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Psychometric Properties of the Connor-Davidson Resilience Scale (CD-RISC) on Vulnerable Colombian Adolescents

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Abstract

The aim of the present study is to analyze the psychometric properties for the Spanish adaptation of the Connor-Davidson Resilience Scale (CD-RISC) in a sample of vulnerable teenagers of Colombia. Two psychometric studies were conducted: one for the 25-item version (CD-RISC-25) and other for the brief 10-item version (CD-RISC-10). All of the items showed good discrimination, with item-total correlations ranging from 0.29 (Item 14) to 0.75 (Item 25). Cronbach's alpha was 0.88 CI [0.86, 0.90] for the 25-item version. Subsequently, an item screening was conducted in order to test a brief version. For the brief 10-item version (CD-RISC-10), a one-factor one-dimensional structure with very good fit was found through exploratory and confirmatory factor analysis. The exploratory factor analysis suggests that CD-RISC-10 could be considered a one-dimensional measure. Importantly, both CD-RISC-25 and CD-RISC-10 showed factorial invariance as a function of sex. In conclusion, the brief 10-item version of the Connor-Davidson CD-RISC presents appropriate psychometric properties to validly and reliably estimate resilience levels for vulnerable Colombian adolescents.
Key words: resilience, vulnerability, CD-RISC, adolescence.

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Novelty and Significance

What is already known about the topic?

- Resilience is a natural, dynamic process associated with human development.
- The Connor-Davidson Resilience Scale CD RISC 25 is an instrument that measures resilience as a trainable skill.
- The scale has been validated and applied in several countries in the vast majority of adult populations and with different occupations.

What this paper adds?

- A 10-item version of the CD-RISC was obtained in the psychometric analysis with vulnerable adolescents in Colombia.
- The scale is useful for assessing resilience as a process in adolescents belonging to ethnic minorities and victims of war.
- The results showed that the factorial equivalence of the CD-RISC across gender.

Resilience is understood as an active resistance process; that is, people are resilient when, despite facing a risky environment, they can normalize their lives. Such normalization occurs through the interrelation of personal resources and contextual variables of personal resources and the context in which the person develops. Resilience is not a fixed and immutable trait that is present or absent but rather a process that develops in the face of adverse challenges (Reed, Fazel, Jones, Panter-Brick, & Stein, 2012). Currently, several authors agree on defining resilience as a natural, dynamic process, linked to development and human growth, in which there is an interweaving

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of ecological, affective, and verbal means that help to overcome adverse situations (Melillo & Suárez, 2001; Torres, 2010).

The notion of resilience, initially described by Rutter (1993) as the process of overcoming instead of succumbing to the effects of exposure to risks during the individual's lifetime, has been extended, and more variables have been added. It is not about denying the negative, nor isolating or falsifying it, but about making a real analysis of the situation and allowing oneself to build and reconstruct the social fabric. This leads to the fact that positive adaptation is not only the child's task, but also of the families, schools, community, and society, all of which must provide resources for children's full development (Melillo & Suárez, 2001; Torres, 2010). Therefore, resilience must be considered as a multidimensional characteristic that varies with context, time, age, gender, and cultural origin, according to the different life circumstances of every individual (Connor & Davidson, 2003).

For some time, resilience has been an important construct in research agendas. Resilience seems to be an important characteristic that allows individuals to cope with any adverse situation but, in recent years, all the attention has been focused on individuals who live in contexts with a higher level of stressful or traumatic situations.

Ruvalcaba Romero, Murrieta Cummingsy, and Arteaga Velázquez (2016) describe the social factors that negatively affect adolescents, among which are the availability of weapons and drugs, the effects of armed conflict, the continuous and chronic exposure to communitarian violence, the inefficiency of the protection systems, and the poverty levels of the neighborhood. Changes in communitarian environments and at home, and school relocation after parents' separation have commonly been associated with psychopathological behavioral symptoms in children and adolescents (Row, Zimmer-Gembeck, & Hood, 2016).

Moreno, García Moya, Rivera, and Ramos (2016) reviewed the level of adversity related to family functioning and positive adaptation through the measurement of a global health score in adolescents from 13 to 16 years old, comparing diverse demographic contexts: school, peers, and life-styles. The study considered psychological and socioeconomic variables that facilitated or inhibited positive adaptation in each context, finding differential results. First, psychological variables such as resilience had greater explanatory capacities in vulnerable teenagers. Second, perceived family wealth and satisfaction with friendships were significant in the analysis of resilience. Last, the factors related to the school context and school peers showed a stronger association with resilience (Narayanan, 2015). This indicates that resilience is a key variable when working with vulnerable children or adolescents.

Likewise, Gudiño, Leonard, and Cloitre (2016) state that adolescents between 13 and 17 years old have experienced at least one traumatic event in their lives, and adolescents belonging to ethnic minority groups in urban environments are even more likely to experience difficulties related to trauma. In Colombia, the percentage of vulnerable children and adolescents is very high. According to the projections from the 2005 census, by 2018, in Colombia 34.45% of the population will be younger than 19 years. Based on the report from the National Administrative Department of Statistics (in Spanish, DANE), it follows that children and adolescents represent a significant population segment that must be attended to integrally, according to the policies stipulated for childhood and adolescence, which includes their psychological well-being. At present, poverty can be considered a problem of Colombia due its increase in recent years. Currently, the national rate of monetary poverty for 2016 was 28.0% (DANE,

2016). This complex reality of Colombia constantly drives this population to crime-related situations, psychoactive substance consumption, or unwanted pregnancies, among other problems, which are associated with an increase in mental health issues (Alba, 2010; Torres, 2010). Additionally, it is frequent the changes in community settings and the relocation of the home and school when there is displacement due to conflict. The occurrence of these factors have been associated with psychopathological behavioral symptoms in children and adolescents (Rowe et alii, 2016).

Within this framework, the timely identification of adolescents' psychic capital of psychosocial characteristics to adapt to their environment, bond with others, and learn to be assertive when defending their rights is crucial. Reliable and valid measures are required to promote and intervene in resilience. There are two different kinds of measures to assess resilience. The first kind evaluates resilience understood as a stable attribute or personality trait. Among them, the Resiliency Scale of Wagnild and Young (1993) is the most recognized and validated for different populations. The second kind of measure evaluates resilience as a trainable skill. Within this kind, the best known scale is the Connor-Davidson Resilience Scale (CD-RISC; Connor & Davidson, 2003).

The CD-RISC has shown good psychometric properties and has been applied and validated in different populations and countries (Madewell & Ponce García, 2016). The original version consists of 25 items rated on a 5-point Likert-type scale (0= not true at all; 4= true nearly all the time). The scale is designed to assess the subject's resilience level during the past month. Total scores range between 0 and 100, with higher scores reflecting greater resilience. This scale has been widely used for different countries and populations, including psychiatric outpatients, anxiety disorder patients, PTSD patients, military, firefighters, university students, etc. (Connor & Davidson, 2003).

Connor and Davidson (2003) conducted an exploratory factor study with a sample of 577 adults from the general population. This analysis showed five factors: Factor 1 reflects the notion of personal competence, high standards, and tenacity; Factor 2 corresponds to trusting one's instinct, tolerance of negative affect, and the face of stress; Factor 3 refers to positive acceptance of change and safe relationships; Factor 4 is related to control; and Factor 5 is related to spiritual influences. The excellent internal consistency and test-retest reliability of the CD-RISC in general and clinical populations support its use in clinical practice. Cronbach's alpha was 0.89 for the general population. Different validations of the CD-RISC show that resilience is quantifiable and influenced by health status (i.e., individuals with mental illness have lower levels of resilience than the general population), that resilience is modifiable and can improve with treatment. Therefore, a high level of resilience indicates better health status.

Solano *et alii* (2016) validated the CD-RISC-25 scale, culturally adapting it to Brazilian Portuguese with a sample of adult outpatients. This version identified four factors. Cronbach's alpha was 0.93 and intra-class correlation coefficient was 0.84, indicating good internal consistency and temporal stability. Xie, Peng, Zuo, and Li (2016) analyzed the psychometric properties of the resilience scale CD-RISC-25 seeking an adequate instrument to quantify the recovery capacity of members of the Chinese military services. Results revealed a three-factor model. Confirmatory factor analysis showed that the CD-RISC-25 applied to the Chinese military sample presented appropriate psychometric properties, including internal consistency, test-retest reliability, and concurrent and structural validity. Alpha ordinal values ranged between 0.81 and 0.94. Correlation coefficients between the global scale score and subscale scores were moderate to high. Test-retest reliability over a two-month interval was 0.66.

Wu, Tan, and Liu (2017) evaluated psychological resilience in Chinese employees. The 3960 participants were selected from a group of novel male employees who had started to work in the last 2-3 months in 12 machine factories in 8 different Chinese provinces. Confirmatory factor analysis (CFA) generated a 4-factor model, showing good internal consistency, concurrent validity, and a consistent structure validity. Test-retest reliability was 0.676 for 1533 participants who were randomly selected from the total sample over a 3-month interval. Cronbach's alpha for the full scale was 0.75. It was concluded that the measurement of resilience through CD-RISC-25 is useful to assess vulnerability to stress in young Chinese employees.

Campbell-Sills and Stein (2007) conducted a psychometric analysis and refinement of a brief version of the CD-RISC. Their justification was the lack of clear criteria for factor selection and the difficulty to interpret the factors, as they contained dissimilar items. The participants were 1743 student from San Diego University, with a mean age of 18.8, who completed the CD-RISC on the computer along with other tests and questionnaires. Exploratory and confirmatory analyses were conducted, resulting on a 10-item scale that explained the data well and contained minimum redundancy. It seems that the 10-item version of the CD-RISC (CD-RISC-10) captures the core characteristics of resilience with a single dimension. Cronbach's alpha of 0.85 indicated good reliability and construct, convergent, and discriminant validity.

Madewell and Ponce García (2016) studied an adult university population, a stage that is characterized by the reorganization of multiple systems. They examined both resilience and psychopathology in this population in the United States. Results indicated that the CD-RISC-10 presented good fit. The CD-RISC-10 offered the advantage of indicating clinical criteria of resilience (high vs. low) and measuring a cognitive factor at the individual level.

Duong and Hurst (2016) adapted the CD-RISC to Cambodian language in Cambodian adolescents and young adults. The total participants were 798 students, 440 were female, with ages ranging from 14 to 24 years. The results showed that the Khmer version of the Connor-Davidson Resilience Scale (CD-RISC-Kh-10) has good psychometric properties, with a Cronbach's alpha of 0.82, and it is valid for use in Cambodian adolescents. They also confirmed that a single dimension underlies the 10 items of the CD-RISC scale for this population.

In spite of the abundant research that has shown the good psychometric properties of the CD-RISC, both for the 25-item version and the brief 10-item version, there are no studies at this point that validate the scale for vulnerable adolescents. Also, there are differences in the results of the scale dimensions for the 25-item and the10-item versions. Therefore, the aim of the present study is to analyze the psychometric properties of the CD-RISC in vulnerable Colombian adolescents and, at the same time, to analyze the psychometric properties of a brief 10-item version of the scale.

Method

Participants

The participants were 988 Colombian adolescents in a vulnerable situation, (484 females, 49%) (*Mage*= 14.50, *SD*= 1.71). The sample was predominantly of mixed racial background (95%), and the rest were Afro-Colombian (5%). Of them, 10.5% of the adolescents reported being displaced by armed conflict in the country. All participants signed an underage consent form, and their parents also signed a regular informed consent form prior to the application.

Instrument

We use the *Connor-Davidson Resilience Scale* (CD-RISC; Connor & Davidson, 2003; Spanish Version: Manzano García & Ayala Calvo, 2013). Before conducting the study, a brief linguistic adaptation of Manzano García and Ayala Calvo (2013) version was conducted. The instrument was reviewed by expert judges to validate the Latin-American terms that Colombian adolescents use, modifying Items 2, 8, 15, and 18 of the 25-item version.

Procedure

For the present study, the Spanish version of Manzano García and Ayala Calvo was used, with minimum linguistic adaptation for the Colombian cultural context. Through different contacts between the Laboratory of Clinical Psychology of the *Fundación Universitaria Konrad Lorenz* (Clinic Lab) and other educational institutions, permission was obtained to evaluate adolescents from two schools of socioeconomic levels 1 and 2 of the cities of *Bogotá* and *Soacha*. Informed consent forms were sent home through the students for their parents or legal guardians. Once the parental consent for was signed, the minors signed an underage consent form before starting the evaluation phase.

The adolescents were asked to undergo a semi-structured interview about sociodemographic variables including sex, date of birth, academic course, ethnicity and perception of the family economic situation or socioeconomic level (measured in stratums, ranging from 1, the lowest stratum, to 6, the highest stratum in the country). Then, the participants received instructions on how to complete the CD-RISC-25.

Data Analysis

To explore the internal consistency of the CD-RISC, the Cronbach's alpha coefficient were calculated for the first random sample with the SPSS19© with 95% confidence intervals (CI). Corrected item-total correlations were obtained to analyze the items level of discrimination.

The factor structure of the CD-RISC was analyzed by means of a cross-validation study. In doing so, two random samples of approximately equal size were obtained with SPSS19©. In the first random sample, an exploratory factor analysis (EFA) was conducted with the software Factor 10.5 (Lorenzo Seva & Ferrando, 2006). The Bartlett's sphericity test and the Kaiser Meyer Olkin (KMO) test were conducted to ensure the applicability of factor analysis. Subsequently, we selected the unweighted least squares (ULS) with Direct Oblimin rotation using polychoric correlations for conducting the EFA. The number of dimensions was determined by optimal implementation of parallel analysis (PA) based on the analysis of minimum range factor (Timmerman & Lorenzo Seva, 2011). Unidimensionality was assessed by calculating the Unidimensional Congruence (UniCo), Common Explained Variance (ECV), and Residual Absolute Load (MIREAL) indices. Values higher than 0.95 and 0.85 in UniCo and CEV, respectively, indicate that the data can be treated as essentially unidimensional, whereas, for MIREAL, a value less than 0.30 indicates unidimensionality (Ferrando & Lorenzo Seva, 2018).

A confirmatory factor analysis (CFA) was conducted with the second random sample. In so doing, we adopted a robust diagonally weighted least squares (Robust DWLS) estimation method using polychoric correlations employing LISREL (Version 8.71, Jöreskog & Sörbom, 1999). We calculated the Satorra-Bentler chi-square test

and the following goodness-of-fit indexes: a) the mean square error of approximation (*RMSEA*), b) the comparative fit index (*CFI*), c) the non-normed fit index (*NNFI*); and d) the standardized root mean square residual (SRMR). According to Hu and Bentler (1999), *RMSEA* values of 0.08 represent a good fit, and values below 0.05 represent a very good fit to the data. For the SRMR, values below 0.08 represent a reasonable fit, and values below 0.05 indicate a good fit. With respect to the *CFI* and the *NNFI*, values above 0.90 indicate that the models fit well, and values above 0.95 represent a very good fit to the data. To obtain a brief version of the CR-RISC, the items that scored below .40 at the loading level (Factor Loading) and/or in the corrected item-total correlation were eliminated. This provoked the elimination of 10 items; the following items were retained: 2, 5, 7, 8, 9, 10, 11, 12, 15, 17, 21, 22, 23, 24, and 25. Five additional items that were difficult to understand by the adolescents during the application and that were not retained in previous brief versions of the CD-RISC were eliminated (Campbell-Sills & Stein, 2007; Duong & Hurst, 2016; González, Moore, Newton, & Galli, 2016; Madewell & Ponce García, 2016; Ye *et alii*, 2017). The final items of the brief version of the CD-RISC were items 5, 7, 10, 11, 12, 17, 21, 23, 24, and 25. A cross-validation study was also conducted with this brief version of the CD-RISC.

Additional CFAs were performed to evaluate metric and scalar invariance across gender of both versions of the CD-RISC (Jöreskog, 2005). That is, we determined whether the factor structure was similar in the two groups (male and female). In doing so, the relative fits of three increasingly restrictive models were compared: the multiple-group baseline model, the metric invariance model, and the scalar invariance model. The multiple-group baseline model allows unstandardized factor loads to vary across gender. The metric invariance model that was nested within the multiple-group baseline model placed equal constraints (i.e., invariance) on the loads across the groups. Finally, the scalar invariance model, which was nested within the metric invariance model, was tested by constraining factor loadings and item intercepts so to be the same across groups. Equality constraints were not placed on estimates of the factor variances because these are known to vary across groups even when the indicators are measuring the same construct in a similar manner (Kline, 2005). For the model comparison, the *RMSEA*, *CFI*, and *NNFI* indexes between nested models were compared. The most restricted model was selected (i.e., the second model versus the first model and the third model versus the second model) if the following criteria suggested by Cheung and Rensvold (2002) and Cheng (2007) were met: the *RMSEA* difference (Δ*RMSEA*) was less than 0.01; and the differences in *CFI* (Δ*CFI*) and *NNFI* (Δ*NNFI*) were equal to or greater than -0.01.

Results

Table 1 shows the CD-RISC-25 items with its linguistic adaptation and factor loadings. All of the items showed good discrimination index, with corrected item-total correlations ranging from .29 (Item 14) to .75 (Item 25). Cronbach's alpha coefficient was .86, 95% *CI* (.88, .90).

The first random sample generated was made up of 492 participants. Exploratory factor analysis was conducted with their data. Previously, Bartlett and Kaiser-Meyer-Olkin (*KMO*) tests were conducted for the CD-RISC-25 with significant results (Bartlett's test: 2725.8 (300), p <.001; *KMO*: .90). This indicates that factor analysis can be used on the scale. The parallel analysis suggested to extract only one factor that explained 27.87% of the variance (*eigenvalue*= 6.97). The values of *UniCo* (0.953), *ECV* (0.85),

Table 1. CD-RISC Scale linguistic adaptation and factor loadings for each item with standardized solution.

Items	Factor Loading
1. Soy capaz de adaptarme cuando ocurren cambios	.31
2. Tengo al menos una persona cercana y confiable que me ayuda cuando estoy estresado	.40
3. Cuando no hay soluciones claras a mis problemas, a veces la suerte o Dios pueden ayudarme	.41
4. Puedo enfrentarme a cualquier cosa	.37
5. Los éxitos del pasado me dan confianza para enfrentarme con nuevos retos y dificultades	.62
6. Intento ver el lado divertido de las cosas cuando me enfrento con problemas	.36
7. Enfrentarme a las dificultades puede hacerme más fuerte	.55
8. Tengo tendencia a recuperarme pronto tras enfermedades, heridas u otras dificultades que afectan mi salud y bienestar.	.45
9. Bueno o malo, creo que la mayoría de las cosas ocurren por alguna razón	.48
10. Siempre me esfuerzo sin importar cuál pueda ser el resultado	.63
11. Creo que puedo lograr mis objetivos, incluso si hay obstáculos	.71
12. No me doy por vencido a pesar de que las cosas parezcan no tener solución	.52
13. Durante los momentos de estrés/crisis, sé dónde puedo buscar ayuda	.30
14. Bajo presión, me centro y pienso claramente	.29
15. Prefiero intentar solucionar las cosas por mí mismo, a permitir que otros tomen todas las decisiones	.48
16. No me desanimo fácilmente con el fracaso	.42
17. Creo que soy una persona fuerte cuando me enfrento a los retos y dificultades de la vida	.66
18. Puedo tomar decisiones difíciles, aunque sepa que éstas pueden afectar a otras personas, si es necesario	.30
19. Soy capaz de manejar sentimientos desagradables y dolorosos como tristeza, temor y enfado	.31
20. Al enfrentarme a los problemas de la vida, a veces actúo por un presentimiento sin saber por qué	.36
21. Tengo muy claro lo que quiero en la vida	.73
22. Siento que controlo mi vida	.50
23. Me gustan los retos	.65
24. Trabajo para conseguir mis objetivos sin importarme las dificultades que encuentro en el camino	.65
25. Estoy orgulloso de mis logros	.75

and *MIREAL* (0.155) strongly supported the unidimensionality of the CD-RISC. In conclusion, the results of the exploratory factor analysis suggested that the CD-RISC can be treated as a one-dimensional measure.

Subsequently, CFA was conducted on the second sample (N= 496) to analyze the fit of the scale to the single-factor model. The fit of the one-factor model the CD-RISC was good: $S\text{-}B\chi^2$ (275)= 487.604, p <.05; *RMSEA*= 0.039, 90% *CI* [0.034, 0.045], *CFI*= 0.978, *NNFI*= 0.976, *SRMR*= 0.051. Figure 1 shows the results of the standardized one-factor model solution for the CD-RISC25.

Table 2 shows the results of scalar and metric invariance analysis of the CD-RISC across gender. Results supported the invariance of the measurement both at the metric and scalar level as a function of gender, as the changes in *RMSEA*, *CFI*, and *NNFI* were lower than 0.01. Figure 1 shows the standardized results for the one-factor model of the questionnaire.

Descriptive data for the CD-RISC is presented in Table 3. Student's t-test for means comparison between boys and girls showed no significant differences between the groups (t= 0.278 p >.05).

In order to obtain a brief version of the CD-RISC, the items with corrected item-total correlations lower than .30 were eliminated (items 6, 14, 18, and 20). Of the remaining 21 items, all items with corrected item-total correlations and factor loading less than 0.40 were eliminated (items 1, 3, 4, 13, 16, and 19). Subsequently, 5 items were eliminated with the following criteria: items not found in the previous 10-item version (Campbell-Sills & Stein, 2007), items that still had the lowest corrected item-total correlations and factor loadings, items reported by the adolescents as being difficult to understand, and items with the same meaning as other items already in the scale. The final CD-RISC-10 is presented in the Appendix.

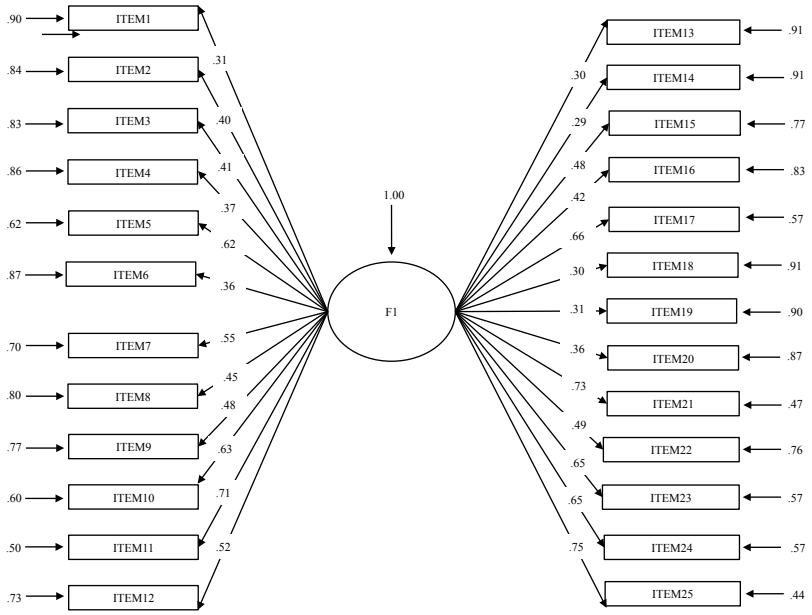

Figure 1. Results of confirmatory factor analysis with Sample 2 to analyze the fit of CDRISC-25 to the one-factor model.

Table 2. Metric and scalar invariance across gender.

Model	*RMSEA*	Δ*RMSEA*	*CFI*	Δ*CFI*	*NNFI*	Δ*NNFI*
Multi Group	.0414		.979		.977	
Metric Invariance	.0408	.0006	.979	.000	.978	-.001
Scalar Invariance	.0405	.0003	.978	-.008	.978	.000

Notes: CFI= Comparative Fit Index; NNFI= Non-Normed Fit Index; RMSEA= Mean Square Error of Approximation.

Table 3. Student's *t* for independent samples by gender.

Gender	*N*	*M*	*SD*	*T*	*p*
Male	504	86.07	16.77	0.278	0.781
Female	484	86.36	16.02		

Table 4 shows the CD-RISC-10 items, item-total correlations and factor loadings. All of the items showed good discrimination, with item-total correlations ranging from 0.51 (item 7) to 0.74 (item 25). The Cronbach alpha coefficient was 0.84, *CI* (0.88, 0.90).

The first randomly generated sample was made up of 492 participants. Exploratory factor analysis was conducted with their data. Previously, Bartlett's and Kaiser-Meyer-Olkin (*KMO*) tests were conducted on the 10-item version of the CD-RISC with significant results (Bartlett's test:

Table 4. Factor loading for the CD-RISC-10.

Item Number	Factor loading
5	.63
7	.55
10	.66
11	.73
12	.51
17	.65
21	.73
23	.66
24	.66
25	.74

1330.4[45], p <.001; *KMO*: 0.92), indicating that factor analysis could be applied to the scale. The parallel analysis found 46.26% of the explained variance (*eigenvalue*= 4.62). The values of *UniCo* (0.98), *ECV* (0.91), and *MIREAL* (0.17) strongly supported the unidimensionality of the CD-RISC-10. In conclusion, the results of the exploratory factor analysis suggest that the CD-RISC-10 can be treated as a one-dimensional measure.

Subsequently, CFA was conducted on the second sample (N= 496) to analyze the fit to the single-factor model. The fit of the CD-RISC-10 to the one-factor model good: $S\text{-}B\chi^2$ (35)= 69,699, p <0.05; *RMSEA*= 0.045, 90% *CI* (0.029, 0.006), *CFI*= 0.991, *NNFI*= 0.989, *SRMR*= 0.039. Figure 2 shows the results of the standardized solution of the one-factor model of the CD-RISC.

Table 5 shows the results of the metric and scalar invariance analysis for the CD-RISC-10 across gender. The results supported the measurement invariance both at metric and scalar level, as the changes in *RMSEA*, *CFI* and *NNFI* were lower than 0.01. Figure 2 shows the standardized results for the questionnaire's one-factor model.

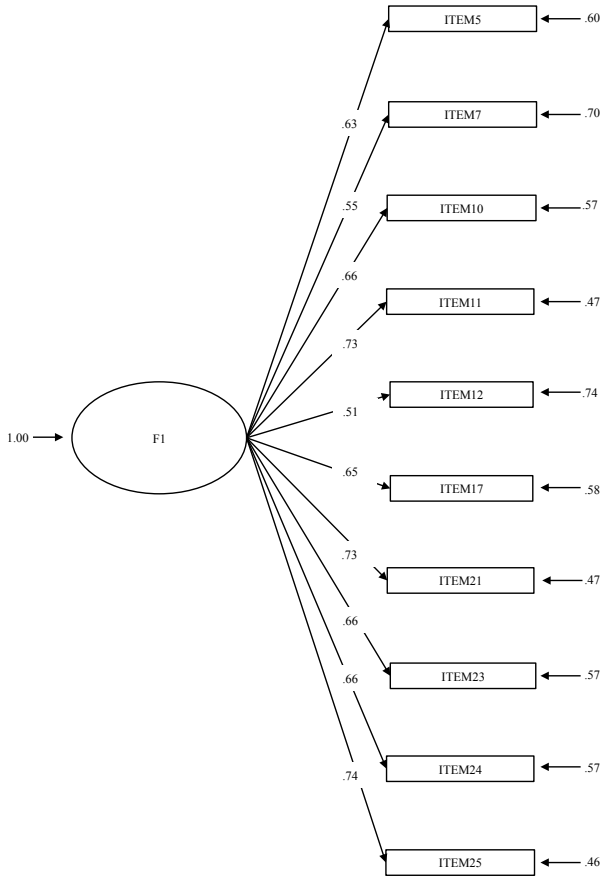

Figure 2. Confirmatory factor analysis of the CDRISC-10 with standardized solution of the one-factor model .

Table 5. Scalar and metric invariance analysis across gender for the CD-RISC-10.

Model	*RMSEA*	Δ*RMSEA*	*CFI*	Δ*CFI*	*NNFI*	Δ*NNFI*
Multi Group	.0476		.991		.988	
Metric invariance	.0463	.0013	.990	-.001	.989	.001
Scalar invariance	.0438	.0025	.990	.000	.990	.001

Notes: CFI= Comparative Fit Index; NNFI= Non-Normed Fit Index; RMSEA= Mean Square Error of Approximation.

DISCUSSION

The present study conducted an adaptation and psychometric study of the CD-RISC-25 resilience scale and a subsequent psychometric study of a 10-item brief version (CD-RISC-10). For the 25-item version, CD-RISC-25, a one-factor structure was found through exploratory analysis and CFA. These results contrast with the results found in previous research (Connor & Davidson, 2003; Manzano García & Ayala Calvo, 2013), which found evidence of two, three, and even five dimensions for the CD-RISC-25. Hence, despite that the results showed good fit of the scale, the items were examined in order to test a brief version. In addition, there is no study in the literature that reports the psychometric properties of the CD-RISC-25 in adolescents. The only published version of this scale for adolescents is a brief 10-item version.

For the CD-RISC-10, a one-factor structure with very good fit was also found through exploratory analysis and CFA. These results are in line with most of the published studies regarding brief versions of the scale (Campbell-Sills & Stein, 2007; Duong & Hurst, 2016; González *et alii*, 2016; Madewell *et alii*, 2016; Ye *et alii*, 2017). Specifically, this version coincides very directly with the CD-RISC-10 validation for Cambodian adolescents. In that study, the authors used a brief version of the scale, as its application is fast and useful with the adolescent population. They also proved the unidimensionality of the CD-RISC-10. Amongst all of the adaptations of the CD-RISC-10 and the CD-RISC-25, Duong and Hurst's (2016) version is the only one for adolescents.

The current study adds evidence suggesting that a one-factor model is also appropriate for vulnerable Colombian adolescents, as it is short and easy to complete, and therefore, it allows reliably measuring resilience as a process. According to Gudiño, Leonard, and Cloitre (2016), adolescents between ages 13 and 17 years from any context will experience at least one traumatic event in their lives. Therefore, this instrument is useful to assess this kind of ability in Colombian adolescents of ethnic minorities and displaced populations, who have experienced community violence or live contexts of delinquency, among other situations.

Lastly, both the CR-RISC-25 and the CD-RISC-10 showed measurement invariance as a function of the group's sex. In consequence, this study replicates the data of González, Moore, Newton, and Galli (2016), who validated the CD-RISC in American population, showing measurement invariance for sex. Duong and Hurst (2016) adapted the CD-RISC to Cambodian (8KH-CD-RISC10) in adolescents, also observing factor invariance as a function of the sex with a brief 10-item version.

Some limitations of this study are worth mentioning. Firstly, the functioning of the CD-RISC was tested only in very specific samples: adolescents who have experienced vulnerable contexts. Therefore, further research is necessary in regular samples of adolescents to confirm the results obtained in this study. Secondly, criterion validity have not been tested. Further research is necessary to estimate the correlation coefficients with other measures such as coping strategies or problem solving skills. Lastly, further

research might prove the efficacy of some intervention proposals with resilience training using the existing valid instruments to date.

As general conclusion, we emphasize the instrument's importance for Colombian population. At this point, there is less than 3% of adapted and validated instruments in Colombian adolescent population, and therefore, this work fills in an important gap. However, resilience has been measured especially in Latin America as a quality or personality trait (Wagnild & Young, 1993), which has not implied great improvement for intervention or training of adolescents, as this kind of traits is assumed to be non-trainable. Understanding resilience as a process; that is, as an ability that is susceptible to be trained, is very useful to identify adolescents who need attention to improve some skills that would provide psychological balance and greater resistance in their natural contexts.

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Appendix

Brief 10-item CD-RISC Scale.

Item	En absoluto (0)	Rara vez (1)	A veces (2)	A menudo (3)	Casi siempre (4)
1. Los éxitos del pasado me dan confianza para enfrentarme con nuevos retos y dificultades	□	□	□	□	□
2. Enfrentarme a las dificultades puede hacerme más fuerte	□	□	□	□	□
3. Siempre me esfuerzo sin importar cuál pueda ser el resultado	□	□	□	□	□
4. Creo que puedo lograr mis objetivos, incluso si hay obstáculos	□	□	□	□	□
5. No me doy por vencido a pesar de que las cosas parezcan no tener solución	□	□	□	□	□
6. Creo que soy una persona fuerte cuando me enfrento a los retos y dificultades de la vida	□	□	□	□	□
7. Tengo muy claro lo que quiero en la vida	□	□	□	□	□
8. Me gustan los retos	□	□	□	□	□
9. Trabajo para conseguir mis objetivos sin importarme las dificultades que encuentro en el camino	□	□	□	□	□
10. Estoy orgulloso de mis logros	□	□	□	□	□