for the development of suicidality.

Despite this argument, the literature supports the idea that the greater the frequency and types of NSSI, the greater the severity of the psychopathology of people who self-injure (e.g. Klonsky & Olino, 2008; Lloyd-Richardson et al., 2007). In addition, the number of different types of NSSI has been found to be a risk factor for suicide (e.g. Fox et al., 2015; Pérez et al., 2018).

Within this framework, it remains unclear whether the different types of NSSI lie on a continuum of different levels of severity and complexity, where higher levels represent the more frequent and severe NSSI types, or whether different NSSI types represent qualitatively different phenomena. The former would lead us to acknowledge that the sum or frequency of NSSI behaviours constitutes a unique and dimensional construct of "non-suicidal self-injury" or unidimensional construct of NSSI. To date, to the best of our knowledge, only Evans and Simms' study have explored the latent structure of self-harm and, in an indirect way, the unidimensional structure of NSSI. For this reason, the main aims of this study were: first, to estimate the prevalence, types, and functions of NSSI in the study participants; and, second, to test the unidimensional factorial structure of non-suicidal self-injury and its discriminant validity in a community sample of adolescents. In line with literature in Europe we expected to find a prevalence of NSSI around 20%, and a unidimensional structure of NSSI types. Moreover, we expected to find positive and statistically significant relationships between NSSI types and emotional dysregulation. Emotional dysregulation has been found to be related with NSSI given that NSSI seem to be behaviours that serve as dysfunctional emotional regulators (e.g., Fox et al., 2015; Gratz & Roemer, 2004; Pérez et al., 2020).

## Method

### Participants

The inclusion criteria were that participants had to be males or females between 12 and 19 years old and provide their informed consent and/or that of their parents. We followed the World Health Organization (WHO, 2003) definition of adolescents as people from 10 to 19 years old. The exclusion criterion was that either the students and/or their parents did not agree to participate in the study. Participants were given appropriate instructions to complete the assessment protocol. All participants understood Spanish.

The study sample was composed of lower secondary, high school, and first-year university students from different provinces in Spain in order to estimate the prevalence and nature of non-suicidal self-injury in Spanish adolescents. The sample was recruited between September 2016 and June 2018. A total of 1,733 students between 12 and 19 years old were assessed in terms of socio-demographic characteristics, types and functions of NSSI, and a subset of psychological variables that were analysed in a broader risk-factor study of NSSI. In addition, 25% of participants ( $n = 452$ ) came from the Valencian Community, 22% ( $n = 403$ ) from the Basque Country, 17% ( $n = 301$ ) from la Rioja, 25% ( $n = 452$ ) from the Community of Madrid, 6% ( $n = 104$ ) from Castilla La Mancha, 6% ( $n = 112$ ) from Castilla-León, and 4% ( $n = 65$ ) from Aragón.

Regarding gender, 809 (46.7 %) were men, and 924 (53.3 %) were women. In relation to age, the mean age was 15.76 ( $SD = 1.77$ ). A total of 138 (7.96 %) adolescents were 12 years old; 187 (10.79%) were 13 years old; 325 (18.75%) were 14 years old; 415 (23.95 %) were 15 years old; 290 (16.73%) were 16 years old; 220 (12.69%) were 17 years old; 67 (3.87%) were 18 years old, and 81 (4.67%) were 19 years old.

For the data collection, 701 (40.5 %) participants used a smartphone to fill in the questionnaires, and 1,032 (59.5 %) participants used a computer, always with the help of one or two

members of the research team. Of the total number of adolescents approached, 82 (4.57 %) of them did not agree to participate or did not finish the complete subset of questionnaires and, thus, were removed from the study sample.

### Instruments

*Inventory of Statements about Self-Injury (ISAS)* (Klonsky & Glenn, 2009; Spanish version Pérez et al., 2019). The first part of the inventory (ISAS-I) asks about the lifetime frequency of 12 different NSSI behaviours performed intentionally and without suicidal intent: banging/hitting self, biting, burning, carving, cutting, wound picking, needle-sticking, pinching, hair pulling, rubbing skin against rough surfaces, severe scratching, and swallowing chemicals. Adolescents were asked to answer how many times they had injured themselves. This question leads to strong variability, very large numbers, and extremely skewed distributions. Therefore, the responses were rescaled into a few “theoretically” meaningless ordinal categories (Likert-type): no presence of any NSSI type; between 1 and 4 times; between 5-50 times; 51-100 times; and more than 100 times. We chose 5 Likert categories for clinical and methodological reasons. First, following the DSM 5 (APA, 2013), three categories should be the better option, as the DSM5 considers that 5 or more NSSI behaviours in the last year are sufficient to diagnose NSSI disorder. However, literature has highlighted that the greater the frequency of NSSI, the greater the severity of psychopathology (Klonsky & Olino, 2008), and that higher frequency and different types of NSSI are related to a higher probability of future suicide behaviour (Klonsky et al., 2013; Pérez et al., 2019). Moreover, clinical experience has shown that patients who self-injure more than 100 times present much more severe psychopathology and prognoses than those who do so between 5 and 50 times. Second, recent and previous methodological studies have pointed out that scales with five-points, ten-points, and seven- points scored highest on “ease of use” and, in relation to “expressing feeling adequacy”, rating scales with more options obtained higher ratings from respondents (Preston & Colman, 2000). In addition, previous studies also stated that reliability increases from 2-point to 6-point or 7-point scales (Nunnally, 1967). Thus, the main reason for choosing 5 categories rather than 3 or 4 was, first, methodological, given that, in terms of reliability and validity, scales with higher point scales are preferred. The second reason, as stated, above, was clinical, with different experts in NSSI considering that NSSI frequency was better represented by a 5-point category.

The second part of the ISAS (ISAS-II) assesses 13 NSSI interpersonal and intrapersonal functions: Interpersonal functions (Autonomy, Interpersonal Boundaries, Interpersonal Influence, Peer-Bonding, Revenge, Self-Care, Sensation Seeking, and Toughness), and Intrapersonal functions (Affect Regulation, Anti-Dissociation, Anti-Suicide, Marking Distress, and Self-Punishment). We found adequate internal consistency for both interpersonal ( $\alpha = .94$ ) and intrapersonal functions ( $\alpha = .97$ ) in our sample.

*Difficulties in Emotion Regulation Scale (DERS)* (Gratz & Roemer, 2004). This scale assesses different features of the emotion regulation process. The Spanish version used in this study (Hervás & Jódar, 2008) consists of 28 Likert-type items with five response levels. It includes five subscales: lack of control of emotions, non-acceptance of emotions, interference of emotions in life, emotional

inattention, and emotional confusion. In the present study, the total scale showed excellent internal consistency,  $\alpha = .89$ . For the subscales, Cronbach’s alpha was adequate: inattention,  $\alpha = .81$ ; lack of control,  $\alpha = .87$ ; confusion,  $\alpha = .71$ ; non-acceptance,  $\alpha = .83$ ; and interference,  $\alpha = .87$ . Discriminant validation of the unidimensional structure was tested using the DERS in this study.

### Procedure

The study procedure was approved by the ethical committees of the Catholic University of Valencia Saint Vincent Martyr (Valencia, Spain). Students were recruited through classroom announcements and consent letters sent home by the direction of the school centres. Students and families received information about the objectives of the research and the type of evaluation that would be administered to students. Participants signed informed consent in the classroom, and parents signed an informed consent when students were under age. Participation was voluntary and anonymous, and participants did not receive any compensation for participating in this study. Moreover, privacy and confidentiality from parents were ensured to avoid interfering with the reliability of the volunteers’ responses.

### Data analysis

We estimated sample and NSSI characteristics through descriptive statistics and frequencies. To test differences in presence and frequencies of NSSI between genders we carried out  $t$  and  $\chi^2$  tests.

First, we turned the ISAS-I into a 5-range scale: 1= no presence of any NSSI type; 2 = between 1 and 4 times; 3 = between 5 and 50 times; 4 = between 51 and 100 times; 5 = more than 100 times. Second, to test the unidimensionality of the ISAS-I (that is, that the different NSSI behaviours constitute a unique and dimensional phenomenon and not qualitatively different behaviours), we carried out a Confirmatory Factor Analysis (CFA) (Muthén & Muthén, 2007) using the JASP free software (JASP Team, 2020). Model fit was evaluated using several criteria: Chi-square, CFI, TLI, SRMR, and RMSEA. The following cut-offs were used to determine good fit: CFI and TLI above .90 (better if above .95), and SRMR and RMSEA below .08 (better if below .05) (Hair et al., 2006). Because the ranged version of the ISAS-I is an ordinal scale and it was not possible to assume multivariate normality (Mardia’s coefficient normalized estimate was  $> 5$ ), the Diagonally Weighted Least Squares (DWLS) method with robust estimation was used. In addition to these indexes, the acceptability of the model was evaluated based on the strength and interpretability of the parameter estimates and the absence of large and meaningful modification indices. Because the Burning and Swallowing chemicals NSSI types from the model tested for the ISAS-I (Model 1 henceforth) showed a corrected-homogeneity index score of .31, they were removed, and a 10-item model for the ISAS-I (Model 2 henceforth) was tested with confirmatory procedures. To choose the best model (Model 2), the expected cross-validation index (ECVI) was used (Schermellech-Engel et al., 2003). Subsequent analyses were performed with the ISAS-I-10 Items.

To report the discriminant validity of the ISAS-I correlations between the total scale and its subscales and the DERS and its subscales were calculated.

Results

Prevalence, types, and functions of NSSI

In the whole sample, 431 (24.6%) adolescents referred to having self-injured at least one time during their lifetime. The mean age of those who had self-injured was 14.85 (*SD* = 1.67). Moreover, 222 (12.7%) adolescents self-injured using more severe NSSI (cutting, burning, pinching with needles, or stabbing). In addition, according to the DSM-5 A criteria, 255 (16.4%) adolescents self-injured more than 5 times. In relation to gender, no statistically significant differences were found between men and women in the frequency of NSSI behaviours,  $t(1724) = 1.23, p = .221$ . This was also the case when considering presence versus absence of NSSI,  $\chi^2 = 1.52, p = .218$ , and when considering those who did and did not meet the DSM criteria for NSSI frequency,  $\chi^2 = .035; p = .852$ .

When comparing lower secondary, high school, and first-year university groups, we found statistically significant differences in NSSI frequency between university students and those from lower secondary,  $p = .007$ , and high school,  $p = .004, F = 5.35, p = .005$ .

In the total sample, 82 (4.7%) adolescents cut themselves, 216 (12.5%) scratched themselves hard, 81 (10.5%) bit themselves, 202 (11.7%) hit themselves, 30 (1.7%) burned themselves, 253 (14.6%) interfered with wounds healing, 41 (2.4%) carved themselves, 124 (7.2%) rubbed their skin hard, 170 (9.8%) pinched themselves, 35 (2%) pricked themselves with needles, 144 (8.3%) pulled their hair, and 44 (2.5%) swallowed dangerous substances. Table 1 shows groups of frequencies (1-4, 5-50, 51-100, and more than 100 times) for each NSSI type. The NSSI types with higher frequencies (more than 5 times during their lifetime) were: interfering with wounds (13.6%), scratching severely (10.6%), banging (10%), biting (7.9%), and pinching (7.8%). Cutting was not the most common form of NSSI, but 3.4% of the participants cut themselves more than 5 times, and 1.2% did so more than 50 times. In addition, of the participants who self-injured, 18.6% cut themselves.

As for the functionality of the NSSI, of the 222 participants who self-injured severely, 99 (46.7%) of them self-injured due to intrapersonal functions, and 49 (29.7%) due to interpersonal functions. Of those, 64 (28.2%) referred to both intrapersonal and interpersonal functions. The rest of the participants did not specify their reasons for self-injury. Moreover, 119 (54.3%) participants who self-injured referred to using self-injury for emotional regulation, 76 (34.7%) to establish interpersonal boundaries, 99 (45.2%) to punish themselves, 85 (38.8%) to receive care from others, 98 (44.7%) to avoid dissociation, 88 (33.8%) to avoid suicide, 59 (26.9%) for sensation-seeking, 32 (14.6%) for peer bonding, 54 (24.7%) to influence others, 67 (30.6%) to show toughness, 93 (42.5%) as a way of marking distress, 31 (14.2%) for revenge, and 52 (23.7%) to show autonomy.

Means, standard deviations, and internal consistency of the model for the ISAS-I obtained in the present study

Cronbach's alpha for the total scale of the ISAS-I in Table 2 was .85. Table 1 shows means, standard deviations, and corrected item-total correlations. In general, all the items were homogeneous enough with the whole scale, except for burning and swallowing chemicals, with an  $r = .31$ , which is on the limit of an acceptable level of consistency (Nunnally & Bernstein, 1994). These results

suggest that the items are well related to each other and might be suitable for measuring a single construct.

Factor Structure of the ISAS-I

A CFA for the ISAS-I types in ranges was specified (Model 1), with a single factor explaining all the indicators in the scale. The model showed a good fit (Hu & Bentler, 1999):  $\chi^2(54) = 77.290, p = .020, CFI = .991, TLI = .989, SRMR = .076, RMSEA = .016 [.006, .023]$ . However, because the Burning and Swallowing chemicals NSSI types showed a corrected-homogeneity index on the limit of acceptability, they were removed, and a 10-item model (Model 2) was tested, showing a better fit (Hu & Bentler, 1999):  $\chi^2(35) = 44.450, p = .131, CFI = .996, TLI = .995, SRMR = .059, RMSEA = .013 [.000, .023]$ . The ECVI suggested that Model 2 was preferable to Model 1: ECVI = .049 and .073 respectively (Table 3).

Figure 1 shows the model obtained for the ISAS-I (Model 2), that is, the ISAS-I-10 Items. All parameters were significant at the .05 level. The ISAS-I-10 Items showed good internal consistency,  $\alpha = .85$ .

*Table 1*  
ISAS-I types, frequencies and percentages

NSSI types	Number of times n (% of the total sample)			
	1-4	5-50	51-100	>100
Cutting	23 (1.3)	38 (2.2)	14 (.8)	7 (.4)
Biting	46 (2.7)	110 (6.4)	20 (1.2)	5 (.3)
Burning	12 (.7)	16 (.9)	1 (.1)	1 (.1)
Carving	7 (.4)	27 (1.6)	1 (.1)	6 (.3)
Pinching	34 (2)	104 (6)	18 (1)	14 (.8)
Pulling hair	30 (1.7)	96 (5.5)	12 (.7)	6 (.3)
Scratching	33 (1.9)	130 (7.5)	31 (1.8)	22 (1.3)
Banging/hitting	28 (1.6)	129 (7.4)	29 (1.7)	16 (.9)
Interfering with wounds	18 (1)	159 (9.2)	49 (2.8)	27 (1.6)
Rubbing skin	25 (1.4)	82 (4.7)	11 (.6)	6 (.3)
Sticking needles	9 (.5)	24 (1.4)	1 (.1)	1 (.1)
Swallowing chemicals	16 (.9)	20 (1.2)	5 (.3)	3 (.2)

*Table 2*  
Means, standard deviations, Cronbach alpha for total ISAS-I, and corrected item-total correlations ( $r_{ii}$ )

	M	SD	$r_{ii}$	$\alpha$
NSSI types	1.81	4.19		.85
Cutting	.09	.47	.45	
Biting	.20	.63	.68	
Burning	.03	.24	.31	
Carving	.05	.35	.41	
Pinching	.20	.66	.65	
Pulling hair	.16	.57	.61	
Scratching	.27	.78	.67	
Banging/hitting	.25	.73	.64	
Interfering with wounds	.34	.87	.57	
Rubbing skin	.14	.54	.55	
Sticking needles	.04	.27	.41	
Swallowing chemicals	.05	.33	.31	

Table 3  
Fit indexes for the two models analysed in the current study

Model	SB $\chi^2$	$\Delta$ SB $\chi^2$	df	$\Delta$ df	p	CFI	TLI	RMSEA [90% CI]	SRMR	$\Delta$ CFI	$\Delta$ TLI	$\Delta$ RMSEA	$\Delta$ SRMR	ECVI
Model 1	77.290		54		.020	.991	.989	.016 [.006, .023]	.073					.073
Model 2	44.450	32.84	35	19	.131	.996	.995	.013 [.000, .023]	.059	.005	.006	.003 [.006, .000]	.014	.049

Note: Model 1 = The ISAS-I-12 Items; Model 2 = The model for the ISAS-I when removing both the Burning and Swallowing chemicals ISAS-I types (ISAS-I-10 Items)

Discriminant validity of the ISAS-I-10 items

The ISAS-I total-scale showed positive and significant correlations with the DERS-total and subscales (Table 4) in the

expected direction, given what the scales are supposed to assess. The only exception was the inattention scale, which did not show statistically significant correlations with the ISAS-I or its subscales (Table 4).

Discussion

The main objectives of the present study were twofold: (1) to estimate the prevalence, types, and functions of NSSI in the study participants; and (2) to test the unidimensional factorial structure of non-suicidal self-injury included in the ISAS-part I and to test its discriminant validity in a community sample of Spanish adolescents.

Estimated prevalence of NSSI types and functionality

In our study, 24.6% of the adolescents evaluated referred to having self-injured at least once during their lifetime, and 12.7% had self-injured using NSSI methods that are considered more severe (cutting, burning, pinching with needles, or stabbing). In the only previous study carried out in Spain to explore NSSI prevalence in a community sample of adolescents, Calvete et al. (2015) found that more than half of the participants had self-injured, and that 32.2% did so using more dangerous methods. Both figures represent a higher frequency of NSSI than what was found in our study, even though the focus groups were in the same age range. However, it is worth mentioning that the instrument used to assess NSSI in Calvete’s study, the Functional Assessment of Self-Mutilation FASM (Lloyd-Richardson et al., 2007), includes NSSI behaviours such as biting one’s lips, thus increasing the prevalence of NSSI due to the higher rate but low severity of some behaviours. In fact, this NSSI type was the most prevalent, endorsed by 48% of the sample. In general, our rates are close to the 17-18% indicated as the average across studies and countries (Muehlenkamp et al., 2012; Swannell et al., 2014).

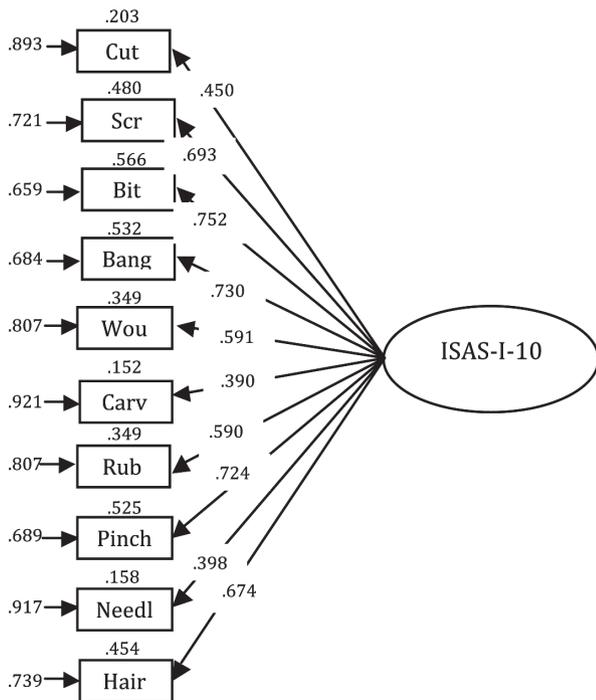


Figure 1. Model for the ISAS-I-10 Items obtained in the current study  
Note: Values at the top of each rectangle are R<sup>2</sup>; values at the left of each rectangle are errors; Cut = Cutting; Scr = Scratching; Bit =Biting; Bang = Banging; Woun = Interfering with wounds healing; Carv = Carving; Rub = Rubbing skin; Pinch = Pinching; Needl = Needle sticking; Hair = Pulling hair

Table 4  
Correlations between the DERS and the ISAS-I-10 types

	ISAS-I-10 types										
	ISAS I-10	Cut	Bit	Carv	Pinch	Pull	Scrac	Bang	Woun	Rub	Needl
DERS total	.32***	.30***	.24***	.21***	.24***	.23***	.22***	.29***	.19***	.15***	.17***
Lack of control	.30***	.29***	.24***	.18***	.24***	.24***	.19***	.27***	.17***	.13***	.16***
Non-Acceptance	.30***	.30***	.20***	.19***	.21***	.20***	.20***	.25***	.15***	.14***	.16***
Interference	.23***	.19***	.20***	.11***	.16***	.18***	.16***	.23***	.14***	.10***	.11***
Inattention	-.02	-.040	-.020	.004	-.002	-.030	.008	-.025	-.008	.005	-.022
Confusion	.17***	.16***	.13***	.17***	.11***	.08**	.12***	.14***	.11***	.08***	.12***

Note: Cut = Cutting; Bit = Biting; Carv = Carving; Pinch = Pinching; Pull = Pulling hair; Scrac = Scratching severely; Bang = Banging; Woun = Interfering wound healing; Rub = Rubbing; Needl = Pinching with needles  
p < .05; \*\* p < .01; \*\*\* p < .001

According to the DSM-5 A criteria, 16.4% of adolescents self-injured 5 times or more in our study. Few studies have considered criteria A of the DSM-5 to estimate the prevalence of NSSI in community samples of adolescents. One of them, Zetterqvist et al. (2013), found a lower percentage of adolescents -6.7%- who met criteria A of the DSM-5. We have to highlight that in this previous study, the authors used a conservative approach and excluded NSSI behaviours such as picking at a wound, biting oneself (mouth or lip), or pulling one's hair, which are included in the FASM, due to their trivial nature. Thus, this difference in assessment methods could explain differences in the estimated prevalence.

The most frequent types of NSSI in our general sample were: interfering with wounds (14.6%), scratching (12.5%), hitting (11.7%), biting (10.5%), and rubbing the skin (9.8%). In addition, 4.7% of the adolescents cut themselves, 3.4% did so more than 5 times, and 1.2% did so more than 50 times. Similar frequencies were found by Zetterqvist et al. (2013), especially in relation to cutting. These authors found that 11.7% of the sample endorsed this type of NSSI, and 2.1% more than eleven times. However, other studies have found a higher prevalence of cutting, such as the study by Bjärehed et al. (2012) in Sweden, which found a frequency of 15.1% for this behaviour.

In our sample, we did not find gender differences in NSSI frequency, nor between those adolescents who self-injured -severely or not- and those who did not. Evidence of the existence of gender differences in the likelihood of self-harming has been equivocal (Rasmussen et al., 2016). Whereas some studies have not found any gender differences in adolescents and young adults (Gratz et al., 2002; Hilt et al., 2008), others have found that girls are significantly more likely to self-harm than boys (O'Connor et al., 2009, 2012). Future studies should explore possible socio-demographic and cultural factors explaining these differences.

Regarding the motives for NSSI, almost half of the participants who self-injured severely referred to intrapersonal functions, whereas a third referred to interpersonal functions. The most frequent functions, present in half of the sample who self-injured, were related to emotional regulation, self-punishment, marking distress, or avoiding dissociation. A third of the adolescents who self-injured mentioned motives such as avoiding suicide, establishing interpersonal boundaries, wanting to receive care from others, wanting to influence others, sensation-seeking, or showing toughness. According to previous research, in adolescents, NSSI have several functions (Rasmussen et al., 2016). Moreover, the literature supports our results, suggesting that non-suicidal self-injury is a way to manage psychological pain and distress (Klonsky & Glenn, 2009; Nock & Prinstein, 2004), thus reinforcing the notion that, for the majority of young people, self-harm is not primarily a manipulative act (Rasmussen et al., 2016). Our results, in addition, support the two-factor structure of motives for self-harm.

#### *Structural validity and unidimensional structure of ISAS-I*

With regard to the second objective of this study, to test the unidimensional structure of non-suicidal self-injury, the CFA for the original ISAS-I (Klonsky & Glenn, 2009) showed a single factor that includes the different types of NSSI, excluding two types of NSSI behaviours -burning and swallowing chemicals- because they showed a corrected-homogeneity index on the limit of acceptability, thus supporting the unidimensionality of the construct of non-suicidal self-injury. As mentioned above, the

different items representing different types of NSSI in the 10-item scale were homogeneous enough with the whole scale, suggesting that they are well related to each other and might be suitable for measuring a single construct.

The only NSSI types with lower consistency levels,  $r = .31$ , which were excluded from the model, were burning and swallowing chemicals. We can explain this result by noting that these two types of self-injuries were less frequent in our sample (1.7% and 2.5%, respectively), and, in the latter case, swallowing dangerous substances has not always been considered a self-injurious behaviour and is not included in every NSSI definition or assessment instrument. Swallowing chemicals is a dangerous behaviour that can be related to the intention to die, due to its unclear danger limit. Moreover, it does not fit some definitions of NSSI (i.e. "deliberate destruction of one's own body tissue in the absence of suicidal intent"; Nock & Favazza, 2009). For this reason, future studies should clarify whether taking dangerous substances should be considered a type of NSSI. In the case of burning, a more dangerous and severe behaviour than other NSSI types (i.e. hitting or rubbing), it has been found to be less frequent in adolescents in this study (1.2%) than in previous studies with Spanish adolescents (Calvete et al., 2015), who found that 6% of their sample used this type of NSSI. In addition, we found it present in all the age ranges assessed in our study (from 12 to 19 years), and thus it is not related to more chronic or older participants. Future studies should explore the specific role of burning in adolescents and its inclusion in the continuum of NSSI.

Consistent with our results, previous studies analysing the internal consistency of the NSSI behaviours in the ISAS-I have reported quite high internal consistency rates (Bildik et al., 2012; Klonsky & Olino, 2008). However, Bildik et al. (2012) pointed out that there are NSSI types with different levels of severity that might not be comparable when calculating the frequency of these types of behaviours. In addition, Evans and Simms (2018) found evidence supporting a bifactor model of self-harm with a general self-harm factor and two specific and orthogonal factors -suicidality and NSSI-. In other words, NSSI and suicidality represent related phenomena that lie in the continuum of self-harm, but are qualitative distinct, differing on motivation towards death, clearly present in suicide behaviours and -at least theoretically- not always present in NSSI. Thus, these results suggest that suicidality and NSSI represent related but independent dimensions and, in line -at least partially- with our results, that NSSI represents a unique dimension.

In this regard, our study is the first to test the unidimensional factorial structure of the ISAS-part I using CFA in Spanish adolescents, providing evidence of a continuum of non-suicidal self-injury in adolescents and, thus, showing that these behaviours constitute one unique phenomenon with different levels of severity and that do not constitute qualitative different phenomena. Previous evidence supports the idea that the greater the frequency and types of NSSI, the greater the severity of the psychopathology of the person who self-injures (e.g. Klonsky & Olino, 2008; Lloyd-Richardson et al., 2007). In addition, the number of different types of NSSI performed has been found to be a risk factor for suicide (e.g. Fox et al., 2015; Pérez et al., 2019). This evidence and our results suggest that different types of NSSI found on the continuum of non-suicidal self-injury constitute a unique phenomenon linked to intrapersonal or interpersonal motivations that, in turn, could be linked to a heightened risk of suicide.

Finally, different types of NSSI were related positively with emotional dysregulation. Previous research has found similar results (Fox et al., 2015), suggesting that emotional dysregulation represents related but distinct phenomena.

#### Limitations and future directions

This is the first study to explore the unidimensionality of ISAS-I in Spanish adolescents and the second study to explore NSSI in a large community sample of adolescents in Spain. However, it has some limitations. Our sample was composed of 1,733 adolescents from 12 to 19 years old. Thus, the results cannot be generalized to clinical samples, which usually display more severe types of NSSI. Thus, future studies should explore the unidimensionality of NSSI in clinical samples. Moreover, this is a cross-sectional study with a non-randomised sample, and so our results provide an estimated prevalence of NSSI. Furthermore, longitudinal studies could test the predictive power of this unidimensional construct in the future prediction of affective disorders, NSSI, and suicide behaviours. Moreover, we did not assess data about former or present psychological treatments, mental illness, pharmacotherapy, or drug intake, and so we did not control the role of these variables

in NSSI. In addition, the possible effect of auto-selection should be mentioned. Despite the limitations, our results show that about a quarter of adolescents have self-injured at some time in their lives, and about 13% have done so in a more severe way. These figures should make us reflect on the difficulties some young people have in regulating their emotions and solving personal or interpersonal problems adaptively, and the need to explore risk factors for these types of behaviours. In addition, as other authors have pointed out (Evans & Simms, 2018) findings in relation to unidimensionality of NSSI should not be interpreted as a suggestion of a true representation of the latent structure of NSSI. Furthermore, it is well known that NSSI have been found to be predictors of future suicide attempts (e.g. Pérez et al., 2019; Scott et al., 2005). Finally, prevention and intervention programmes should focus on exploring emotion regulation problems and maladaptive self-injury behaviours in young people at school, and on working on emotions, problem solving, interpersonal skills, self-expression, anxiety, self-care, self-image, executive functions, and self-esteem, in collaboration with families, starting from pre-school education. These prevention programs could be considered in order to keep adolescents from engaging in more serious self-harm behaviours, such as suicide attempts.

#### References

- American Psychiatric Association (2013). *Diagnostic and Statistical Manual of Mental Disorders* (5th Ed.) (DSM- 5). American Psychiatric Publishing.
- Bildik, T., Somer, O., Basay, B., Basay, Ö., & Özbaran, B. (2013). The validity and reliability of the Turkish version of the inventory of statements about self-injury. *Turkish Journal of Psychiatry*, 24(1), 49-57. <https://doi.org/10.5080/u6901>
- Bjärehed, J., Wångby-Lundh, M., & Lundh, L. G. (2012). Nonsuicidal self-injury in a community sample of adolescents: Subgroups, stability, and associations with psychological difficulties. *Journal of Research on Adolescence*, 22(4), 678-693. <https://doi.org/10.1111/j.1532-7795.2012.00817.x>
- Calvete, E., Orue, I., Aizpuru, L., & Brotherton, H. (2015). Prevalence and functions of non-suicidal self-injury in Spanish adolescents. *Psicothema*, 27(3), 223-228. <https://doi.org/10.7334/psicothema2014.262>
- Dahlström, Ö., Zetterqvist, M., Lundh, L. G., & Svedin, C. G. (2015). Functions of nonsuicidal self-injury: Exploratory and confirmatory factor analyses in a large community sample of adolescents. *Psychological Assessment*, 27(1), 302. <https://doi.org/10.1037/pas0000034>
- Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (2010). *Multivariate data analysis* (Vol. 7). Prentice Hall.
- Crumbaugh, J. C., & Maholick, L. T. (1969/1981). *Manual of instructions for the purpose in life test*. Viktor Frankl Institute of Logotherapy.
- Evans, C.M., & Simms L.J. (2019). The latent structure of self-harm. *Journal of Abnormal Psychology*, 128(1), 12-24. <https://doi.org/10.1037/abn0000398>
- Fox, K. R., Franklin, J. C., Ribeiro, J. D., Kleiman, E. M., Bentley, K. H., & Nock, M. K. (2015). Meta-analysis of risk factors for nonsuicidal self-injury. *Clinical Psychology Review*, 42, 156-167. <https://doi.org/10.1016/j.cpr.2015.09.002>
- Gratz, K. L., & Roemer, L. (2004). Multidimensional assessment of emotion regulation and dysregulation: Development, factor structure, and initial validation of the difficulties in emotion regulation scale. *Journal of Psychopathological Behavior*, 26(1), 41-54. <https://doi.org/10.1023/B:JOBA.0000007455.08539.94>
- Gratz, K. L., Conrad, S. D., & Roemer, L. (2002). Risk factors for deliberate self-harm among college students. *American Journal of Orthopsychiatry*, 72(1), 128-140. <https://doi.org/10.1037/0002-9432.72.1.128>
- Hair, J. F., Anderson, R. E., Tatham, R. L., & Black, W. C. (2006). *Multivariate Data Analysis* (6th. ed.). Pearson Prentice Hall.
- Hervás, G., & Jódar, R. (2008). Adaptación al castellano de la Escala de Dificultades en la Regulación Emocional [Spanish adaptation of the Difficulties in Emotion Regulation Scale]. *Clínica y Salud*, 19(2), 139-156.
- Hilt, L. M., Nock, M. K., Lloyd-Richardson, E. E., & Prinstein, M. J. (2008). Longitudinal study of non-suicidal self-injury among young adolescents: Rates, correlates, and preliminary test of an interpersonal model. *Journal of Early Adolescence*, 28(3), 455-469. <https://doi.org/10.1177/0272431608316604>
- Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, 6(1), 1-55. <https://doi.org/10.1080/10705519909540118>
- JASP Team. (2020). JASP (Version 0.14). [Computer software]. <https://jasp-stats.org/download/>
- Joiner, T. (2005). *Why people die by suicide*. Harvard University Press.
- Klonsky, E. D., & Glenn, C. R. (2009). Assessing the functions of non-suicidal self-injury: Psychometric properties of the Inventory of Statements about Self-injury (ISAS). *Journal of Psychopathological Behavior*, 31(3), 215-219. <https://doi.org/10.1007/s10862-008-9107-z>
- Klonsky, E. D., May, A. M., & Glenn, C. R. (2013). The relationship between nonsuicidal self-injury and attempted suicide: Converging evidence from four samples. *Journal of Abnormal Psychology*, 122(1), 231. <https://doi.org/10.1037/a0030278>
- Klonsky, E. D., & Olino, T. (2008). Identifying clinically distinct subgroups of self-injurers among young adults: A latent class analysis. *Journal of Consulting and Clinical Psychology*, 76(1), 22-27. <https://doi.org/10.1037/0022-006X.76.1.22>
- Klonsky, E. D., Muehlenkamp, J. J., Lewis, S. P., & Walsh, B. (2011). *Nonsuicidal self-injury*. Hogrefe.
- Larsson, B., & Sund, A.M. (2008). Prevalence, course, incidence and 1-year prediction of deliberate self-harm and suicide attempts in early adolescents. *Suicide and Life-Threatening Behaviour*, 38(2), 152-165. <https://doi.org/10.1521/suli.2008.38.2.152>
- Lloyd-Richardson, E. E., Perrine, N., Dierker, L., & Kelley, M. L. (2007). Characteristics and functions of non-suicidal self-injury in a community

- sample of adolescents. *Psychological Medicine*, 37(8), 1183-1192. <https://doi.org/10.1017/S>
- Madge, N., Hewitt, A., Hawton, K., De Wilde, E. J., Corcoran, P., Fekete, S., van Heeringen, K., De Leo, D., & Ystgaard, M. (2008). Deliberate self-harm within an international community sample of young people: Comparative findings from the Child & Adolescent Self-harm in Europe (CASE) Study. *Journal of Child Psychology and Psychiatry*, 49(6), 667-677. <https://doi.org/10.1111/j.1469-7610.2008.01879.x>
- Muehlenkamp, J. J., Claes, L., Havertape, L., & Plener, P. L. (2012). International prevalence of non-suicidal self-injury and deliberate self-harm. *Child and Adolescent Psychiatry and Mental Health*, 6(1), 1-10. <https://doi.org/10.1186/1753-2000-6-10>
- Muehlenkamp, J. J., Suzuki, T., Brausch, A. M., & Peyerl, N. (2019). Behavioral functions underlying NSSI and eating disorder behaviors. *Journal of Clinical Psychology*, 75(7), 1219-1232. <https://doi.org/10.1002/jclp.22745>
- Muthen, L. K., & Muthen, B. O. (2007). *Mplus statistical software*. Muthén & Muthén.
- Nock, M. K., & Prinstein, M. J. (2004). A functional approach to the assessment of self-mutilative behavior. *Journal of Consulting and Clinical Psychology*, 72(5), 885. <https://doi.org/10.1037/0022-006X.72.5.885>
- Nunnally, J. C. (1967). *Psychometric theory*. McGraw-Hill.
- Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric Theory* (McGraw-Hill Series in Psychology. Vol. 3). McGraw-Hill.
- O'Connor, R. C., Rasmussen, S., & Hawton, K. (2009). Predicting deliberate self-harm in adolescents: A six month prospective study. *Suicide and Life-Threatening Behavior*, 39(4), 364-375. <https://doi.org/10.1521/suli.2009.39.4.364>
- O'Connor, R. C., Rasmussen, S., & Hawton, K. (2012). Distinguishing adolescents who think about self-harm from those who engage in self-harm. *British Journal of Psychiatry*, 200(4), 330-335. <https://doi.org/10.1192/bjp.bp.111.097808>
- Olfson, M., Gameroff, M. J., Marcus, S. C., Greenberg, T., & Shaffer, D. (2005). Emergency treatment of young people following deliberate self-harm. *Archives of General Psychiatry*, 62(10), 1122-1128. <https://doi.org/10.1001/archpsyc.62.10.1122>
- Pérez, S., García-Alandete, J., Cañabate, M., & Marco, J.H. (2020). Confirmatory factor analysis of the Inventory of Statements about Self-injury in a Spanish clinical sample. *Journal of Clinical Psychology*, 76(1), 102-117. <https://doi.org/10.1002/jclp.22844>
- Pérez, S., Ros, M. C., Folgado, J. E., & Marco, J. H. (2019). Non-suicidal Self-injury Differentiates Suicide Ideators and Attempters and Predicts Future Suicide Attempts in Patients with Eating Disorders. *Suicide and Life-Threatening Behavior*, 49(5), 1220-1231. <https://doi.org/10.1111/sltb.12521>
- Plener, P. L., Schumacher, T. S., Munz, L. M., & Groschwitz, R. C. (2015). The longitudinal course of non-suicidal self-injury and deliberate self-harm: A systematic review of the literature. *Borderline Personality Disorder and Emotional Dysregulation*, 2, 1-11. <https://doi.org/10.1186/s40479-014-0024-3>
- Preston, C.C., & Colman, A.M. (2000). Optimal number of response categories in rating scales: Reliability, validity, discriminating power, and respondent preferences. *Acta Psychologica*, 104(1), 1-15. [https://doi.org/10.1016/s0001-6918\(99\)00050-5](https://doi.org/10.1016/s0001-6918(99)00050-5)
- Rasmussen, S., Hawton, K., Philpott-Morgan, S., & O'connor, R. C. (2016). Why do adolescents self-harm? *Crisis*, 37(3), 173-186. <https://doi.org/10.1027/0227-5910/a000369>
- Schermellech-Engel, K., Moosbrugger, H., & Müller, H. (2003). Evaluating the fit of structural equation models: Tests of significance and descriptive goodness-of-fit measures. *Methods of Psychological Research Online*, 8(2), 23-74.
- Scott, L. N., Pilkonis, P. A., Hipwell, A. E., Keenan, K., & Stepp, S. D. (2015). Non-suicidal self-injury and suicidal ideation as predictors of suicide attempts in adolescent girls: A multi-wave prospective study. *Comprehensive Psychiatry*, 58, 1-10. <https://doi.org/10.1016/j.comppsy.2014.12.011>
- Swannell, S. V., Martin, G. E., Page, A., Hasking, P., & St. John, N. J. (2014). Prevalence of nonsuicidal self-injury in nonclinical samples: Systematic review, meta-analysis and meta-regression. *Suicide and Life-Threatening Behavior*, 44(3), 273-303. <https://doi.org/10.1111/sltb.12070>
- World Health Organization (2003). *Adolescent friendly health services: An agenda for change*. World Health Organization. <https://apps.who.int/iris/handle/10665/67923>
- Zetterqvist, M., Lundh, L. G., Dahlström, Ö., & Svedin, C. G. (2013). Prevalence and function of non-suicidal self-injury (NSSI) in a community sample of adolescents, using suggested DSM-5 criteria for a potential NSSI disorder. *Journal of Abnormal Child Psychology*, 41(5), 759-773. <https://doi.org/10.1007/s10802-013-9712-5>