

SENTIA: An Adolescent Suicidal Behavior Assessment Scale

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Abstract

Background: The main objective of this work was to design and validate a new measuring instrument, called SENTIA, for assessing suicidal behavior in Spanish adolescents. **Method:** a total of 1790 randomly selected students participated in the survey. The average age was 15.70 ($SD=1.26$), 53.7% of the sample were girls. **Results:** The results of exploratory factor analyses suggested that the dimensional structure that best explained the SENTIA scores was a bifactor model, specified in a general suicidal behavioral factor plus three specific factors (Ideation, Communication, and Act/Planning). SENTIA scores demonstrated adequate levels of reliability. None of the SENTIA items showed differential functioning by gender. SENTIA scores were positively associated with suicidal ideation, symptoms of depression, emotional and behavioral problems, and psychotic-like experiences. **Conclusions:** SENTIA is a useful, easy, brief measuring instrument that has been specifically constructed and validated for the assessment of suicidal behavior in Spanish adolescents. As a screening tool, SENTIA can help the analysis, evaluation, understanding, and intervention in a the major socio-health problem that is suicide.

Keywords: adolescents, suicidal behavior, evaluation, prevention, SENTIA.

Resumen

SENTIA: Escala para la evaluación de la conducta suicida en adolescentes. **Antecedentes:** el objetivo principal de este trabajo fue construir y validar un instrumento de medida, denominado SENTIA, para la evaluación de la conducta suicida en adolescentes españoles. **Método:** participaron 1790 estudiantes seleccionados mediante un muestreo estratificado por conglomerados. La media de edad fue 15,70 ($DT= 1,26$), siendo el 53,7% chicas. **Resultados:** los resultados del análisis factorial exploratorio sugirieron que la estructura dimensional que mejor explicaba las puntuaciones de SENTIA consistía en un modelo bifactor, concretado en un factor general de conducta suicida más tres factores específicos (Ideación Suicida, Comunicación Suicida y Acto/Planificación Suicida). Las puntuaciones de SENTIA mostraron adecuados niveles de fiabilidad. Ningún ítem de SENTIA mostró funcionamiento diferencial en función del género. Las puntuaciones de SENTIA se asociaron positivamente con ideación suicida, síntomas de depresión, problemas emocionales y comportamentales y experiencias psicóticas atenuadas. **Conclusiones:** SENTIA es un instrumento de medida sencillo, breve y útil que ha sido construido y validado específicamente para la evaluación de la conducta suicida en jóvenes españoles. SENTIA, como herramienta de cribado, puede ayudar a analizar, evaluar, comprender e intervenir en un problema socio-sanitario de primer orden como es la conducta suicida.

Palabras clave: adolescentes, conducta suicida, evaluación, prevención, SENTIA.

Suicide is a global health problem (WHO, 2014). Consummated suicide is the second most-common cause of death in adolescents and young adults worldwide. It is also one of the main causes of premature death and years of disability associated in life (Catalá-López et al., 2013; WHO, 2014). Suicidal behavior is a multidimensional and multifactorial phenomenon associated with stigma. Its conceptual delimitation, etiology, assessment, prevention, and intervention is a complex task with no easy solution (e.g., O'Connor & Pirkis, 2016). Currently, many questions related to suicidal behavior are still unanswered. One of these questions is related to the lack of conceptual definition and associated taxonomy (Goodfellow et al., 2018), something that also affects assessment, intervention, and prevention.

As a multidimensional construct, suicidal behavior manifests in different ways. Its phenotypic expressions vary from suicidal ideation, through suicidal communication and planning, to suicidal acts and consummation (Anseán, 2014; O'Connor & Nock, 2014; O'Connor & Pirkis, 2016). The level of suicide risk depends on biological underpinnings (e.g. diathesis), psychological factors (e.g., frequency, distress, desire to die), and environmental variables (e.g., life events, cultural factors). Etiological models of suicidal behavior focus on the complex interaction between biological, psychological, and social factors (Klonsky et al., 2016; O'Connor & Pirkis, 2016).

In Spain in 2017, a total of 3679 individuals died by suicide (INE, 2016). The prevalence of suicidal behavior during adolescence is high. In a meta-analysis, Lim et al., (2019) found that the lifetime prevalence and the 12 month prevalence for suicide attempts in adolescents was 6% (95% CI: 4.7-7.7%) and 4.5% (95% CI: 3.4-5.9%), respectively. In addition, for suicidal ideation the lifetime and 12-month prevalence was 18% (95% CI: 14.2-22.7%) and 14.2% (95% CI: 11.6-17.3%), respectively. Gender,

as a demographic factor, also affects suicide rates. For instance, in samples of adolescents and young adults, women have a higher risk of suicide attempts (OR 1.96; IC 95% 1.54-2.50), and men have higher risks of suicide consummation (HR 2.50; IC 95% 1.8-3.6) (Miranda-Mendizabal et al., 2019). Furthermore, adolescents with suicidal behaviors have, among other things, more mental health problems (e.g., emotional and behavioral issues, substance abuse), as well as lower quality of life, self-esteem, and emotional regulation (Fonseca-Pedrero et al., 2018; Hawton et al., 2012; O'Connor & Nock, 2014; Turecki & Brent, 2016).

Suicidal behavior is a major public health issue because of its prevalence and because of the associated consequences on personal, family, educational, and socio-health levels. Thus, the priority national strategies should be prevention (Fernández-Artamendi et al., 2019; O'Connor & Pirkis, 2016). Suicide prevention requires the reliable detection and identification of possible high-risk cases, as well as early preventative intervention. Previous studies have shown the efficacy of suicide prevention strategies (Zalsman et al., 2016). Schools are a particularly important venue for establishing prevention programs. For instance, school-based awareness and screening programs have been shown to reduce suicide attempts and suicidal ideation (O'Connor & Pirkis, 2016; Zalsman et al., 2016). It is worth noting that multiple risk and protective factors need still to be assessed (e.g., across agents, various measures) (Franklin et al., 2017) for proper evidence-based suicide prevention.

Suitable assessment requires measuring instruments with adequate psychometric properties in order to guide evidence-based decisions. There are a wide range of measuring instruments for the assessment of suicidal behaviors in the literature (e.g., Batterham et al., 2015; Runeson et al., 2017). Some of the most widely-used are the Columbia Suicide Severity Rating Scale (C-SSRS) (Posner et al., 2011), the Beck Scale for Suicide Ideation (BSS) (Beck et al., 1979), or the Paykel Suicide Scale (PSS) (Paykel et al., 1974). The PSS has demonstrated adequate psychometric properties in Spanish adolescents (Fonseca-Pedrero et al., 2018). Nevertheless, to the best of our knowledge, there is no specific tool to use in the Spanish context designed and validated for the assessment of suicidal behavior in adolescents. Thus, it is necessary to develop specific screening tools for suicidal behavior that can be used with Spanish adolescents following the international standards for test construction (e.g., Lane et al., 2016; Muñoz & Fonseca-Pedrero, 2019). An assessment tool specifically developed for Spanish adolescents will improve the capacity to understand, analyze, evaluate, and prevent suicidal behavior.

Within this research context, the main goal of the present study was to develop and validate a psychometric tool to assess suicidal behavior, called SENTIA, in the adolescent Spanish population. The following specific objectives arise from this general objective: a) to analyze the prevalence rates of suicidal behavior; b) to study the internal structure underlying the SENTIA scores; c) to estimate the reliability of the SENTIA scores; d) to analyze the relationship of SENTIA scores with psychometric indicators of mental health and well-being; and e) to establish the corresponding normative data.

Method

Participants

We conducted stratified random cluster sampling at the classroom level in a population of about fifteen thousand students

from La Rioja. The layers were created considering the type of school (public/private) and the stage of schooling (compulsory, post-compulsory, and vocational training), where the probability of classroom extraction was determined as a function of the total number of students. The students belonged to 30 schools and 98 classes. The study was carried out in 2019.

The initial sample comprised 1,972 students, and we removed those with high scores (more than two points) on the Oviedo Infrequency Scale (Fonseca-Pedrero et al., 2009) (more than two points) ($n = 146$) or who were over 19 years old ($n = 36$). Thus, there were a total of 1,790 students in the final sample, 816 boys (45.6%), 961 (53.7%) girls, and 13 (0.7%) with gender diversity. The mean age was 15.70 years old ($SD = 1.26$), ranging from 14 to 18 years old (14-years-old $n=342$; 15-years-old $n=541$; 16-years-old $n=410$; 17-years-old $n=299$, and 18-years-old $n=198$). A total of 89.4% of the participants were Spanish.

We used a cross validation sampling method for the analysis. The final sample of 1,790 was randomly divided into three different subsamples. The first random subsample was composed of 620 students (275 boys; 44.4%), mean age 15.65 ($SD = 1.28$). The second subsample was composed of 566 students (250 boys; 44.2%), mean age 15.65 ($SD = 1.28$). The third subsample was composed of 604 students (291 boys; 48.2%), mean age 15.76 ($SD = 1.26$). No statistically significant differences were found between the three subsamples, either by gender or age.

Instruments

The Adolescent Suicidal Behavior Assessment Scale (SENTIA). The SENTIA scale is a self-report instrument designed for the assessment of suicidal behavior for adolescents. It is composed of 16 items in dichotomic format (yes/no). The SENTIA items are shown in Table 1.

The Prodromal Questionnaire-Brief (PQ-B) (Loewy et al., 2011). The PQ-B is a psychosis-risk screening measure containing 21 dichotomic items (true/false). The PQ-B presents additional questions regarding extent/severity of impairment and distress, rated on a Likert-type scale (1="Strongly disagree"; 5="Strongly agree"). The Spanish adaptation of the PQ-B has demonstrated adequate psychometric properties (Fonseca-Pedrero et al., 2016).

The Paykel Suicide Scale (PSS) (Paykel et al., 1974). The PSS is a self-report tool designed for the evaluation of suicidal behavior. It consists of a total of 5 items with a dichotomous response system (Yes/No). Higher scores are related with high severity of suicidal ideation. The Spanish adaptation of the PSS has demonstrated adequate psychometric properties (Fonseca-Pedrero et al., 2018; Fonseca-Pedrero & Albéniz, 2020).

The Strengths and Difficulties Questionnaire (SDQ) (Goodman, 1997). The SDQ is a self-report instrument widely used to screen for mental health difficulties and prosocial behaviour. The SDQ consists of a total of 25 items distributed across five subscales: Emotional symptoms, Behavior problems, Hyperactivity, Peer problems, and Prosocial behavior. We used a Likert-type response format with three options (0 = "Not true", 1 = "Somewhat true", 2 = "Certainly true"). The validated Spanish version of the SDQ was used in the present study (Ortuño-Sierra et al., 2015).

The Personal Wellbeing Index-School Children (PWI-SC) (Cummins & Lau, 2005). The PWI-SC contains eight items about satisfaction, corresponding to different quality of life domains: standard of living, personal health, achievement in life, personal

relationships, personal safety, feeling part of the community and future security. In this research, we used only the first item of the PWI-SC (overall satisfaction). The PWI-SW has been validated with samples of Spanish adolescents (Fonseca-Pedrero, 2017).

The Reynolds Adolescent Depression Scale-Short Form (RADS-SF) (Reynolds, 2002). The RADS-SF is a self-report summary for assessing the severity of depressive symptomatology in adolescents. It consists of a total of 10 elements in a Likert type response format with 4 options (1 = “almost never”; 4 = “almost always”). In this study, we used the version adapted and validated for Spanish adolescents (Ortuño-Sierra et al., 2017).

The Rosenberg Self-esteem Scale (Rosenberg, 1965). This instrument allows us to assess self-esteem. It consists of 10 items that are scored on a 4-point Likert scale (1 = “Strongly disagree”; 4 = “Strongly agree”). In this study, we used the Spanish version, which has adequate psychometric properties (Fonseca-Pedrero, 2017).

The Oviedo Infrequency Scale (INF-OV) (Fonseca-Pedrero et al., 2009). INF-OV was administered to the participants to detect those who responded in a random, pseudorandom or dishonest manner. The INF-OV instrument is a self-report composed of 12 items in a 5-point Likert- scale format (1 = “Completely disagree”; 5 = “Completely agree”). Students with more than three incorrect responses on the INF-OV scale were eliminated from the sample.

Procedure

The research was approved by the Clinical Research Ethics Committee of La Rioja (CEICLAR). The questionnaires were

administered to groups, during school hours, in a dedicated classroom under the supervision of a previously trained researcher. In addition, informed consent from parents or legal guardians was sought for participants under 18 years old. Participants were informed of the confidentiality of their responses and of the voluntary nature of the study. The research was presented to the participants as a research about emotional well-being and mental health.

Data analysis

First, following the criteria of development and validation of a measuring instrument, and following a previous pilot study, we started with the process of item reduction (Muñiz & Fonseca-Pedrero, 2019). This was an iterative process, considering a bifactor model made up of a general factor plus three specific factors. The psychometric criteria considered for removing items were: a) items that presented a discrimination index under 0.30; b) items that were not grouped in a bifactorial structure, specified in a general factor plus three specific factors; c) items with factor loadings lower than 0.30; and d) items with differential item functioning (DIF) by gender.

Second, the prevalence was calculated as the percentage of people who responded positively to each of the items.

Third, the total subsample was randomly divided into three subsamples. In the first subsample, a pure exploratory bifactor model was conducted (Lorenzo-Seva & Ferrando, 2019). We used Unweighted Least Squares with promin rotation and a Polychoric

Table 1
SENTIA: An Adolescent Suicidal Behavior Assessment Scale

SENTIA	
A continuación, se presentan una serie de afirmaciones. Por favor, responde de forma sincera atendiendo a tu forma de pensar y sentir en los últimos 6 meses. Muchas gracias por tu colaboración. (Below are a number of statements. Please, respond honestly, thinking about how you have felt and thought in the last 6 months. Thank you very much for your cooperation)	
	Sí (yes) No (no)
1. ¿Has planificado quitarte la vida? (Have you planned to take your own life?)	
2. ¿Has estado pensando en cómo podrías quitarte la vida? (Have you been thinking about how you could take your own life?)	
3. ¿Has deseado estar muerto? (Have you ever wished you were dead?)	
4. ¿Has pensado que sería mejor estar muerto? (Have you ever thought it would be better to be dead?)	
5. ¿Has estado cerca de quitarte la vida y finalmente algo ha fallado? (Have you been close to taking your life and finally something went wrong?)	
6. ¿Has intentado quitarte la vida y finalmente alguien te ha frenado? (Have you tried to take your life and finally someone has stopped you?)	
7. ¿Has amenazado a tus amigos o familiares con quitarte la vida? (Have you threatened your friends or family with taking your own life?)	
8. ¿Has ideado algún plan para acabar con tu vida? (Have you thought of a plan to end your life?)	
9. ¿Has hecho algo con la intención de que otros entendieran que querías quitarte la vida? (Have you done anything to make others understand that you wanted to take your life?)	
10. ¿Has comentado a alguien que quieres quitarte la vida? (Have you told anyone that you want to take your own life?)	
11. ¿Has intentado pedir ayuda ante estas ideas de suicidio? (Have you tried to ask for help when faced with these ideas of suicide?)	
12. ¿Has intentado quitarte la vida? (Have you tried to take your own life?)	
13. ¿Te has hecho daño a ti mismo (autolesión: cortes, pinchazos, etc.) sin intención de morir? (Have you hurt yourself (self-harm: cuts, punctures, etc.) without intending to die?)	
14. ¿Has intentado quitarte la vida y finalmente desestimaste esa opción? (Have you ever tried to take your life and finally rejected the idea?)	
15. ¿Has pensado que no puedes pedir ayuda a nadie (ante estas ideas de quitarte la vida)? (Have you thought that you cannot ask anyone for help?)	
16. ¿Has tenido ideas de quitarte la vida? (Have you ever had ideas about taking your life?)	
Scoring system (Sistema de corrección):	
Total score: sum of the items with a positive answer (Puntuación total: sumatorio de los ítems con respuesta afirmativa) (Yes=1; No=0).	
Subscale Suicidal Act/Planning (Acto/Planificación): items 1, 5, 6, 8, 12, 13, and 14.	
Subscale Suicidal Communication (Comunicación): items 7, 9, 10, and 11.	
Subscale Suicidal Ideation (Ideación): items 2, 3, 4, 15, and 16.	

Correlation matrix. A smoothing algorithm was applied. In the second subsample, the bifactor model from the first subsample was analyzed. In the third subsample, we performed an analysis using IRT. A two-parameter IRT model was used (Muñiz, 2018).

Fourth, we examined DIF by gender (Gómez-Benito et al., 2018). In this study, we applied the Mantel-Haenszel (Mantel & Haenszel, 1959) procedure.

Fifth, we calculated the omega coefficient to estimate reliability. Sixth, in order to gather validity evidence about the relationship with other variables, we produced a Pearson correlation matrix between the SENTIA scores and psychometric indicators of socio-emotional adjustment. Seventh, to analyze whether there were differences in the mean scores according to gender and age we performed a MANOVA. Finally, we calculated normative data using percentile values.

We used SPSS 24 (IBM, 2016), FACTOR (Ferrando & Lorenzo-Seva, 2017), and R for the data analyses.

Results

Stages in the development of SENTIA

The development of SENTIA was carried out according to the international guidelines for test construction and validation (AERA et al., 2014; Garrido et al., 2019; Haladyna & Rodríguez, 2013; Lane et al., 2016), following the steps proposed by Muñiz & Fonseca-Pedrero (2019) for test development. The use of these guidelines allowed a standardized process for test development.

We generated a representative pool of construct items, bearing in mind that a short instrument was expected. Content validity of the instrument was ensured by gathering items from existing instruments as well as constructing new items. In addition, we consulted a total of 10 external experts. All items were in a dichotomic format (Yes/No), adapted to adolescent language. Moreover, following previous studies, no reverse-worded items were used (Suárez-Alvarez et al., 2018).

For the first version of SENTIA, a total of 21 items were generated. This version was used in the quantitative pilot study. A convenience sample of 445 students ($M = 14.31$ years old; $SD = 0.61$; 51.5% girls) from La Rioja (Spain), participated in the survey. The Omega coefficient for the total score was 0.95. All the items showed a discrimination index over 0.30. The EFA displayed a bifactor solution, with a general suicide factor plus three specific factors (Act/planning, Ideation, Communication).

Following the aforementioned psychometric criteria, five items were dropped. Three items showed factor loadings under 0.30: “¿Sientes que puedes confiar en alguien (amigos, padres, etc.) cuando tienes problemas graves?” (Do you feel that you can trust someone (friends, parents, etc.) when you have serious problems?); “¿Has comunicado tu sufrimiento vital a personas o amigos de tu entorno?” (Have you communicated your suffering to people or friends around you?); “¿Cuando sientes que los problemas te superan, ¿eres capaz de pedir ayuda?” (When you feel that your problems are overwhelming you, are you able to ask for help?). Two items showed DIF by gender: “¿Has pensado que tus problemas no van a solucionarse nunca?” (Have you thought that your problems will never be solved? “¿Has fantaseado con cómo sería estar muerto?” (Have you fantasized about what it would be like to be dead?). Thus, the final version of the SENTIA was made up of 16 items (see Table 1).

Descriptive statistics of the items

Table 2 shows the descriptive statistics of the SENTIA items in the total sample. Due to the dichotomic scoring system, the mean indicates the prevalence of suicidal behavior for each item. For instance, 18% of adolescents reported they wished they were dead in the previous year.

Validity evidence based on internal structure

Exploratory bifactor model

Table 3 depicts factor loadings and eigenvalues of the bifactor model for the first subsample. Bartlett's statistic was 7055.5 ($p < 0.001$) and the Kaiser-Meyer-Olkin (KMO) test was 0.969. The explained common variance of the general factor was 70% and for all factors it was 85.1%. In terms of item content, the first factor was called Suicidal Act/planning, the second factor was called Suicidal Ideation and the third one was called Suicidal Communication. It is worth mentioning that two items demonstrated factor loadings of 0.29 in the specific factors.

In the second sample, we reran the exploratory bifactor model. Table 4 gives factor loadings and eigenvalues in the second subsample. Bartlett's statistic was 6422.8 ($p < 0.001$) and the KMO test was 0.956. The explained common variance of the general factor was 63.25%. The explained common variance for all factors was 81.3%. The factor loading of one item of the general factor was below 0.30. In terms of item content, the first factor was called Suicidal Communication, the second factor was called Suicidal Act/planning, and the third was called Suicidal Ideation. It is worth highlighting two main differences between results of the first and second bifactor analyses: a) item 2 now loaded on the Act/planning factor and not on the Ideation factor; b) items 15 and 16 showed cross-loadings between Ideation and Communication factors. Based on item content and results of the first bifactor analysis, we decided that these three items belonged in the Suicidal Ideation factor.

Table 2
Descriptive statistics of the SENTIA items (whole sample)

Item	M	SD	Skewness	Kurtosis	Discrimination index
1	0.05	0.23	3.92	13.36	0.77
2	0.14	0.34	2.13	2.53	0.67
3	0.15	0.36	1.94	1.75	0.70
4	0.18	0.38	1.67	0.80	0.65
5	0.03	0.17	5.56	28.89	0.62
6	0.02	0.13	7.28	51.10	0.45
7	0.03	0.18	5.24	25.45	0.32
8	0.04	0.21	4.44	17.76	0.70
9	0.02	0.15	6.47	39.89	0.46
10	0.05	0.22	4.17	15.44	0.59
11	0.03	0.18	5.29	25.97	0.41
12	0.04	0.18	5.05	23.52	0.68
13	0.12	0.33	2.33	3.44	0.53
14	0.04	0.20	4.72	20.31	0.64
15	0.13	0.33	2.23	2.98	0.39
16	0.10	0.30	2.62	4.86	0.77

Differential item functioning by gender

DIF is considered as validity evidence based on internal structure. None of the items of SENTIA showed differential item functioning by gender.

Table 3
Factor loadings of the exploratory bifactor model (first subsample)

Item	FI (Act/Planning)	FII (Communica- tion)	FIII (Ideation)	General Factor
1	0.29			0.72
2			0.37	0.81
3			0.31	0.63
4			0.32	0.73
5	0.44			0.68
6	0.53			0.68
7		0.68		0.34
8	0.40			0.78
9		0.29		0.76
10		0.54		0.83
11	-0.30	0.40		0.70
12	0.72			0.75
13	0.57			0.73
14	0.43			0.75
15			0.65	0.41
16			0.35	0.86
Eigenvalue	0.98	0.75	0.68	11.2

Note: In parentheses, items from the final version of SENTIA. Loadings lower than absolute 0.25 were omitted.

Table 4
Factor loadings of the exploratory bifactor model (second subsample)

Item	FI (Communi- cation)	FII (Act/ Planning)	FIII (Ideation)	General Factor
1		0.54		0.75
2		0.36		0.71
3			0.41	0.72
4			0.31	0.75
5		0.59		0.70
6		0.95		0.68
7	0.93			0.22
8		0.39		0.83
9	0.66			0.71
10	0.20			0.71
11	0.47			0.53
12	-0.32	0.57		0.74
13		0.27		0.62
14		0.47		0.75
15	0.37		0.25	0.59
16		0.29	0.20	0.80
Eigenvalue	1.24	0.88	0.77	10.12

Note: Loadings lower than absolute 0.25 were omitted. In italics the factorial loadings of two items are highlighted, which allow us to understand the internal factor structure of the SENTIA scale.

Item response theory analysis

With the third subsample, we conducted an IRT analysis. As Table 5 shows, item 1 demonstrated the highest level of discrimination, while item 6 had the highest level of difficulty.

Reliability estimation of the scores

The estimation of the reliability of the scores was carried out with the Omega coefficient for the total sample. The value for the total score was 0.91, for Act/Planning 0.94, for Communication 0.84, and for Ideation 0.92. All the discrimination indexes were over 0.30 (see Table 2).

In addition, the accuracy of the scores was calculated from an IRT perspective. Figure 1 shows the test information function for the overall sample. The highest accuracy in estimating the suicidal behavior latent trait ranged between values of 1 to 2.5.

Validity evidence based on relationships to other variables

The correlation between SENTIA scores and other psychometric indicators was examined in the total sample. As Table 6 shows, SENTIA scores were positive and statistically significantly correlated with suicidal behavior (Paykel Scale), depressive symptoms, emotional and behavioral difficulties, and psychotic-like experiences. Negative statistically significant correlations were found between SENTIA scores and emotional wellbeing, self-esteem, and prosocial behavior scores.

Mean comparisons by gender and age

Statistically significant differences in the SENTIA scores were found by gender (λ Wilks = 0.98, $F = 10.98$, $p < 0.01$, η^2 partial = 0.018). Girls demonstrated higher scores than boys in the total score ($F = 23.492$, $p < 0.01$, η^2 partial = 0.013), and in Ideation ($F = 27.982$, $p < 0.01$, η^2 partial = 0.016), Communication ($F =$

Table 5
Item response theory parameterization: two-parameter normal ogive model
(third subsample)

Item	a	b
1	2.207	1.775
2	1.713	1.327
3	1.557	1.258
4	1.541	1.135
5	1.512	2.259
6	0.888	3.047
7	0.845	0.019
8	1.657	2.005
9	1.133	2.698
10	1.255	2.128
11	0.945	2.707
12	1.953	2.090
13	0.995	1.581
14	1.420	2.145
15	0.711	2.079
16	2.011	1.446

Note: a=discrimination; b=difficulty.

17.212, $p < 0.01$, η^2 parcial = 0.010), and Act/Planning subscales ($F = 8.460$, $p < 0.05$, η^2 parcial = 0.005). We found no statistically significant differences by age (λ Wilks = 0.991, $F = 1.371$, $p > 0.05$, η^2 parcial = 0.003) or interaction between gender and age (λ Wilks = 0.994, $F = 0.957$, $p > 0.05$, η^2 parcial = 0.002).

Normative data

Since statistically significant differences were found according to gender in the mean scores, the percentiles were computed independently for boys and girls (see Tables 7 and 8).

Discussion

Suicidal behaviors have a clear impact at various levels, including personal, academic, family, relationship, occupational, and socio-health impacts. In addition, suicidal behavior is a global health problem that is still not properly analyzed and understood,

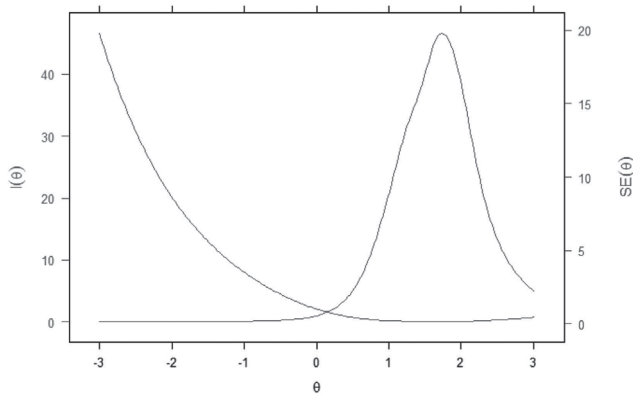


Figure 1. Test Information Function: SENTIA (total sample).

Table 6
Pearson correlation matrix between SENTIA scores and psychometric indicators (total sample)

	SENTIA			
	Total score	Ideation	Communication	Act/Planning
PSS	0.780**	0.773**	0.475**	0.656**
RADS-SF	0.627**	0.643**	0.352**	0.515**
PQ-B	0.410**	0.435**	0.252**	0.309**
SDQ EMO	0.416**	0.450**	0.237**	0.312**
SDQ CD	0.256**	0.232**	0.182**	0.229**
SDQ Peer	0.383**	0.400**	0.197**	0.315**
SDQ HIP	0.181**	0.196**	0.101**	0.136**
SDQ PROS	-0.078**	-0.085**	-0.028	-0.065**
PWI-SC	-0.481**	-0.501**	-0.266**	-0.387**
Self-esteem	-0.508**	-0.536**	-0.277**	-0.402**

Note: PSS = Paykel Suicide Scale; RADS-SF = Reynolds Scale Depression for Adolescents- Short Form; SDQ = Strengths and Difficulties Questionnaire; SDQ EMO = Emotional Problems; SDQ CD = Conduct Problems; SDQ Peer = Peer Problems; SDQ HIP = Hyperactivity; SDQ PROS = Prosocial Behavior; PQ-B= Prodromal Questionnaire-Brief. PWI-SC= Personal Wellbeing Index-School Children, item 1; Self-esteem = Rosenberg Self-esteem Scale
** $p < 0.01$.

particularly during adolescence. Therefore, the current landscape stresses the implementation of actions for suicide prevention (e.g., screening program). In this sense, developing specific measuring instruments –following international standards (Muñiz & Fonseca-Pedrero, 2019) – may help in the early, reliable identification of suicidal behaviors in young people in order to assist prevention. To date, in the Spanish context, there are no specific instruments for assessing suicidal behavior in the adolescent population. Thus, the main goal of the present study was to design a new tool called

Table 7
Normative data for girls (N = 961)

Percentile	Ideation	Communication	Act/Planning	Total score	Percentile
1	0	0	0	0	1
10	0	0	0	0	10
20	0	0	0	0	20
30	0	0	0	0	30
40	0	0	0	0	40
50	0	0	0	0	50
60	0	0	0	0	60
70	1	0	0	1	70
75	1	0	0	1	75
80	2	0	0	2	80
85	3	0	1	3	85
90	4	1	1	5	90
92	4	1	1	6	92
95	4	1	3	9	95
97	5	2	5	11	97
99	5	3	6	13	99
M	0.86	0.18	0.41	1.46	M
SD	1.47	0.59	1.23	2.86	SD

Table 8
Normative data for boys (N = 816)

Percentile	Ideation	Communication	Act/planning	Total score	Percentile
1	0	0	0	0	1
10	0	0	0	0	10
20	0	0	0	0	20
30	0	0	0	0	30
40	0	0	0	0	40
50	0	0	0	0	50
60	0	0	0	0	60
70	0	0	0	0	70
75	0	0	0	1	75
80	1	0	0	1	80
85	1	0	0	2	85
90	2	0	1	2	90
92	3	0	1	3	92
95	3	0	1	5	95
97	4	1	3	7	97
99	5	2	6	11	99
M	0.49	0.07	0.24	0.81	M
SD	1.12	0.38	0.89	2.05	SD

SENTIA (the Adolescent Suicidal Behavior Assessment Scale) using a representative sample of Spanish adolescents.

The prevalence rates we found were similar to those found in previous studies. In a meta-analysis, Lim et al. (2019) found that lifetime prevalence and 12-month prevalence for suicide attempts was 6% and 4.5% respectively. In addition, lifetime prevalence and 12-month prevalence for suicidal ideation was 18% and 14.2% respectively. In Spain, the prevalence of suicidal ideation in the adolescent population is around 30%, while the prevalence of suicide attempts is around 4% (e.g., Fonseca-Pedrero et al., 2018; Fonseca-Pedrero & Pérez de Albéniz, 2020). In addition, we found significant differences by gender, girls scored higher than boys in Suicidal Ideation, Communication, and Act/Planning factors. No significant differences were found by age. These results are consistent with previous studies conducted in adolescent samples (Fonseca-Pedrero et al., 2018; Miranda-Mendizabal et al., 2019).

Analysis of the internal structure indicated that the SENTIA scale was made up of a general factor of suicidal behavior plus three specific factors: Ideation, Communication, and Act/planning. The inclusion of all the expressions of suicidal behavior in the SENTIA scale, whether it is wishing to be dead, communication to others, self-harm or specific suicidal ideation, allow us to better tap into the underlying latent construct in order to drive screening and intervention procedures. In addition, this bifactor model allowed us to produce a total score of suicidal behavioral and three specific dimensions that could be interesting from both clinical and research points of view. Furthermore, none of the SENTIA items displayed gender DIF. These results allowed us to ensure equivalence in the SENTIA measuring process without any threat to validity, and pursue fairness in testing. From a conceptual viewpoint, this bifactor model of suicidal behavior is in line with the continuum approach proposed in previous studies (Anseán, 2014; O'Connor & Nock, 2014).

The study of the reliability of the SENTIA scores gave values over 0.90. In addition, from an IRT perspective, the information function showed that the SENTIA scale accurately measured the higher scores of the latent trait. Overall, these findings suggested that SENTIA scores are measured with precision.

In addition, we gathered sources of validity evidence based on external variables. In this regard, SENTIA scores were positively correlated with tentative risk factors of suicidal behavior such as depressive symptoms, emotional and behavioral problems

and subclinical psychotic experiences and negatively correlated with emotional wellbeing, self-esteem and prosocial behavior. Moreover, SENTIA scores were positively associated with other measures of suicidal behavior such as the Paykel Suicide Scale. The analysis of convergent and discriminant evidence with different constructs is an important source of validity and allowed us to construct a tentative nomological network. These results are in line with previous studies where youngsters exhibiting suicidal behavior (e.g. suicidal ideation, suicide attempts) report, among other things, more mental health problems and disorders, lower quality of life levels, and poorer academic achievement (Fonseca-Pedrero et al., 2018; Hawton et al., 2012; O'Connor & Nock, 2014; Turecki & Brent, 2016).

The findings of this research should be interpreted in the light of the following limitations. First, although the sample used here was representative, the students came from La Rioja, a particular Spanish region. Second, the findings were based on self-reports which have some well-known limitations. Finally, given that this was a cross-sectional study, no causal inferences can be drawn.

In conclusion, SENTIA seems to be a brief, useful, easy screening tool with adequate psychometric properties that allows the evaluation of all spectra of suicidal behavior (ideation, planning, intention, communication, and act) in Spanish youngsters. Having a specific self-report, validated in a representative sample of the Spanish population may help us to understand, analyze, assess, and prevent suicidal behavior in this developmental stage in which many bio-psycho-social changes take place (e.g., high risk for mental disorders).

Future studies should examine the SENTIA scale with new samples, in relation to other variables from multiple levels of analyses, and develop a shorter version. In addition, future studies could analyze the underlying etiological mechanisms, as well as risk and protective factors with new psychometric models (e.g., network analysis) and procedures (e.g., walk-in assessment).

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